

Program Review

Mathematics
Portland Community College



MATHEMATICS

Fall 2014 – Fall 2018

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Chapter 1: Program/Discipline Overview:

What are the educational goals or objectives of this program/discipline? How do these compare with national or professional program/discipline trends or guidelines? Have they changed since the last review, or are they expected to change in the next five years?

As with any undergraduate or developmental education Department, the primary goal of the faculty in the Math SAC can be summarized as follows: we hope to support students' life goals by imparting the skills and cognitive abilities necessary for continued success as they navigate their way through the education system and into the workforce. The above has not changed since the last program review.

Over the last five years, the Math SAC has spent thousands of hours researching and successfully employing and taking to scale current national trends in the following major reforms: adding ALC courses and increasing tutoring across the courses we offer; creating and consistently increasing sections for alternate math pathways (MTH58/98/105); shortening math pathways (easing prerequisites for MTH243, addressing COMPASS placement tests under-placing students); and fulfilling state mandates and national trends to employ multiple measures for student placement (which rolled out Fall 2017). We expect to revise and improve these areas over the years using data-driven decision-making as we refine these new components of our role in the college. These changes have not come easily. But through the efforts of our SAC, we have significantly improved the student experience and been leaders in the state and in the nation.

Of particular note, the Math SAC has dedicated itself to help students alleviate the high cost of college. Despite discouragement from many directions, over the last five years, the Math SAC has written and adopted OER textbooks and lab manuals in many math courses with plans to adopt more and is successfully phasing out graphing calculators in exchange for free online graphing software. More WeBWork course sets were completed so more students can avoid the cost of online homework systems. Working with IT, servers were established to support WeBWork, and with the support of the Distance Learning office, WeBWork has been integrated into D2L Brightspace with direct login and grade pass-back. These efforts have impacted thousands of students. OER's are a major focus for our future as we work to add more OER's to more courses in the years to come.

Finally, equitable student success has become a focus in the nation's higher education institutions, and the Math SAC is embracing it. Over the years, the SAC has devoted more and more time to discussing equity and diversity issues, and providing training. In the 2018-2019 academic year, the Math SAC will

devote seven hours spread through our four SAC meeting times dedicated to diversity and equity training. We expect this work to continue.

Briefly describe curricular, instructional, or other changes that were made as a result of your SAC's recommendations in the last program review and/or the administrative response. (*The administrative response can be found opposite your SAC's listing at the web page where the Program Reviews are posted – look for the "AR" pdf.*) Note: Any changes NOT made as a result of the last program review should be described in the appropriate section elsewhere in this template.

Administrative response on curriculum alignment between levels and sections: The DOIs strongly support the focus on these ongoing efforts and encourage the Math Leaders in the SAC and on each campus to continue this work.

During the past 5 years, Math SAC made a series of changes in the curriculum to better serve students. In particular, the MTH60/65/95 CCOG committees enacted major curricular changes and adopted an in-house OER textbook and an online homework system, both authored by PCC's math faculties. Having these resources in-house will allow us the flexibility to alter curriculum and tailor instruction to our changing needs since we can now alter resources accordingly.

The MTH243 CCOG committee changed the prerequisite to allow more students to take the class. Some content was removed from the CCOG and a focus on increasing pass rates has altered the content of the course significantly.

The MTH65 placement policy was changed to allow students to be directly placed into the course, and the same change was established for MTH98. This was done to align courses across the STEM and non-STEM pathways.

The ALC curriculum has aligned across the district, and the number of sections offered has increased.

Administrative response on professional development aimed at creating more active learning environments: Real world examples and problems, group work, Think-Pair-Share, exploration of POGIL techniques should be explored. The DOIs strongly support and encourage these ongoing efforts.

Instructors continue to inject current real-world examples into their courses and employed POGIL, group work and other techniques, and sharing these successes is a regular agenda item during SAC Meetings as

well as conference topics at ORMATYC and AMATYC. An increasing number of Instructors are working to employ the “flipped” model and early results show increased pass rates. We expect these innovations to continue and increase.

MTH58/98 Development

The development of the Math Literacy Pathway began with an NSF grant proposal in 2013-2014 to get funding to create an alternative math pathway for students not needing the traditional algebra sequence for their degrees. When the proposal came to a halt, we moved forward in creating a steering committee to create the pathway based on the grant research we did on best practices for addressing the needs of these students. The MTH58/98 sequence was the end result of that work.

We have gone through several evolutions of these courses since their inception in Fall 2014. Initially, the MTH58 course was linked with a CG study skills course that was developed with the cooperation of the CG and MTH departments. The link was dropped after the second year when we found programs were avoiding the courses because they did not want to add more credits to the already full requirements, and it was becoming increasingly difficult to find ideal staffing pairs for the CG 58 and MTH 58 courses.

Many of the changes that have occurred in the Math Literacy Pathways have been in an attempt to give our students more access to complete their math requirements successfully. MTH 58 has been accepted as a math competency course, MTH 98 has been accepted as a pre-requisite for MTH 105 and MTH 243, and most recently, students can now be placed into MTH 98 directly without having to take MTH 58 first. We are continuing to make changes in the curriculum for both MTH 58 and MTH 98. We hope to ensure more success for our students in their math requirements.

Our biggest challenge has been getting buy-in from the various programs and departments who have a math requirement. Since we created this pathway, we have been reaching out to CTE programs, degrees and certificates, advising, individual departments, among others to create an understanding of the content of these courses, the teaching philosophy behind them, the students they are intended for, and their place in the general scheme of the mathematics we offer. We need to continue to educate the PCC stakeholders in ensuring our students get the math background they need to pursue their academic goals successfully.

Administrative response on training on diversity and cultural competence: The DOIs support this work and encourage and Math SAC and Leaders to expand these efforts.

Promoting diversity has become part of the normal culture within the Math SAC. This is true in many venues – during SAC meetings; as part of professional development within the college and from outside the college; as part of face-to-face conversations in the office; and as a focus for conversation in the classroom with students. In addition, the Math SAC will implement two projects in 2018-2019 school year to promote diversity: PCC Math Says YESS and Math: A Problems and Solutions Manual. Members of the Math SAC are well-represented in the efforts put forward by the college.

As a response to this focus on self-education and improvement over the past years, Instructors are improving their teaching to meet the increasing awareness of the needs of our diverse student and faculty population.

Administrative response on improved oversight of online courses: The DOIs support the involvement of math faculty, representing the Math SAC, being engaged and consulted in these discussions and pilots going forward.

The online environment is constantly changing and presents instructors and students with new opportunities and obstacles each year. In response to the unique needs of online instruction, over the past five years, math faculty members, Rebecca Ross and Carl Yao joined the PCC's Online Learning Advisory Committee, advising the Committee about the specific obstacles and needs of online math courses and their Instructors and students. In addition, Ann Cary was established as the Distance Learning Liaison, working to help instructors improve their courses. Regular district-wide instructor meetings have begun to discuss alignment and improve teaching methods and policies. In addition, course review materials specific to online courses were adopted and are employed during regular faculty review, which have increased in number since the college adopted multi-year contracts for part-time faculty.

Since MTH courses first went online, many significant advances have been made with technology and what we understand about pedagogical best practices and the needs of online MTH students. Collaborative efforts were made by a number of MTH faculty to create updated, sharable course shells for almost all of our currently-offered online courses. Additionally, a number of new courses were added to our online offerings. These new and revised course shells provide a rich variety of learning opportunities for students; they provide students with both video and text learning resources/activities, utilize online homework platforms, provide frequent, rich instructor feedback, create opportunities for instructor-student and student-student interaction, and meet current accessibility guidelines.

Additionally, a number of faculty completed the required training in order to begin teaching online. The newly developed courses, revised courses, and newly-trained faculty are outlined below.

New online courses (with fully-funded course developments):

Course Number	Developer(s)	Date Reviewed
MTH 76	Jeff Pettit	08-20-2014
MTH 105	Bernards, Redmond	03-15-2018
MTH 251	Austina Fong	12-11-2015
MTH 252	Austina Fong	12-12-2016
MTH 253	Austina Fong, Damien Adams	In progress
MTH 254	Noah Dear, Dennis Reynolds	In progress

Course revisions/ re-development of existing courses (with partial or full funding):

Course Number	Developer(s)	Date Reviewed
MTH 60	Ann Cary, Scot Leavitt, Stephanie Yurasits	09-22-2017
MTH 65	Ann Cary, Scot Leavitt, Stephanie Yurasits	06-01-2018
MTH 70	Michele Marden	06-08-2017
MTH 95	Emily Nelson	09-10-2018
MTH 111	Jessica Bernards	02-20-2017
MTH 111	Greta Swanson	03-22-2018
MTH 112	Wendy Fresh	01-09-2018
MTH 243	Jennifer Ward	12-13-2017
MTH 244	Jennifer Ward	03-22-2018

Administrative response on establishing formal mentoring relationships with new part-time faculty: The DOIs support these efforts and will continue to work with POD, TLCs and other Departments to further these efforts. We strongly encourage further development these to engage and support part-time faculty.

To support part-time faculty, the Math SAC uses Google Drive to share teaching materials for all math courses. SAC minutes are now accessible on SPACES, and guidelines for communicating and voting via email have been established in the SAC By-Laws. Sylvania campus is continuing with its Level Team support structure. Rock Creek campus is working to re-arrange full-time and part-time office space to increase interaction between faculty. Southeast Campus started the Course Lead support structure. Online faculty meet to address common concerns and best-practices. Faculty Department Chairs continue to refine new-hire orientation material. Oversight for new Dual Credit Instructors has been moved away from full-time faculty to off-campus part-time faculty, an issue the Math SAC remains very concerned about.

Although our faculty pool has shrunk with falling enrollment as well as losses due to placement reform, having fewer new-hires has not slowed the continued efforts to update orientation and solidify access to resources for new part-time hires.

Administrative response on strengthening liaison relationships with advising and other student services: The DOIs strongly support improved communication with students about the importance of placement testing and improved availability of online and on-campus review and preparation resources. Continued dialogue between faculty, instructional leaders, and student services are essential in making these process improvements meaningful and widely understood.

The now-defunct COMPASS placement system often placed students in lower-level math courses based on a snap-shot of their remembered math skills. Most students skipped the review and directly took the placement test. They wasted time and money and prolonging their time in college extending graduation time and reducing their chances of graduating. PCC recognized this problem and reformed the placement system employing multiple measures: performance in high school math courses, high school GPA, math courses taken at other colleges, and at-home access to ALEKS (an artificially intelligent skills review and skills-assessment tool). Math faculty worked with advising and other disciplines to develop the current placement system and designate “placement zones” to help identify which students need the most involvement from advising. We worked with advising and other disciplines to design rubrics for advisors; these rubrics are currently being used across the district to help advisors guide students with the lowest placement.

The new multiple measure placement process has helped students prepare for the placement skills exam. Previously, there was an extensive need to communicate with students regarding skill review

online and on-campus and preparation resources prior to testing. With the new placement system, students placed using ALEKS technology are provided relevant review material immediately following their ALEKS assessment. Students can then take the test again, having reviewed material they likely learned previously but forgot. PCC, in collaboration with the placement committee (including math faculty), created a new placement website to aid students with proper information and placement: <https://www.pcc.edu/resources/testing/placement/>

A new website was created to help advisors and students determine a student's best precollege level math path, "What's your math path" which can be found here:

<https://www.pcc.edu/advising/math/>

The math SAC actively worked to strengthen the relationship and information sharing during the creation of new courses and paths, such as the MTH 58 – 98 track and the expansion and re-design of the ALC courses. SAC faculty members met multiple times (and continue to meet both formally and informally) to improve pathways and placement into and between them. Examples of this include visits to the testing center at the beginning of the new placement roll-out as well as speaking at both district- and campus-level advising meetings. Inter-department relationships have been strengthened and information is shared more smoothly between all parties

Administrative response on major curriculum revisions: The DOIs suggest the SAC continue to explore existing curricula under development, such as Statway, Quantway, and the work of the Dana Center, to assess whether there are appropriate models that could be readily adapted to PCC, rather than developed from scratch and requiring a large investment of resources. The Math SACs Pre-College Committee is an appropriate place to continue this work of research, revisions, and recommendations.

The Math SAC did not follow the administrative response to adopt developed curricula but instead invested resources to develop materials and resources from scratch. The result is the development and adoption of the ORCCA (Open Resource for Community College Algebra) textbook adopted for all face-to-face (and optionally for online) MTH 60, 65, and 70 courses. ORCCA has also been developed for MTH 95 and is being piloted for some face-to-face and online MTH 95 courses. WeBWork has been developed and implemented as both a static homework set for ORCCA as well as a dynamic online homework platform for a broad range of math courses and courses for other disciplines at PCC. WeBWork's online component began with a handful of Math courses a few years ago to ninety-six Math courses for Fall 2018, spanning homework sets for MTH 20, 60, 65, 70, 95, 111, 243, 253, and 261

In addition to the curriculum developed and continuing to be developed in-house, we have piloted and adopted other curricular changes and OER textbooks. The external textbooks have had their own obstacles, including obstacles associated with adopted publisher materials. However, the Math SAC supports continued efforts by its members to experiment with new curriculum and textbooks including support to use publisher resources for instructors that wish to use them.

Administrative response on computer classrooms and smartboards: The DOIs support your recommendation that students on all campuses have access to equitable equipment and resources, similar classroom experiences, and equal opportunity for success. Please continue to work with your division deans and DOIs to improve classroom resources across the college. The same applies to equitable access to tutoring and academic support, including ALC classes.

The Math SAC has seen improvement with technology resources but struggles from campus to campus to achieve equal resources for students and instructors. Since the Math SAC is continuing its phase-out of TI and Casio graphing calculators and replacement with Desmos.com and GeoGebra.org, some campuses are still better equipped than others. Facilities, IT, campus libraries, Student Resource Centers, computer labs and other departments have supported the efforts of the Math SAC to improve students' access to technology, classrooms and instructors. However, funding is not balanced between campuses to achieve the recommendation from Administration. The budget decisions to achieve this shared goal are largely outside the realm of the Math SAC.

Some campuses have expanded ALC courses; some have not. ALC classes are being offered at Sylvania, Cascade and Rock Creek. The greatest increase is at Rock Creek, which is due in part to the large number of computer classrooms Rock Creek has. Southeast currently does not offer ALC courses. A combination of increased funding and increased advertising to students (from instructors, advisors and from the College overall) might improve the success of ALC courses.

Administrative response on CG classes, Study Skills and Liaison with Student Services: A new CG course combining study skills, mitigation of math anxiety, and career exploration in CTE and STEM is a creative idea to be taken up by the CG SAC. This is an idea definitely worth pursuing while other work strengthening the connections between the Math SAC and student services is ongoing.

MTH58/98 faculty worked together with CG faculty to create a study skills course, which MTH58 students were required to co-register for. The co-requisite encountered obstacles and was eventually removed as a co-requisite. The obstacles included differences in student populations (MTH58 students were taking the course not by choice but by requirement which until that point was uncommon for CG courses) and unintended consequences (for example, if a student passed MTH58 but not the CG co-requisite, the CG co-requisite became an unintended barrier to completing MTH58).

The Math SAC has not pursued course development by the CG SAC beyond the current courses that have been developed.

Chapter 2: Outcomes and Assessment: Reflect on learning outcomes and assessment, teaching methodologies, and content in order to improve the quality of teaching, learning and student success.

Course-Level Outcomes: The college has an expectation that course outcomes, as listed in the CCOG, are both assessable and assessed, with the intent that SACs will collaborate to develop a shared vision for course-level learning outcomes.

Math SAC's Documentation Standards Statement

There has been some confusion on how important using standardized math notation is in PCC's math classes. In 2016, the Math SAC issued the following statement:

It is the philosophy of the Portland Community College Mathematics Subject Area Committee (PCC Math SAC) that it is important for students to learn how to communicate mathematics using standardized notation, as this is part of the educational process. We believe that when students are able to effectively use mathematical notation to compose meaningful mathematical statements, it is reflective of a deeper understanding of the mathematical concepts being described. Also, an understanding of math concepts and language includes the comprehension of math symbols and implementing their standard usage and format in communicating deductive mathematical reasoning. Finally, the importance of reading, writing and understanding the language of mathematics helps students communicate in the STEM fields. Consequently, the PCC Math SAC has adopted "documentation standards" for many of our courses. These standards are intended to help students learn how to communicate mathematics effectively, which we believe will empower students to be successful in current and future coursework.

Formatting in Math

At the May 25, 2017 Mathematics SAC meeting, Bill Diss had a break out session on the importance of formatting in mathematics. Many of the attendees had also served on the Statement of Documentation Standards Committee, chaired by Amy Cakebread. This committee had come up with a statement in 2016 to assist instructors working in the Dual Credit program and to assist PCC's math faculty. The following items were discussed at the May meeting:

- The writing of a mathematical problem is similar to writing a paper. All steps are important just as every sentence is important in a paper. The final step is just part of the problem just as the final sentence in a paper is just part of the paper.
- The use of equal signs should be clarified with students. Many students use equal signs when the statements are not mathematically equivalent.
- Problems should be worked in a vertical fashion with one equal sign on a line. When there is only one statement on a line, it is easier to find errors than if multiple statements and multiple equal signs are on one line.
- Documents currently exist on the mathematics page for PCC and the notation standards should be highlighted for teachers and students.
- More consistency between Instructors is desired so that students can see the importance of formatting and notation as they go between different math classes.
- Proper use of notation and formatting should be part of the grade on a problem.

“Closed Book, No-Notes” SAC Discussion

During the October 2016 SAC meeting, a break out session was held to discuss the meaning of the phrase “closed book, no-notes exams” which is a phrase in many of our CCOGs. It had been observed by multiple faculty members that some instructors interpreted this instruction in a strict sense whereas others interpreted it to mean that only part of the exam had to be no-notes or that a 3x5 card didn’t count as notes. During the breakout session, about 20 math instructors discussed and wrote a more specific definition of this phrase:

“Closed book, no-note exams” are defined by the Math SAC as exams that are entirely closed to assistance from books (or other similar references) and entirely closed to any student notes. This includes, but is not limited to, items such as “a single sheet of notes” or “an index card” on any part of a closed-book, no-notes exam. Instructors may only provide students with a SAC-approved “formula” or “conversion” sheet during the exam, if such a sheet is referenced in a CCOG.

When the work group returned to the SAC meeting and presented this definition, it was approved by the SAC. During the discussion prior to the vote, it became clear that there was still some concern about how many exams this would apply to and what percentage of the grade for each course these types of

exams would make up. It was recommended that CCOG committees discuss the exam policy for each individual class and make these things clear within the CCOG when they make updates in the future.

Math SAC work with the Discipline Subject Area Committee 2017-2018

EAC/LAC work group and Academic Affairs considered issues regarding PCC's Core Outcomes and program assessment. The College has not effectively measured whether or not students "get" all of the Core Outcomes as they work on their degrees and certificates. The work group has developed a framework (adapted from AAC&U's Multi-State Collaborative to Advance Learning Assessment project) to reconsider PCC's Core Outcomes while addressing concerns about assessing student learning at the Degree/Certificate level. The framework's basic goal is to develop a shared rubric for each Transfer Degree Subject Area which can be used to score student work from any General Education course in that Subject Area. This means that for every General Education Math course (roughly all of the Math SAC's 100- and 200-level courses), the instructor would need to assign coursework which can be scored using the same rubric as work from our fellow disciplines in the Science and Computer Science.

In Fall 2017, Academic Affairs called for a Math SAC volunteer to help develop and pilot the rubric. At the Fall 2017 Math SAC meeting, math faculty voiced concerns about this process including:

- "It would be challenging for [Science, Computer Science, and Math] to have a common outcome."
- "No funding is available to support math faculty developing capacity for rubric-based assignment development." (Math SAC Minutes Fall 2017)

At that time, no one volunteered to represent the Math SAC during work on the rubric. Near the end of Fall 2017, Ralf Youtz volunteered.

During Winter and Spring 2018, Youtz worked with the Discipline Subject Area Committee (DSAC) for the Science, Computer Science, and Math Subject Area on developing the rubric for College-wide assessment of a new Discipline-Subject-Area-specific Core Outcome. Kendra Cawley (Dean of Academic Affairs) and Jamee Kristen (RC FT Sociology FDC and LAC member) led the DSAC's work.

As work progressed, Youtz worked to gather Math SAC members' ideas, questions, and concerns about the framework. Some of which have been paraphrased below to capture common questions:

- How challenging will this assessment process be for part-time and full-time faculty to incorporate into our work?
- How will part-time faculty be supported with time and pay to adapt their teaching practices to the framework?
- How will the Math SAC be able to use these assessment data for improving individual instructor's practices, CCOGs, department practices, and SAC policies?
- Has this framework been created using an equity lens?
- How will these assessment data lead to support for curricular or pedagogical development?
- How do we incorporate the new Core Outcome for our Subject Area into Math SAC CCOGs? Into course outcomes?
- What are the systems of accountability?

Next, some specific responses to the framework and the shared rubric's possible effects on math faculty work:

- "[If] we keep to traditional teaching, should rubric adjust to us? Or should we adjust to the rubric because it [requires] deeper/better learning?"
- "If math faculty are held to this rubric, it would drive substantial change for curriculum which would likely change our teaching. How to get to this place is unknown."
- "Looking good! My mental gears are working. I believe this will work easily for my Project assignments and I imagine this will encourage us all to create new assignments and alter current assignments in a positive direction."
- "Meaningful rubric-based assessment of outcomes [is a] great idea! Useful for well-trained instructors, [but] useless for untrained instructors. Without capacity-building among FT and PT Faculty, nothing will happen."

Youtz shared these Math SAC questions and concerns with the DSAC on our workdays and with Academic Affairs Dean Kendra Kawley and LAC leadership. Math SAC input resulted in minor, cosmetic changes to the rubric.

At the April 2018 Math SAC meeting, Ann Cary (SY Math Dept., Curriculum Committee Chair) and Youtz updated the Math SAC on the proposed framework. Youtz shared a draft version of the assessment rubric for the Science, Computer Science, and Math Discipline Subject Area. Cary, Youtz, and the Math SAC co-chairs asked for anonymous written feedback on the proposed framework and the draft rubric. Questions and concerns about the proposed framework included:

- "Will administration go to the negotiations table and ask for faculty learning and collaboration money/time and actually address the FT workload issues and the lack of pay for PT and create the expectation for involvement/knowledge of curriculum and assessment design? If this doesn't happen, this work will remain marginalized and detested by most— and it will be hoop-jumping even if a [SAC] wanted to make it meaningful. Until there are the supports and the structure, this can't be lifted in the near term."
- "[There] doesn't seem to be a step in the 'framework' during which instructors and SACs will get feedback about how their students did on the assessment, thus allowing instructors and SACs to take steps to improve. [At] best, just a subset of the artifacts that a particular instructor (and, thus, just a subset of the artifacts from a SAC) will be scored so even if the results are shared with the SAC any analysis will only represent a subset of the SACs (and instructor's) students so it really won't tell a story about the students in the SAC's or instructor's classes. This project feels like a hoop jumping exercise to satisfy arbitrary accreditation requirements without a hint of something that's meaningful and that could help us improve student learning."
- "I'm curious what the plan is when the scores on the assessment are low and we conclude that students don't have an adequate grasp of the core outcomes? Nothing in the framework suggests how we'll 'close the loop,' and this make[s] the 'framework' very unappealing. It feels that we're just trying to check a box for the single purpose of checking a box."
- "I have trouble appreciating why all of this won't end up being a monumental expenditure of time and effort to appease the academics at the accrediting agency, but without accomplishing any real improvement to the education we provide."

- "How will this help more students come to my office hours? How will this help and empower students to succeed?"

Response to the rubric was mixed. Along with concerns about instructor support (both training and pay) required for Math SAC members to create the rubric, the assignments, and to score the assessment artifacts, questions and concerns included:

- "Where in this process are the students? Will this rubric be shared? Will it be up to the instructor for his/her class?"
- "I have no idea how this [rubric] in any meaningful/non-contrived way could be applied to a math class we currently offer. Furthermore, I have no idea, nor an example of any kind, of how this would be meaningful to faculty."
- "Has this rubric been vetted by critical race theory or whatever it is we say we do for ensuring equity lens to not further widen the success rates of marginalized students?"

Youtz raised issues of concern at the next DSAC work day, but he felt the Math SAC's ideas and concerns about the rubric had, at best, only cosmetic effects on the rubric's design. To date, none of the Math SAC's critical questions about the framework have been addressed. Once Youtz recognized that neither the framework nor the rubric would be affected by Math SAC input, he resigned from the DSAC. James Saul has stepped in to pilot the rubric.

At the May 2018 Math SAC meeting, Ralf Youtz gave another update on DSAC work, then ended his responsibility to the DSAC. Math SAC co-chairs took a straw poll asking if SAC members supported College-wide adoption of the proposed General Education and Core Outcomes Assessment framework. One sixth of SAC members voted "yes." Half voted "no." The remaining third voted "I don't know."

We close this review of Math SAC work on the framework for Core Outcomes assessment in PCC General Education courses with one thoughtful, critical Math SAC member's comment that captures both critical and emotional responses to the proposed framework from the Math SAC:

I can't imagine how FT [Math] faculty will handle such a radical change. [...] Someone needs to be thinking about how to meet faculty where we are now. Allow space for the angst. Show examples. Allow more space for the angst. Discuss what is mathematical learning and our 'teaching philos' as individuals and [as a] collective [...] within the context of PCC mission and YESS. Allow tons of space for angst. If admin have a line to be held, it is shared. Allow space for the angst. Find [money] for training. Allow space for the angst. Somewhere in this, we will move forward, but this is a HEAVY lift.

What is the SAC process for review of course outcomes in your CCOGs to ensure that they are assessable?

The Math SAC assigned this task to CCOG committees. All CCOG committee Chairs and members are aware that course outcomes must be assessable and examined outcomes to make sure they were assessable, and if not, outcomes were modified to be assessable. After the initial review and “overhaul,” any subsequent changes to the CCOG in following years are made at the subcommittee level. During that time, the subcommittee reviews changes to make sure outcomes are assessable. After this process, the SAC approves changes and sends changes to CourseLeaf. After years of emphasis on this, the Math SAC has become accustomed to examining outcomes and their ability to be assessed as part of the normal process.

Identify and give examples of changes made in instruction, to improve students' attainment of course outcomes or outcomes of requisite course sequences (such as are found in in MTH, WR, ESOL, BI, etc.), that were made based on the results of assessment of student learning.

Some examples include: creating a lab component for MTH 252 similar to the lab component in MTH 251; revamping evaluation of concepts within exams to allow students to be assessed on exams without having to purchase a graphing calculator; creating videos embedded within WeBWorK and ORCCA and linking and organizing WeBWorK problems to the videos; ... these and other examples were begun through examining student need with a focus on accurate assessment and took considerable time and effort on the part of part-time and full-time faculty to organize new material and training. The SAC has been very support of these efforts to improve our instruction.

Addressing College Core Outcomes

Update the Core Outcomes Mapping Matrix. <http://www.pcc.edu/resources/academic/core-outcomes/mapping-index.html> For each course, choose the appropriate Mapping Level Indicator (0-4) to match faculty expectations for the Core Outcome for passing students. (You can copy from the website and paste into either a Word or Excel document to do this update, and embed it in your report or provide as an appendix. Or, you may send the revised matrix to Susan Wilson, swilson@pcc.edu, in advance of your program review due date so she can update the web page; then, you can insert a link to the web page in the body of your report).

Course #	Course Name	CO1	CO2	CO3	CO4	CO5	CO6
MTH 20	Basic Math	2	0	3	0	3	3
MTH 25C	Fractions	2	0	3	0	3	3
MTH 26C	Decimals	2	0	3	0	3	3
MTH 30	Business Mathematics	2	0	3	0	3	3
MTH 58	Math Literacy I	3	2	4	2	2	3
MTH 60	Introductory Algebra – 1st term	2	0	3	0	3	3
MTH 61	Introductory Algebra – Part I	2	0	3	0	3	3
MTH 62	Introductory Algebra – Part II	2	0	3	0	3	3
MTH 63	Introductory Algebra – Part III	2	0	3	0	3	3
MTH 65	Introductory Algebra – 2nd term	2	0	3	0	3	3
MTH 76	Introduction to GeoGebra	2	0	3	0	2	1
MTH 70	Review of Intro Algebra	2	0	3	0	3	3
MTH 84	Introduction to LaTeX	3	0	4	0	0	1
MTH 93	Intro to Graphing Calculators	1	0	1	0	2	1
MTH 95	Intermediate Algebra	2	0	3	0	3	3
MTH 98	Math Literacy II	3	2	4	2	2	3
MTH 105	Explorations in Mathematics	2	0	3	0	2	2

Course #	Course Name	CO1	CO2	CO3	CO4	CO5	CO6
MTH 111	College Algebra	2	0	3	0	3	3
MTH 112	Elementary Functions	2	0	3	0	3	3
MTH 211	Foundations of Elementary Math I	3	0	3	0	3	2
MTH 212	Foundations of Elementary Math II	3	0	3	0	3	2
MTH 213	Foundations of Elementary Math III	3	0	3	0	3	2
MTH 241	Calculus for Mgt and Life/Soc Sciences	2	0	3	0	2	1
MTH 243	Statistics I	3	1	4	0	3	3
MTH 244	Statistics II	3	1	4	0	3	3
MTH 251	Calculus I	2	0	3	0	3	2
MTH 252	Calculus II	2	0	3	0	3	2
MTH 253	Calculus III	2	0	3	0	3	2
MTH 254	Vector Calculus I	2	0	3	0	3	2
MTH 256	Differential Equations	2	0	3	0	3	1
MTH 261	Applied Linear Algebra	2	0	3	0	3	2

Assessment of Core Outcomes (LDC) or Degree and Certificate (CTE) Outcomes.

Reflecting on the last five years of assessment, provide a brief summary of one or two of your best assessment projects, highlighting efforts made to improve students' attainment of the Core Outcomes (LDC-DE disciplines) or Degree and Certificate Outcomes (CTE programs). (If including any summary data in the report or an appendix, be sure to redact all student identifiers.)

Academic Year 2015-16

Math Learning Assessment Subcommittee (MTH LAS) Project and Work Executive Summary

Assessment Theme & Goal: We chose the potential new Core Outcome of Quantitative Literacy (QL): The vital ability to understand, communicate, and engage with the mathematical content of real-world problems and modern data-driven information settings. We investigated student achievement of QL via learning retention of prerequisite math skills considered crucial for success in select coursework areas. Our larger goal: To evaluate our DE math program effectiveness in promoting student readiness, success and completion along QL-dependent academic paths.

Accomplishments: In collaboration with CTE (Automotive & Machining), we completed a SAC-wide assessment of retained crucial prerequisite math skill learning, using faculty- selected success benchmarks. In nearly every case, students were unable to demonstrate working retention of these crucial skills at minimally acceptable levels. This evidence was statistically significant. In every case, increasing the assessment depth further revealed a consistently lowering success trend.

Going Forward: Our findings suggested our students may significantly benefit from targeted interventions designed to address the identified math weaknesses. In doing so, our SAC will improve success and completion and will better support QL achievement. Results were formally presented to the Math SAC. They were also forwarded to stakeholder subcommittee Chairs (MTH 20, 58) so these leaders could evaluate findings and pursue any desired course and/or program changes accordingly.

For our MTH LAS work in 2015-16, the Math SAC received the highly coveted Certificate of Recognition for Exemplary Assessment of Student Learning, awarded jointly by the PCC Learning Assessment Council and the Dean of Academic Affairs.

This 2015-16 project was one of the Math SAC's most progressive and large-scale assessment projects to date, and we considered it a stepping stone for an even more ambitious project to occur the following year. While a formal intervention action plan based on 2015-16 findings (to achieve assessment cycle loop-closure) was not pursued by the Math SAC, the MTH 20 COG subcommittee did devote meeting time to the matter in Winter 2017. Regarding the findings, the following informal action plan items were discussed:

- Search for a more contextual, activity-based textbook (ideally OER)
- Support the development of new manipulative-based learning activities
- Leverage the recent change of the MTH 20 course to 5 contact hours
- Pursue new learning connections with technology-assisted instruction

Academic Year 2016-17

Math Learning Assessment Subcommittee (MTH LAS) Project and Work Executive Summary

The MTH Learning Assessment Subcommittee completed a year-long learning assessment research project around the exploratory outcome of Quantitative Literacy. We chose the theme of STEM success and completion, focusing on the transition point between 100-level and 200-level STEM-oriented mathematics coursework. Our goal: Inform the Math SAC on whether the expected prerequisite readiness levels of these incoming students are actually supported by evidence.

Specifically: We assessed the retained learning of first-day MTH 251 (Calculus I) students, prior to any practice review, or instruction. Our topics included the top four prerequisite (MTH 111/112) concepts deemed by associated teaching faculty as most critically important to the success of students entering their courses.

In addition to MTH LAS holding regular meetings and delivering informative SAC presentations, our efforts also included the following significant elements:

- Project planning
- Paying PT faculty members for their participation
- SAC-wide polling
- Assessment instrument and rubric design
- Norming sessions
- Soliciting participation from faculty (classroom and online)
- Securing authorization from Division Deans and Administrative Assistants
- Coordinating the district-wide administration and collection of assessment
- Producing, summarizing, and analyzing high-quality data
- Using data analysis to draw appropriate inferences and conclusions
- Producing/delivering professional summary reports to the Learning Assessment Council and the Math SAC

Our project findings suggested that our entering Calculus I (MTH 251) students, who are making the vulnerable transition from 100-level to 200-level STEM-oriented mathematics coursework, are arriving very significantly under-prepared with respect to our faculty-expected prerequisite readiness levels. These results were statistically significant. Furthermore, the four areas showing

evidence of an under-prepared state corresponded exactly with those particular prerequisite (MTH 111 and MTH 112) mathematics concept and skill areas specifically identified by our MTH 251 teaching faculty as most critical to the success of students entering these courses.

MTH LAS believes these findings are highly meaningful and valuable for the Math SAC, with significant implications for all QL stakeholders concerned with the academic success and completion of our students. Our learning assessment project activity is also intended to support the improvement of teaching and learning in our academic area. As such, MTH LAS recommended the immediate development of any/all relevant actions and interventions, including potential new subcommittee formation and SAC activity, to “close the loop” in the assessment cycle regarding our assessment findings.

Our project details and findings were formally presented to the Math SAC and delivered to the PCC Learning Assessment Council.

For MTH LAS work in 2016-17: For the second year in a row, the Math SAC received the highly coveted Certificate of Recognition for Exemplary Assessment of Student Learning, awarded jointly by the PCC Learning Assessment Council and the Dean of Academic Affairs. Called a “tour de force” by the PCC Learning Assessment Council Chair, our 2016-17 learning assessment project was ground-breaking in myriad ways. It also provided optimum opportunity for launching our very first formal math intervention action plan for assessment cycle loop-closure.

This would be the first time the Math SAC formally pursued assessment cycle loop-closure to improve student learning based upon such assessment findings. To enable an appropriate on-ramp for this activity, the 2016-17 MTH LAS immediately requested permission from the Learning Assessment Council and the Dean of Academic Affairs, to dedicate the following full academic year to achieving this outcome. This permission was granted. The 2016-17 MTH LAS next initiated the formation of an Action Team for the following year. The Action Team dedicated themselves to crafting and implementing a formal intervention action plan. The Math SAC further committed to subsequently reassess student learning in those areas selected in the upcoming intervention action plan, to examine if such intervention produced the desired improvement of student learning in those same areas.

Academic Year 2017-18

This year, instead of starting a new assessment project, the PCC Math Department chose to create an action committee in order to close the assessment loop on the work done during the 2016/17 assessment project. The 2016/17 report focused on the mathematical readiness of incoming MTH 251 (Calculus 1) students. The goal of the action committee was to produce an intervention to address deficiencies that were discovered about these students.

The action committee looked to try some new ways to make improvements for student learning based on our discoveries from the previous school year. We began by looking at the 2016/17 LAS Assessment Report. The target audience for the report was all enrolled PCC students immediately entering MTH 251, prior to any formal review practice or instruction in the course. They focused on this population because students are actively making the difficult transition from 100-level to 200-level STEM-oriented mathematics coursework. Students were asked questions related to four prerequisite knowledge areas: domain and range, logarithms, composition of functions, and trigonometry involving radian measure. The overall scores were much lower than the Math SAC had anticipated.

At the Action Committee's first meeting, they developed a game plan. PCC's MTH 251 class already has a lab component with a robust lab manual written by PCC instructors. The Action Committee decided that the eventual goal would be to look into the possibility and effectiveness of adding a review to the lab model, using a similar model to the Just-in-Time Teaching Model (JiTT). The JiTT model tries to give students the ability and means to do work outside of the classroom to prepare for prerequisite materials. For the purposes of this action, the committee decided that we should choose one of the four subject areas to focus on. If the review was useful, we could look for funding in the future to expand the model. Between the first and second meetings, we did an informal survey of all PCC calculus instructors. From the informal survey, the Action Committee discovered that trigonometry involving radian measure was the subject that was the most important for our action. At the second meeting, they further broke down their strategy by looking into what the Assessment Report found that students needed for trigonometry. They broke the topic down into three detailed areas: memorization of unit circle values in radian measure; evaluation of sine, cosine, and tangent values in radian measure; and graph recognition for sine and cosine graphs.

Next, they contacted Alex Jordan, a PCC math instructor who worked on updating the most recent version of the lab manual and has extensive knowledge of content development, PreTeXt, coding, and WeBWorK. He estimated it would take approximately 14 hours of work to code the type of review that the action committee envisioned into PreTeXt, to be formatted for the lab manual, and then about ten

minutes per application problem to be coded into WeBWork. The Action Committee decided that this amount of work would require additional funding and should be a future goal. They decided to use problems and videos that were already available on MyOpenMath, with some necessary recoding, and develop a temporary version of the review to see how Calculus students responded to the JiTT model.

As stated above, the intervention focused on memorization of the unit circle in radian measure, evaluation of sine cosine and tangent in radian measure, and recognition of sine and cosine graphs. A module was created for each content area within a MyOpenMath course shell, and each module included instructional videos and a set of practice problems. Given the timeframe, they selected videos found online rather than make new videos. They previewed several videos for each content area and posted those that were engaging, aligned with PCC presentation standards, and when possible, featured people from underrepresented populations, including women and people of color. Each module included three to five algorithmically generated practice problems. The intervention may be accessed by first registering a MyOpenMath account, then Enrolling in a New Class using the course ID 32683 and Enrollment Key: LAS Action.

At the Spring 2018 SAC in-service, the action team presented the review. Next school year the LAS Assessment Committee is planning to look into the effectiveness of the review. If the review proves to be useful, the Action Committee will recommend that the SAC look for funding to create a JiTT modeled review for all four of the subject areas and integrate them into WeBWork and the existing lab manual.

Do you have evidence that the changes made were effective by having reassessed the same outcome? If so, please describe briefly.

Reassessment of the most current LAS work is planned but not yet complete. Regarding this part of the process, our SAC has found it difficult to retain consistent faculty participation from one year to the next, largely due to the time-consuming nature of the work. There have been several dedicated core members, but the amount of effort required is a large request of part-time faculty who have carried a large portion of the efforts. But groundwork is carried forward and effects are delivered to the SAC with changes occurring at the micro- and macro-level.

Evaluate your SAC's assessment cycle processes. What have you learned to improve your assessment practices and strategies?

Having a “close the loop” year is very helpful when implementing improvements.

Are there any Core Outcomes that are particularly challenging for your (LDC-DE) SAC to assess, or difficult to align and assess within your (CTE) program? If yes, please identify which ones and the challenges that exist.

No. Over the years, we have found assessing some Core Outcomes to be more relevant, but none are irrelevant or difficult.

Chapter 3: Other Instructional Issues

Please review the data for course enrollments in your subject area. Are enrollments similar to college FTE trends in general, or are they increasing or decreasing at a faster rate? What (if any) factors within control of your SAC may be influencing enrollments in your courses? What (if any) factors within control of the college may be influencing enrollments in your courses?

College-Wide FTE Students Data:

Campus	2013-14		2014-15		2015-16		2016-17		2017-18	
	FTE	Percent Change	FTE	Percent Change	FTE	Percent Change	FTE	Percent Change	FTE	Percent Change
Collegewide	27,734	-5.4%	25,886	-6.7%	23,896	-7.7%	23,384	-2.1%	22,737	-2.8%
Cascade	6,369	-7.3%	5,701	-10.5%	4,937	-13.4%	4,841	-1.9%	4,729	-2.3%
RockCreek	7,541	-5.8%	7,200	-4.5%	6,796	-5.6%	6,797	0.0%	6,767	-0.4%
Southeast	2,861	5.4%	3,015	5.4%	2,745	-9.0%	2,722	-0.8%	2,530	-7.0%
Sylvania	10,963	-6.5%	9,969	-9.1%	9,224	-7.5%	8,871	-3.8%	8,580	-3.3%
WF					194		154	-20.8%	131	-15.2%

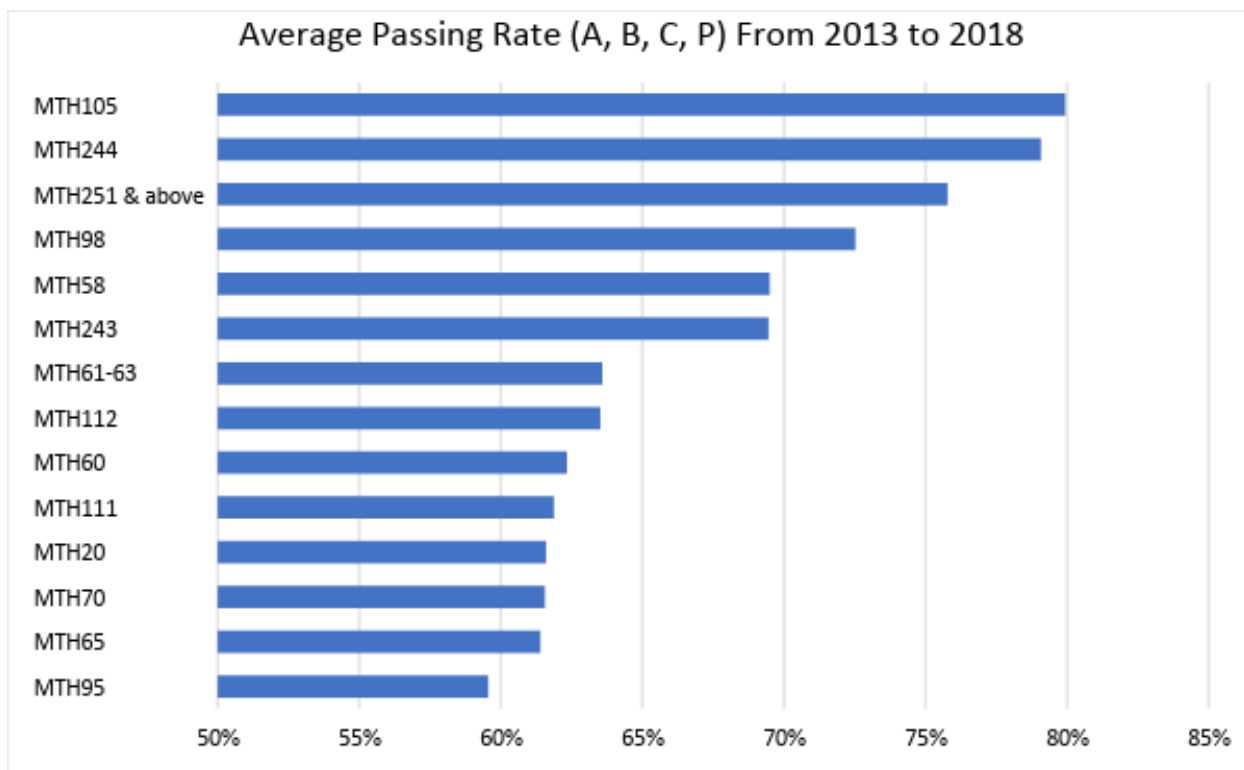
FTE Students Who Take Math Classes:

Campus	2013-14		2014-15		2015-16		2016-17		2017-18	
	FTE	Percent Change	FTE	Percent Change	FTE	Percent Change	FTE	Percent Change	FTE	Percent Change
Collegewide	4,261	-5.8%	3,868	-9.2%	3,504	-9.4%	3,349	-4.4%	2,940	-12.2%
Cascade	862	-2.8%	753	-12.5%	592	-21.4%	535	-9.6%	489	-8.8%
RockCreek	1,333	-6.4%	1,274	-4.4%	1,204	-5.5%	1,161	-3.6%	1,073	-7.5%
Southeast	629	-0.1%	619	-1.6%	582	-6.0%	607	4.3%	547	-9.9%
Sylvania	1,437	-9.2%	1,222	-15.0%	1,126	-7.8%	1,046	-7.1%	832	-20.5%

In general, the number of FTE students who take math courses has decreased faster than the number of FTE students at PCC. This is true for all campuses except SE campus.

The strongest change is seen in the 2017-2018 academic year, where the drop in enrollment is five times as large than the drop in general enrollment. This is most likely due to the success of the new placement system where students are often either being placed out of math or are placed high enough to need only one course instead of several in sequence.

Please review the grades awarded for the courses in your program. What patterns or trends do you see? Are there any courses with consistently lower pass rates than others? Why do you think this is the case, and how is your SAC addressing this?



The horizontal scale should begin at zero.

STEM vs. Non-STEM

With the exception of MTH251+ which has a high pass rate, there is a stark distinction between the pass rates of STEM courses (MTH60/61/62/63/65/70/95/111/112) which are all below 63.6% and non-STEM courses (MTH58/98/105/242/244) which are all above 69.4%. Math 20 feeds into both the STEM and non-STEM math paths.

Discontinuation of MTH 61/62/63

All campuses no longer offer MTH 61/62/63 which together are equivalent to the MTH 60/65 sequence and equivalent to the MTH 70 course. The courses are no longer offered in part because of low demand, and also because MTH 61/62/63 had similar passing rate as MTH 60/65.

More Students in MTH 58/98 Path

The Math SAC worked with Advising to help more students choose the path of MTH 58/98 instead of the traditional MTH 60/65 path. The following table shows this trend:

Number of Students Enrolled

	MTH 58	MTH 98	MTH 60	MTH 65
2014-15	345	102	6,391	5,035
2015-16	518	201	5,469	4,547
2016-17	833	278	4,321	3,741
2017-18	717	274	2,255	2,256

Note that enrollment at PCC has decreased each year, yet enrollment in MTH58/98 more than doubled since its initial offering and was not strongly impacted by the drop in math enrollment due to Placement Reform.

More Students in MTH 243/MTH 105

The passing rate of MTH 111 has been consistently low, mainly due to its difficulty. The Math SAC continues to work with Advising to help more students choose MTH 243 and MTH 105, which have higher passing rates than MTH 111. The following table shows this trend:

Number of Students Enrolled

	MTH 111	MTH 105	MTH 243
2013-14	4,797	371	2,335
2014-15	3,832	470	2,721
2015-16	3,440	467	2,831
2016-17	3,483	586	2,875
2017-18	3,774	1,007	2,990

Note that the increase in MTH 111 from 2016-17 to 2017-18 is likely a result of placement reform where PCC now accepts high school coursework to help determine placement; this change allows more students to place themselves into higher level math classes than before.

More Students into Higher-Level Math Courses

The Oregon Legislature passed House Bill 2681, recommending Oregon community colleges recognize high school grades for placement. Since then, students are generally placing into higher-level math courses, fewer are placing into lower-level math courses, and many CTE students are placing out of math courses all together. The following table shows the trend:

Number of Students Enrolled

	MTH 20	MTH 60	MTH 65	MTH 95	MTH 111
2015-16	3,138	5,469	4,547	4,460	3,440
2016-17	2,390	4,321	3,741	4,397	3,483
2017-18	1,118	2,255	2,256	4,525	3,774

The unfortunate consequence is that more students are not passing their higher math courses. placed into a class they are not ready for. As a result, passing rates dropped in almost all courses heavily influenced by the new placement system.

Passing Rate (A, B, C, P)

	MTH 20	MTH 60	MTH 65	MTH 95	MTH 111
2015-16	62.70%	67.10%	61.80%	63.10%	63.00%
2016-17	64.90%	62.60%	62.80%	59.40%	63.80%
2017-18	61.40%	59.20%	57.80%	51.80%	59.40%

The Math SAC recognizes the new development in placement and will continue to adapt to it. As a starting step, the MTH 60/65/95 CCOG Committee redesigned curriculums of those three courses. The Math SAC has also focused on support courses by increasing the number of ALC courses offered at most campuses and encouraging instructors to advertise the resource.

MTH 60/65/70/95 CCOG Redesign

We are undergoing a significant curriculum restructuring in our Developmental Ed STEM math pathway. With the creation of the math literacy sequence in 2014, MTH 60/65/95 became the math department's STEM pathway leading to MTH 111 College Algebra. The CCOG committee for these courses (and MTH 70) met during the 2014-15 academic year. They discussed restructuring the 60/65/95 sequence but decided to wait until the math literacy sequence was more established. When the CCOG committee reconvened during the 2017-18 academic year, they decided to consider a reorganization of the curriculum in the 60/65/95 sequence and put out a call to the SAC asking for suggestions, small and large. After reviewing the proposals, the committee chose to explore further a proposal which kept the content in the sequence largely the same but reorganized the content among the courses to achieve an overall theme in each course. The theme of MTH 60 would be linear equations and relationships. The

theme of MTH 65 would be math preparation for science classes. The theme of MTH 95 would be algebra preparation for college-level math courses (leading toward calculus).

The proposed reorganization of the MTH 60/65/95 curriculum had several motivations. The first motivation was to consolidate linear ideas into one class. Linear relationships in the past had been mostly covered in MTH 60, but systems of linear equations had been covered at the beginning of MTH 65. Having linear relationships split between the two classes had been awkward because it was the only linear topic in MTH 65 and only lasted for the first two weeks. The rest of the term was spent on nonlinear topics. In the redesign, MTH 60 will include systems of linear equations. With this move, all of the linear topics are covered in a single course. This change also will make covering systems of linear equations easier because instructors won't have to review graphing lines as was necessary in MTH 65. To make room for this topic, the geometry segment in MTH 60 was moved into MTH 65.

A second motivation was to restructure MTH 65 with content that would help students taking science courses that have MTH 65 as a prerequisite. Science instructors at PCC have long told us that teaching unit conversions in introductory algebra would be ideal for their courses. They loved that unit conversion was taught in the new math literacy sequence but wanted to retain an algebra prerequisite to their courses. Moving the geometry material from MTH 60 into MTH 65 fit with including unit conversions in the new restructured MTH 65. Problems involving geometry often have unit conversions within them.

A third motivation was to adjust to the change in the student population we have seen in MTH 95 since the institution of the new placement process. The new placement process at PCC uses multiple measures including high school math classes and grades to place students into PCC math courses. MTH 95 is the default placement for students who have taken and passed algebra in high school. Therefore, our MTH 95 classes are heavily populated with students who haven't taken MTH 65. A major topic in MTH 95 is rational expressions and equations. This topic requires that the students know how to factor polynomials well. Factoring has traditionally been taught in MTH 65. Many students who have placed into MTH 95 through the new system have little or no knowledge on how to factor. This has made teaching and learning to work with rational expressions and equations very difficult for both students and faculty. In the new restructured 60/65/95 sequence, the topic of factoring has been moved to MTH 95. This will help fill in the knowledge gap that is being seen in current MTH 95 students.

Moving the topic of factoring into MTH 95 from MTH 65 fit with the new themes for these restructured classes. MTH 65's theme is science preparation, and factoring is not necessary for this. MTH 95's theme is preparation for further mathematics work, and factoring is necessary for future math work in subsequent STEM math courses. To accommodate the significant shift of factoring into MTH 95, several topics from MTH 95 were moved into MTH 65. Topics moved were chosen to fit with the science theme. For instance, simplifying radical expressions was moved into MTH 65 because they involve exponents and science students should know how to work with formulas that have exponents and root expressions. Another shift was to move solving equations graphically into MTH 65 from MTH 95. Learning to read and interpret graphs is an important skill in the sciences. The restructured MTH 95 will have a unit on solving different types of equations (linear, quadratic, radical, rational, absolute value). This will better prepare students for experiencing different types of equations in later math courses.

The MTH 60/65/95 committee will ask for approval of the restructured sequence at the October SAC meeting. With its approval, the committee will work to restructure MTH 70 which has traditionally been a review of MTH 60/65.

MTH 105 Restructure

MTH 105 underwent a significant curricular restructuring to coincide with an increased state-wide alignment of MTH 105 at colleges in Oregon. During the academic year of 2013-14 many Oregon community colleges, including PCC, were considering or starting to offer a math literacy sequence in addition to their traditional algebra track. A concern arose during that year about whether a 100-level math class that had a math literacy course as its prerequisite would transfer to one of our 4-year universities in Oregon because all 100-level math classes had an intermediate algebra prerequisite. Most math literacy sequences were being designed to feed into MTH 105, a course that community colleges and universities in Oregon used as a 100-level math course for students not majoring in a science, social science or business-related field. Colleges used MTH 105 in this way, but there was little consistency in the name of the course or the curriculum of the course. During the Summer of 2014, a committee came together to propose a solution: if all of the community colleges and state universities in Oregon agreed upon a common name and curriculum for the course, then that consistency would allow Oregon universities to feel comfortable accepting transfer credits for MTH 105 from any community college, regardless of what the prerequisite of MTH 105 was. This would enable community colleges to allow math literacy and intermediate algebra to be alternative prerequisites for their MTH 105 courses and be assured of its transferability.

In September 2014, the Math SAC formed a subcommittee and appointed a SAC member to represent the PCC math program at state meetings to create a common MTH 105 curriculum. The subcommittee met to discuss the topics they felt were important to try to retain in MTH 105. PCC's version of MTH 105 had had a very open curriculum in which instructors were free to choose three topics (from a long list of approved topics) to cover during the course. The committee hoped to be able to retain some of that flexibility which highlighted Instructors' individual focuses of expertise and allowed for an enriching and enjoyable course. The state-wide meeting was held in early October. Representatives from nearly all of the state's community colleges and universities attended. Many colleges wanted MTH 105 to contain mostly statistics, probability, and personal finance topics. Some colleges wanted logic and problem solving included. Some, like PCC, wanted to retain flexibility in the content. In the end, a compromise was reached in which about 30% of the course would be statistics and probability, about 20% of the course would be logic and problem solving, about 20% of the course would relate to personal finance, and the remaining 30% would be left to the individual department to choose from a list of state appropriate topics. The state committee put together a document containing the new required curriculum in each of these topic areas and settled on a new name for MTH 105 that would be used throughout the state. MTH 105 would in the future be called "Math in Society" at Oregon community colleges and universities.

In October 2014, PCC's representative at the state meeting reported back on the recommended changes to MTH 105. Some faculty were disappointed by the rigidity of the proposed course curriculum. Others felt that the new curriculum would be a good change and were pleased that instructors were still allowed choice in 30% of the course. All were happy to hear that the state universities were on board with accepting MTH 105 transfer credits if the new curriculum was instituted. With approval from the SAC, the MTH 105 committee rewrote the CCOG to match the new state curriculum for the course. These changes were approved by the SAC in an email vote in December 2014.

In addition to changing the content and the name, the MTH 105 CCOG committee recommended that the SAC approve changing the credit load structure of MTH 105 to be more consistent with its prerequisite courses and other 100 level math courses at PCC. MTH 105 was one of the few courses in the Math SAC that hadn't changed to a 5 hour per week structure in the late 1990s when the Math SAC had a Title III grant to improve retention and success. All of the pre-college level courses controlled by the Math SAC had gone to meeting 5 hours per week with the student registering for it as a 4-credit course and instructor workload defined as 3 lecture and 2 lecture/lab credits. With the change to a more

defined curriculum with required topics, the MTH 105 committee felt that making this same change to 5 hours would give the instructors and students more in-class time with the material and allow for more group structure activities. The Math SAC approved this change in an email vote in December 2014. Ultimately the new curriculum, new course title, and credit change for MTH 105 were approved by the curriculum committee and the College in early 2015.

Once the course had been approved, the MTH 105 curriculum committee investigated and found a textbook that best fit with the curriculum change. The SAC approved its adoption Spring 2015 and it has been in use since then. In Spring 2018, a new MTH 105 committee was formed to investigate using an OER for MTH 105. They received SAC approval to work on and then pilot an OER for the course based on a free online textbook called “Math in Society” that had been written by David Lippman. During Summer 2018, the committee edited certain chapters of Lippman’s book and wrote new sections for a MTH 105 OER to fit with our MTH 105 curriculum. This new OER is being piloted by several MTH 105 courses during Fall 2018.

MTH 261 Prerequisite change and CCOG revisions

During the regular review of the MTH 261 CCOG, we revised the course content to align more closely to applications in low dimension. The subcommittee felt this made the course more in-line with a 200-level course, where previously there had been some 300-level content. Coordinating with the calculus and differential equations subcommittees, we changed the prerequisite from MTH 253 to MTH 252. The hope was to encourage students to take linear algebra earlier, so that it could be useful to more students in vector calculus and differential equations. In part because of the prerequisite change, enrollment in MTH 261 has doubled even while overall enrollment has fallen.

Changes in MTH 243 Pre-Requisite

In the past, MTH 243 required MTH 111 as a prerequisite. The low passing rate of MTH 111 acted as a barrier for students who needed to take MTH 243. The Math SAC recognized this barrier, and (after researching the potential benefits and detriments) changed the pre-requisite of MTH 243 to MTH 95 or MTH 98. MTH 243 enrollment has seen steady increased ever since. More importantly, the passing rate has been steady ever since the pre-requisite change in 2014.

	MTH 243 Enrollment	MTH 243 Passing Rate
2013-14	2,335	69.30%

2014-15	2,721	68.70%
2015-16	2,831	68.60%
2016-17	2,875	70.60%
2017-18	2,990	70.10%

Note that MTH 243 enrollment is increasing despite the decrease in college enrollment overall.

MTH 211-213 CCOG Changes

The MTH 211-213 subcommittee worked on updating and revising the CCOG’s to better reflect changes in the K-12 education system. We aligned the language with Common Core Standards and changed some of the topics to reflect more of the mathematical content in today’s schools. We also worked on aligning the courses across campuses to help students change from one instructor to the next as they move through the sequence.

Students Placing into MTH 65

Beginning in the mid-2000’s the Math SAC decided to prevent students from placing into MTH 65, because MTH 65 is the second in a two-term sequence and because students could take MTH 70 instead. Several years later, the Math SAC decided that students should again be allowed to place into MTH 65. The SAC realized that students who knew MTH 60 content, but not MTH 65 content should not take MTH 70 since MTH 70 was designed as a review course and was therefore faster-paced. When the new multiple measures placement system was put into place, it was incorrectly assumed that students could not place into MTH 65. During the 2017-18 academic year, this misunderstanding was brought to the SAC’s attention and we again formally approved students’ ability to place into MTH 65 through the new placement system.

MTH 243/244 CCOG Changes

In October 2016, the MTH 243/244 CCOG Committee reviewed the GAISE (Guidelines for Assessment and Instruction in Statistics Education) Standards and how they related to PCC CCOGs. The MTH 243/244 Committee met in December 2016 to discuss potential CCOG changes. A list of CCOG topics was moved from the required content to the CCOG’s addendum which allowed instructors more freedom with regards to what topics to cover. The committee also added topics to the required CCOG content so the University of Oregon would recognize PCC’s transferred MTH 243 credits.

MTH 20 CCOG Changes

This committee was formed in the Spring of 2016 and lasted until the Spring of 2018.

This committee's first action was to change the course name from "Basic Math" to the more inclusive and descriptive "Fundamentals of Mathematics." They also made some small changes to the course description (nothing relating to the content of the course). These were submitted to the SAC, approved in Winter 2017, and went into effect for Fall 2017.

In January 2017, Tom Songer advised the committee regarding his work as chair of the Math SAC's assessment subcommittee. They subsequently decided to look for a more contextual, activity-based textbook (ideally an OER).

In October of 2017, the committee decided to remove mode from the curriculum. It was generally considered unnecessary until later in the math course sequence.

The committee began the textbook adoption process in May of 2017. They reviewed over a dozen books and four different online homework platforms. The consensus was that there were several, equally good, publisher textbooks, and that the OER books reviewed were all lacking in significant areas. The committee had a strong preference for ALEKS as an online homework system. They ended up choosing a McGraw-Hill textbook (the 3rd edition of "Basic College Mathematics" by Miller, O'Neill, and Hyde). The OER from OpenStax, "Prealgebra" by Maracek and Anthony-Smith, was also adopted as a pilot, with hope that instructors would be able to pilot this book and work out any major issues, so that it could be widely adopted in the future.

Motions for the above items all passed at the May 2018 Math SAC meeting.

MTH 20 Activity Packet

A committee formed to look at teaching practices in developmental math and decided to focus on a resource for Math 20 instructors. The goal was to have an activity packet of ready-made activities that encourages the use of a variety of teaching methods. Committee members collected existing activities and then generated more activities for topics where no activities had yet been employed. They collaborated with Disability Services for accessibility of the packet and for tactile manipulatives to enhance learning for all students. They designed and 3D printed fraction circle pieces to go with the fraction activities. Disability Services also coded the entire packet in an accessible website that is available to students and faculty at PCC and other colleges. Funding from the special project fund allowed part-time instructors to participate and be paid for their time.

MTH 105 Activities

After learning about culturally responsive teaching, math instructor Cara Lee designed a Math 105 course as a flipped class. The students watch video lectures before class and work together in groups during class on engaging and relevant material. Using group roles helps the students have a structure for learning how to work well together. Having a classroom that is designated for groups is very important in shifting the teaching and learning norms on campus.

The first project in Math 105 is a math and identity project which encourages students to reflect on their experiences in math and set new goals. It helps instructors understand students' identities and to be aware of stereotypes students have experienced so instructors can better avoid perpetuating them. Students select a math role-model who is someone with whom they identify and who inspires them. This gives students a broader sense of who is doing math and who can do math.

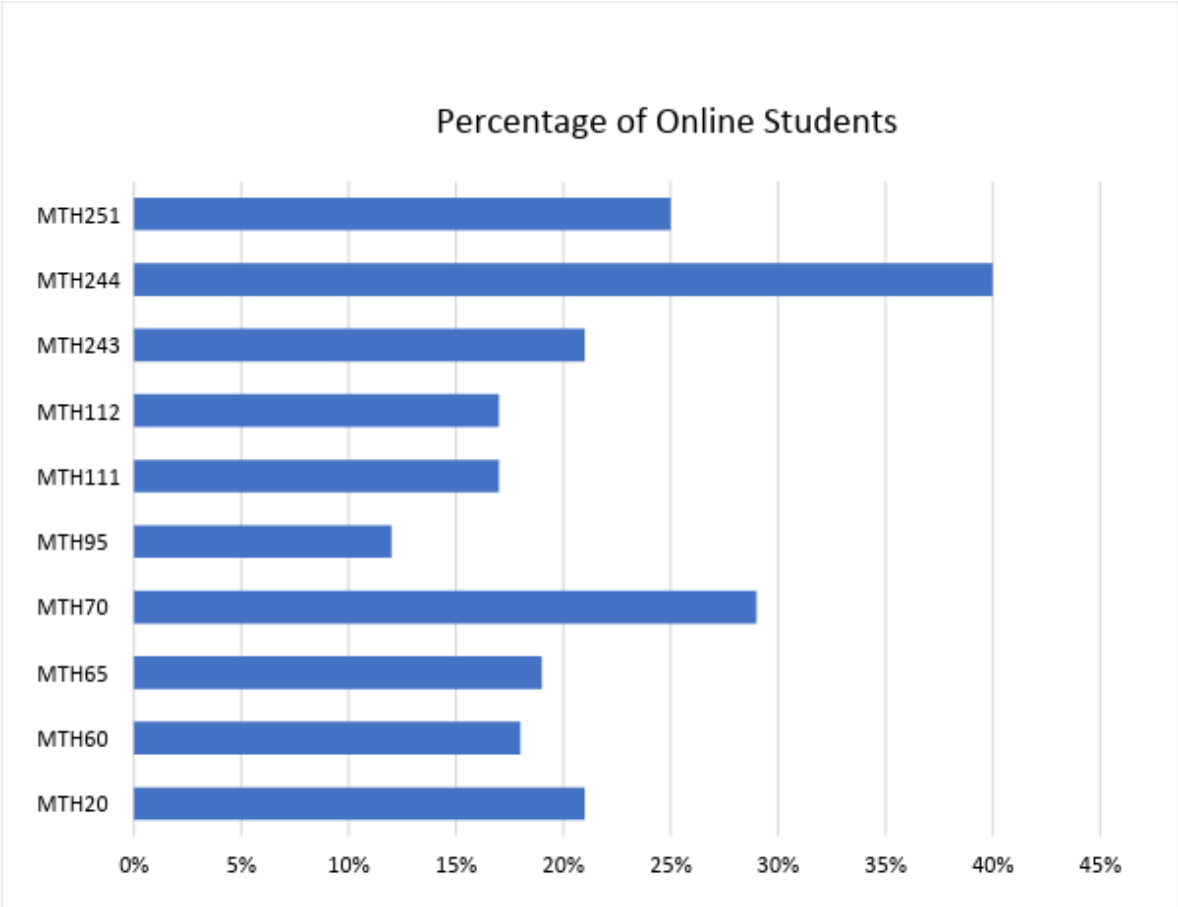
The second MTH 105 project is a campus poster presentation session where students work in groups and present their work to their peers. Students choose a topic that is relevant to them and do a quantitative analysis of the problem along with current and/or proposed solutions. In a campus event, they present their findings to students, instructors and other campus community members.

Thanks to those projects, Cara Lee received the PCC Diversity, Equity and Inclusion Faculty award for Culturally Responsive Teaching in 2018.

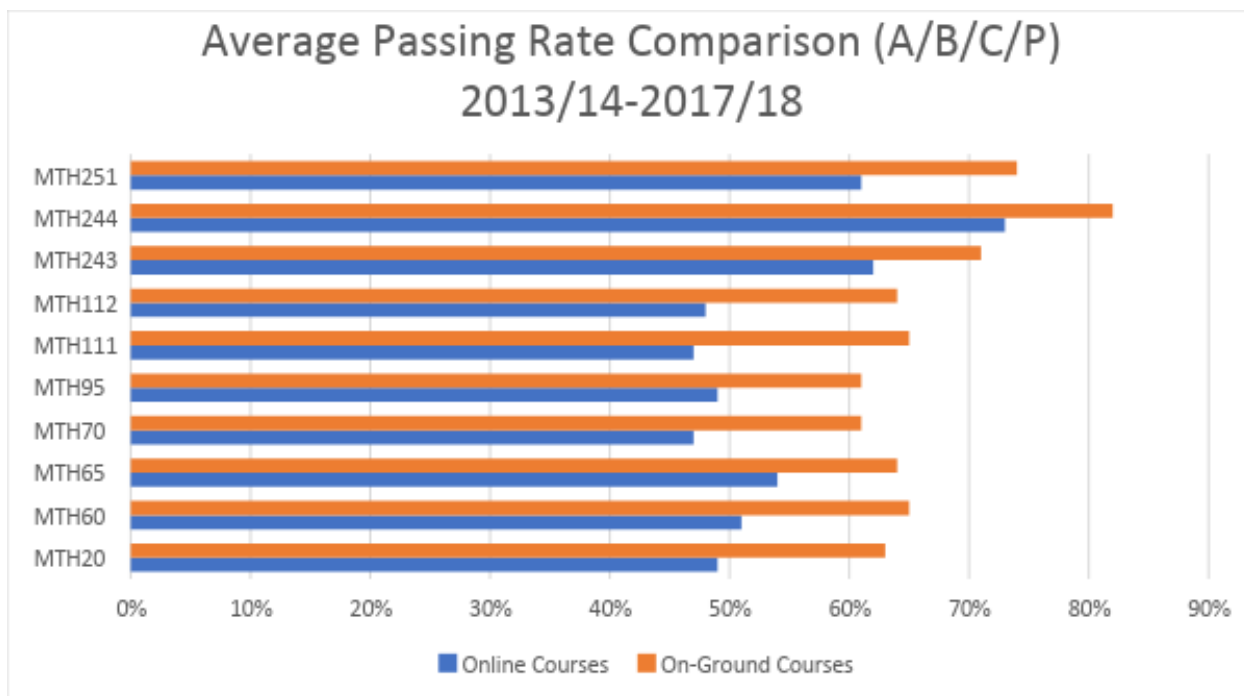
Which of your courses are offered online and what is the proportion of on-campus and online? For courses offered both via DL and on campus, are there differences in student success? If yes, describe the differences and how your SAC is addressing them.

Online education is becoming more and more popular in the nation, and PCC is not an exception. Many students must work on their degrees while managing work, family obligations, and other demands on their daytime hours. In the past 5 years, the Math SAC developed online MTH 105, MTH 251 and MTH 252 courses, and is in the process of developing MTH 253 and MTH 254.

In the past 5 years, 18% of PCC students who took math classes were online students. The following chart shows the percentage of online students in each math class:



However, the gap in pass rates between online and face-to-face courses persists in math courses across the nation, and PCC is not an exception. The following chart shows this gap:



Has the SAC made any curricular changes as a result of exploring/adopting educational initiatives (e.g., Community-Based Learning, Internationalization of the Curriculum, Inquiry-Based Learning, etc.)? If so, please describe.

HECC-funded projects for Calculus OER:

In academic year 2016- 17, the HECC funded two SAC members (Alex Jordan and Carly Vollet) to work on two Open Educational Resources for calculus. In both cases, the work was to take an existing calculus OER and convert it to PreTeXt source files thereby making these OERs more feature-rich and sustainable.

One project was Active Calculus, an inquiry-based learning calculus textbook. The calculus subcommittee lobbied administration to approve moving MTH 252 to the model of MTH 251, as a four-credit class that meets for six hours each week, with three hours being lab hours. The SAC identified Active Calculus as the possible core for a MTH 252 lab manual, following the model of the MTH 251 lab manual. Working with the author, we completed conversion of Active Calculus, and it is now the core of the MTH 252 lab manual.

Expansion of ALC Curriculum:

In September 2018 the Math SAC approved a motion for a new prefix, Alternative Learning Mathematics, (ALM). The intent of ALM is to house math department support courses, such as ALC 20/60/65/95, and to include similar courses to support College Algebra, (MTH 111) and Statistics, (MTH 243). The Math SAC also approved 1-year pilots for support courses for both MTH 243 and MTH 111. The Math SAC also approved moving the current ALC 20/60/65/95 courses to the new ALM prefix.

ALC Math offering has been extended to CA and RC campuses. Each of them is offering multiple sections at different times, making it convenient for students to fit an ALC course into their schedules. CA and RC offer also each a late-start one-credit section halfway through the term for students who discover later that they need more support. In Spring 2016, the SY administration had changed SY's flexible-time lab-style ALC Math offering to match CA's and RC's fixed-time classroom style. Around the same time, SE started reducing its ALC offerings and ultimately stopped offering ALC math support courses all together, making it necessary for students who wish to take ALC to travel to either SY or CA.

The Math SAC formed an ALC committee that made some significant changes to the descriptions and outcomes of all 8 active ALC Sections (ALC 20B, ALC 20C, ALC 60B, ALC 60C, ALC 65B, ALC 65C, ALC 95B, and ALC 95C). These changes were approved at the October 26th, 2016 SAC Meeting and then by the Curriculum Committee on December 7th.

Even though the Math SAC houses and makes decisions about all its ALC Math courses, CourseLeaf still requires the signature of the DE SAC chair. Historically, the DE SAC housed both ALC English and ALC Math. Course Leaf cannot support two SACs for one course prefix. Therefore, in February 2018 the Math SAC approved a motion for a new prefix, Alternative Learning Mathematics, ALM. The intent of ALM is to house Math SAC support courses, such as ALC 20 – 95, and to include similar courses to support college level algebra, MTH 111, and Statistics, MTH 243. Recently, the ALM prefix has been approved by the VP of Academic Affairs.

The Math SAC also approved 1-year pilots for support courses for both MTH 243 and MTH 111, and to move the current ALC 20/60/65/95 courses under the new ALM prefix. With the approval of the ALM prefix, the support courses for MTH 243 and MTH 111 are moving forward. The pilot course to support MTH 243 is currently being run as an experimental course, ALC 199.

Flipping Classroom

The type of flipped classroom where students watch videos outside of class then work on homework in class has been around for years. Some instructors have used the model at PCC, but it has not been widely used at PCC. Math SAC instructors Jessica Bernards and Wendy Fresh took this model and expanded it with activities done inside and outside of class to increase student engagement, create an inclusive classroom community, and involve students working together in an active learning environment. Their efforts and the efforts of other full-time and part-time Instructors have resulted in much higher pass rates in the MTH 111 and MTH 112 flipped classes at PCC from the 60-70% range to consistently in the 80-90% range. Jess and Wendy are currently mentoring other Math SAC instructors on flipping and hope the number of flipped classes will continue to expand.

Community Based Learning Award

During Winter term, 2017, a group of faculty from the Math, Computer Science and Sociology Departments developed a survey about housing insecurity. The project was inspired by Evicted, the Everybody Reads book for 2017, by Matthew Desmond. The survey was coded online by a Computer Science class and given to students and staff at all four campuses. The data was then given to Statistics courses in Spring 2017 to analyze. Cara Lee's classes held a poster presentation in the Great Hall at the Southeast Campus. Several students presented their posters at the CBL Banquet at the end of the year. Amy Cakebread, Ann Cary, Ralf Youtz, Emiliano Vega and Cara Lee received the Outstanding Collaborations in Community Based Learning Award for their work on this project.

Are there any courses in the program that are offered as Dual Credit at area high schools? If so, describe how the SAC develops and maintains relationships with the HS faculty in support of quality instruction.

PCC Dual Credit has had a number of new developments over the last year (2017-18) – and also for the upcoming school year (2018-19). Bret Rickman was hired as the new Math Dual Credit Liaison to begin the 2017-18 academic year to: serve as a support and accountability partner for dual credit high school teachers, be the ‘math curriculum expert’ for our PCC Dual Credit Office, and to be a direct communication link between the PCC Math SAC and our high school dual credit teachers, administration and Dual Credit Office.

A new development area for the 2017-18 academic year was the addition of Math 105 (Math in Society) classes in three of our partner high schools. Math 105 serves as a great option for high school students to receive not only college credit, but also to act as an excellent path for high school seniors to stay involved with mathematics, learn how math impacts their daily lives, and prepare for college level mathematics coursework. Not only was Math 105 added to our dual credit offerings, but the gradual upgrade to free online graphing utilities such as Desmos & GeoGebra (as specified by the PCC Math 111, 112, 251, 252 & 253 Course Curriculum Outcome Guides) began in earnest with our high school dual credit partners.

For the upcoming 2018-19 academic year, several major developments will begin. One area is the inclusion of “in house” Instructors of Record (IOR). “In house” IORs are full-time high school faculty who are concurrently PCC adjunct teachers. “In house” IORs will allow high school districts to stay within their very tight budget constraints while maintaining high-level quality standards of dual credit classroom instruction. Along with “In house” IOR’s, another major new development will be attaining NACEP (National Alliance of Concurrent Enrollment Partnerships) accreditation for our PCC Dual Credit program.

Please describe the use of Course Evaluations by your SAC. Have you created SAC-specific questions? Do you have a mechanism for sharing results of the SAC-specific questions among the members of your SAC? Has the information you have received been of use at the course/program/discipline level?

Course Evaluations are used by individual SAC members to get feedback from students and are used during 2- and 3-year faculty reviews. The SAC does not employ SAC-specific questions.

Chapter 4: Needs of Students and the Community

Have there been any changes in the demographics of the student populations you serve? If there have been changes, how have they impacted curriculum, instruction, or professional development, and, if so, in what way?

Racial, Gender and Age Breakdowns of PCC Math Students

Race/Ethnicity	2013-14		2014-15		2015-16		2016-17		2017-18	
	Headco..	% of Total	Headco..	% of Total	Headco..	% of Total	Headco..	% of Total	Headco..	% of Total
Asian	1,542	6.7%	1,493	7.2%	1,480	7.9%	1,483	8.4%	1,462	8.9%
Black	1,460	6.4%	1,285	6.2%	1,027	5.5%	944	5.4%	860	5.3%
Hispanic	2,793	12.2%	2,524	12.1%	2,286	12.2%	2,339	13.3%	2,290	14.0%
Multi	1,253	5.5%	1,290	6.2%	1,321	7.1%	1,261	7.2%	1,228	7.5%
Native	272	1.2%	244	1.2%	200	1.1%	141	0.8%	152	0.9%
Pacific	155	0.7%	144	0.7%	148	0.8%	150	0.9%	128	0.8%
Unreported	1,694	7.4%	1,495	7.2%	1,365	7.3%	1,288	7.3%	1,130	6.9%
White	13,680	59.9%	12,301	59.2%	10,897	58.2%	10,020	56.8%	9,117	55.7%
Grand Total	22,849	100.0%	20,776	100.0%	18,724	100.0%	17,626	100.0%	16,367	100.0%

Gender	2013-14		2014-15		2015-16		2016-17		2017-18	
	Headco..	% of Total H..	Headco..	% of Total H..	Headco..	% of Total H..	Headco..	% of Total H..	Headco..	% of Total H..
Female	11,706	51.2%	10,717	51.6%	9,495	50.7%	8,890	50.4%	8,249	50.4%
Male	10,905	47.7%	9,727	46.8%	8,901	47.5%	8,330	47.3%	7,581	46.3%
Unreported	238	1.0%	332	1.6%	328	1.8%	406	2.3%	537	3.3%
Grand Total	22,849	100.0%	20,776	100.0%	18,724	100.0%	17,626	100.0%	16,367	100.0%

Age Group	2013-14		2014-15		2015-16		2016-17		2017-18	
	Headco..	% of Total H..	Headco..	% of Total H..	Headco..	% of Total H..	Headco..	% of Total H..	Headco..	% of Total H..
Under 20	6,241	27.3%	6,034	29.0%	6,086	32.5%	6,193	35.1%	5,906	36.1%
20-24	6,419	28.1%	5,956	28.7%	5,310	28.4%	4,931	28.0%	4,726	28.9%
25-49	9,510	41.6%	8,245	39.7%	6,904	36.9%	6,183	35.1%	5,448	33.3%
50+	678	3.0%	539	2.6%	422	2.3%	319	1.8%	287	1.8%
Grand Total	22,848	100.0%	20,774	100.0%	18,722	100.0%	17,626	100.0%	16,367	100.0%

Women in Math

Females are generally under-represented in higher-level math courses. PCC Math faculty member, Damien Adams oversees the podcast, *Women in Math: The Limit Does Not Exist*. Each podcast focuses on promoting the visibility of women in mathematics. There are typically two types of episodes - biographies on women of the past (or present), and conversations between current students. Those

featured on the podcast have typically been students hand-picked or suggested by math faculty. Each student prepares their podcast are set up to record. Students are responsible for generating all of the material; he provides the equipment, the space, and the opportunity.

Since the podcast launched on October 26, 2016, the 28 episodes have garnered over 10,000 plays across the world. So far, all episodes have been recorded during Damien's employment at Cabrillo College, but Damien has begun recording at PCC. So far, one recording at PCC has been generated, but more are coming!

Placement Reform

When the announcement came that the COMPASS placement tool would soon no longer be available, PCC took the opportunity to examine its overall placement system to improve the student experience and increase placement accuracy. Representatives from the Math SAC joined the COMPASS Phaseout Committee. The Committee met regularly to outline each step of an ideal math placement process, formulated a placement system and an implementation plan. By the time COMPASS was no longer available, the team had completely redesigned how students were placed into math courses at PCC. Using national research on college placement and following state directives to employ multiple measures, the system is designed as follows: PCC now considers high school GPA and assumes a student has mastered their last high school math class if they passed the course within 7 years with a B- or better; it recommends students retake their most recent high school math class if they earned a C+ or less in their most recent high school math class; PCC also employs ALEKS as an at-home skills placement tool and remediation tool. With ALEKS, each student does not review and test on campus but at home in order to lower anxiety, strain, inconvenience and the inaccuracies that come with them. In addition, students can retake the placement test more often than in the past.

The placement system was calibrated to err on the side of placing students too high, with plans to calibrate the placement system more conservatively if resulting data suggests to do so. Although data is preliminary, initial results show the following: placement by high school information results in a higher chance of passing a course compared to placement by skills using ALEKS; the number of students in Math 20, 60 and 65 has dropped significantly and risen significantly in Math 95 and 111; the most encouraging result is that the number of students entering and passing Math 105 and Math 111 has increased significantly under the new placement system even as enrollment in the college continues to fall after the recession; however, pass rates in some key math courses (MTH 95 and 111) have in general

gone down, a result the placement reform team predicted might happen but had hoped would not occur. Also, although our team had hoped that the new system would be more equitable and would show a closing of the achievement gap between races, initial results show little to no improvement in the disparity between the success rates of white students in math courses compared to students of other races after the placement system was employed.

Study Skills Resource

Research has shown that students with strong study skills are more successful in their academic pursuits than their counterparts; however, many students entering developmental mathematics courses lack these skills. In an effort to help students build a stronger awareness of how a successful student studies, Math SAC member Jessica Bernards from the Rock Creek Campus created an OER Math Study Skills program to be used in our math courses. This program consists of seven topics all relating to study skills specific to mathematics: how learning math is different, resources available for help at PCC, time management, listening and note-taking skills, how to do homework, test taking strategies, and overcoming math and test anxiety. Each lesson has three parts: a short video to be watched by students outside of class, a student worksheet to be completed in conjunction with the video, and an in-class discussion led by the instructor. Additionally, each topic has quotes from successful students which help strengthen the ideas in each video.

This program has been found to effectively help with student retention and pass rates. It is now being used at over 22 colleges nationwide including PCC. The study skills resources can be found at spot.pcc.edu/mathstudyskills.

What strategies are used within the program/discipline to facilitate success for students with disabilities? If known, to what extent are your students utilizing the resources offered by Disability Services? What does the SAC see as particularly challenging in serving these students?

Improved Accessibility through OERs

An early motivation for generating OER math textbooks, calculus lab manuals, online homework platforms and other online resources arose from the Math SAC's efforts to improve screen readers. A team of math faculty discovered automated screen readers were largely inept at reading math expressions accurately. In addition, they called on vendors of published online platforms to fulfill the

accessibility requirements set forth by the federal government. Response from vendors was that accessibility was forthcoming, but delays lasted years. The result of this work done by PCC Math faculty to improve accessibility is a set of standards and practices that are followed across the nation. It was recently discovered that the work done by PCC faculty has become “the bible” for disability offices at schools across the nation.

It was largely from this work that the framework and standards for our in-house textbooks and WeBWork homework platforms was established. Our resources are written in MathML allowing in-house generated documents to be screen-read by standard screen-readers and, should the need arise, be printed in Braille, a process that would otherwise cost the college tens of thousands of dollars for publisher texts.

Course Substitution for Students with Learning Disabilities

From PCC's "Guidelines for Course Substitution on the Basis of Disability" document:

In accordance with the Rehabilitation Act of 1973, Section 504, colleges must be willing to modify academic requirements to prevent discrimination against eligible students with disabilities. Therefore, qualified students with disabilities may request that appropriate course substitutions be considered as a programmatic accommodation.

Each academic year, there are roughly 15 - 25 substitution requests submitted. Typically once a term, a committee comprised of representatives from Disability Services, a Dean of Instruction, a representative from the degree or certificate that the student is applying for, a representative from SAC that has the required course for the degree/certificate, and a representative from the SAC that has the course requested to be used for the substitution gets together to review each request on an individual basis. Since a math course is typically the course for which the substitution would be used, we have a SAC member, Scot Leavitt, who regularly represents the Math SAC's perspective on the course substitution committee.

Additionally, our SAC has done some work in conjunction with the DS office, to look for courses other than the PHL 191 (Analysis & Evaluation of Argument) which might be able to be used as a substitute for the math requirements for some degrees or certificates. Even as such a list begins to be developed, it is important to recognize that any request to substitute a course in place of a math course (whether it's PHL 191 or anything else) is evaluated on a case-by-case basis.

The appropriateness of the course substitution depends on the degree or certificate the student is applying for and the student's particular situation. It cannot be argued that simply because a particular student used a specific course for one degree that the same course could be used by another student for a different substitution request. For this reason, it has been extremely helpful to have a consistent Math SAC representative on this course substitution committee.

SAC Meeting Visit by Disability Advisor

PCC Disability Services Counselor Jennifer Margolis visited the Math SAC in 2015 and gave advice on how math faculty can help students with disabilities. She covered the following aspects:

- Disability Services overview—what our Department does to ensure that all students have equal access to their classes.
- What happens when a student comes to Disability Services. How do they qualify for services?
- How a student requests their accommodations and notifies faculty about their accommodations; what an instructor should do after receiving a Faculty Notification Letter.
- How staff can talk with students about their accommodations to ensure that everyone is in agreement for how they will be implemented.
- Liaison Accommodations: Consideration for Deadline Adjustment, Consideration for Flexibility with Attendance and Engagement, Consideration for Flexibility with Group Work. How are these different, how they are interpreted and implemented? What are Instructors' responsibilities around these accommodations?
- How to refer a student to DS, if an instructor thinks a student could benefit from accommodations.
- If you're unsure about what to do: please contact DS. They're happy to meet with instructors, students, and/or instructors and students together.

Course Replacement Options for Students with Disabilities

In 2014 the Disability Services Department formed a committee to look at revising the Guidelines for Course Substitution in accordance with the Rehabilitation Act of 1973 as a way for Portland Community College to have a more streamlined approach to course substitutions. Since most of Portland Community College's course substitutions involve mathematics, two members of the Math SAC joined

the committee. This committee formed an entirely new application form and process for course substitutions to proceed. The math department feels that the new process is well informed and fair.

Two main changes happened to the process during the committee meetings: the application form for revisions to happen was both significantly revised and vetted so that it clearly states the process and appropriate steps for a course substitution to happen; the second and more important change was that a Committee Review Session was formed. In the past, course substitutions happened at the discretion of the Math Department Chair at each campus and the process was not clear for making approvals. A committee review session is currently scheduled once per term to review pending request. The Committee includes a Dean of Instruction, the Disability Services Director, DS Practitioners, a subject area committee representative from any subjects that are named in the required or substituted course fields on the pending request, and any appropriate CTE faculty chairs. The two members of the math department SAC both felt that this change was the fairest way to implement substitutions. The Math SAC has been happy with this process since the changes have been implemented.

PreTeXt and WeBWork

Math Instructor Alex Jordan led efforts to provide math accessibility in electronic formats. When faculty only use accessible electronic materials, this supports the inclusion of a broad community of students with diagnosed and undiagnosed disabilities. Alex co-developed and advised on accessibility with both PreTeXt and WeBWork. He co-organized a week-long workshop at the American Institute of Mathematics in Spring 2018 on advancing the state of math accessibility on the web. He has worked with the Math SAC to use accessible math formats in our CCOGs and accessible materials in Spaces for our SAC documentation. He advises that additional faculty are needed to continue this work.

What strategies are used within the program/discipline to facilitate success for online students? What does the SAC see as particularly challenging in serving online students?

Online instruction is an ever-evolving environment as platforms improve and the electronic world changes. Online faculty work collaboratively and collegially to share insight and advice as well as materials and standard practices in online instruction. We work with the Distance Learning Office to uphold the standards put forth by the college and our faculty work to employ the Quality Matters rubric and we revisit SAC-level decisions regularly, specifically the Math SAC's guideline to require two

proctored exams for most math courses and our refinement of the parameters of this SAC policy. The challenges the Math SAC faces center on pass rates. Succeeding in an online class requires additional self-discipline and organization; this is even more true for online math courses. Encouraging students to employ online tutoring, seek out support from DL advisors and the Student Help Desk, and connect with classmates and teachers leads to greater success, but we still struggle to raise student success to the levels achieved in face-to-face classes.

Has feedback from students, community groups, transfer institutions, business, industry or government been used to make curriculum or instructional changes (if this has not been addressed elsewhere in this document)? If so, describe.

The Higher Education Coordinating Commission (HECC) recognizes the key role that affordability plays in student success, and that textbooks and other learning devices are a significant factor in the affordability equation. Oregon House Bill 2871, passed during the 2015 Legislative Session, provides a legislative investment in the area of textbook affordability, with a specific focus on the development of Open Educational Resources (OERs). Open Educational Resources are free and accessible teaching, learning and research resources that can be legally adapted and redistributed for students' use at low or no cost. The Math SAC understands how PCC students often struggle financially and the SAC has made significant efforts in providing OER to PCC math students and plans to continue with those efforts.

ORCCA (Open Resource Community College Algebra)

In the summer of 2016, the Board of Directors approved the funding of a large project to create an OER textbook for basic algebra from scratch, covering MTH 60, 65, and 95. The new book would be written using PreTeXt software. As an OER for the highest volume math courses at PCC, the project had the potential to save \$1.3M annually given 2015 – 16 enrollment figures. This moment came following:

- An earlier team effort by SAC members to write an OER for MTH 111
- The experience of using PreTeXt to redesign the MTH 251 lab manual
- Rejection of an NSF proposal to write a similar OER textbook while simultaneously enhancing WeBWork

With that last item, a plan was already in place to work on the book. Over the course of 2016 – 17 and 2017 – 18, seven SAC members (Ann Cary, Alex Jordan, Ross Kouzes, Scot Leavitt, Cara Lee, Carl Yao, and

Ralf Youtz) learned the ins and outs of using PreTeXt and wrote the ORCCA textbook for basic algebra. Scot Leavitt, Ann Cary, and Emily Nelson built online course shells for MTH 60, 65, and 95 that use ORCCA as the primary text. Kara Colley wrote challenge exercises at the end of most sections.

During AY 2017 – 18, 29 instructors piloted ORCCA in 64 sections of MTH 60, 65, and 95. The pilot instructors communicated to each other and to the ORCCA development team regularly, with meetings, emails, and a feedback submission form. Over the course of that year, the MTH 60 and 65 portions of the book were revised. During the Spring SAC Meeting, the ORCCA was adopted district-wide as the textbook for face-to-face sections of MTH 60 and 65. At present, ORCCA is an approved pilot for MTH 95, with ongoing feedback collection and revisions.

Perhaps the largest impact of this project is the dollar savings to students. Enrollment has fallen since 2016, more students place into MTH 111 with our new placement system, and ORCCA is not fully adopted for MTH 95. Consequently, we estimate the student savings from ORCCA adoption for 2018 – 19 will be about \$600K.

The use of PreTeXt enables a single source document to simultaneously create an ADA-accessible e-book, and a professional, print-ready pdf. The text also utilizes WeBWork, an open-source online homework platform that can create unique (but equivalent) problem sets for each student. Because the text uses a single source, the homework problems in the book correspond exactly to the online homework sets. Both of these technology features are huge assets to the sustainability of the textbook over time.

The coordinated pilot of so many instructors working together had an interesting side effect of rejuvenating general collaboration among faculty. Coming out of the pilot year, there is a new collection of shared teaching and assessment materials being shared using the Google Drive.

With ORCCA, some faculty have expressed feeling freer to try the "flipped" model classroom. This model often requires students to watch video lectures and complete assigned readings outside of class, and

use class time for collaborative problem solving. The PreTeXt eBook form of ORCCA together with its built-in videos and interactive examples are cited as a major reason faculty have pursued this effort.

Replacing Calculators with OER Graphing Technology

The Technology Use Subcommittee was formed in Fall 2014 with the primary charge of exploring if it was feasible to have students purchase tablets (equipped with free online graphing software such as Desmos or GeoGebra) instead of physical graphing calculators (primarily TI-89s and Casio Classpads). The main perceived benefit was that tablets would be a multi-function tool, something that a student could use to access their textbook, online homework, and other resources. Because tablets are wifi-enabled devices though, the primary concern was how instructors would administer exams with such devices.

After three years of discussion, exploration, and piloting, the Technology Use Subcommittee recommended the following to the MTH SAC: That students use online graphing calculators on devices they already own, and that faculty would be responsible for adapting their tests and other assessments. Although the committee was initially motivated by the fact that both Desmos and GeoGebra are free technologies, by the end of their work they felt strongly that these technologies were simply *the best to support student learning* and far surpassed commercial graphing calculators.

A visual timeline of the work of this committee is shown here:

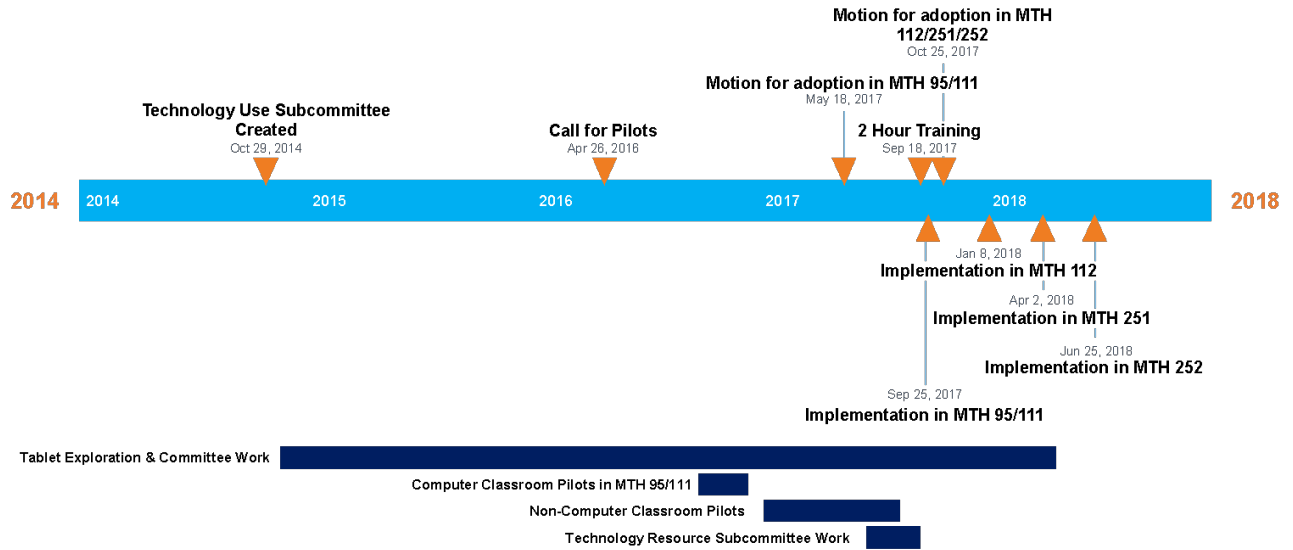


Figure 1: Timeline of Work by the Technology Use Subcommittee

Exploration:

While the initial charge of this subcommittee was to explore tablet use, they determined quickly that having students purchase a tablet instead of a graphing calculator was not a good idea. For one, IT referred to these devices as “disposables” and could not provide full support. This matched our testing of such tablets we borrowed from the bookstore (that ranged in price from \$119 to \$229). The devices were particularly difficult to use, to keep charged, and they did not seem like they would last longer than one or two years.

The committee also surveyed our colleagues in engineering and physics, whose students often complete MTH courses before enrolling in those courses. The survey’s intent was to determine the extent to which our colleagues rely on us to teach their students graphing calculator skills. Although the response rate was low, it was clear that they expect students to enter with specific math skills and instruct students in particular uses of graphing calculators themselves.

Lockdown software (similar to Lanschool, that MTH faculty use in computer classrooms to restrict internet access during assessments) was something that the committee explored in depth. While such software might have been feasible for classroom sets of tablets, there were legal issues that inhibited its feasibility for use on student-owned devices.

Knowing that we did not want to invest in individual tablets or classroom sets of tablets, and that lockdown software was not an option, we shifted our focus to this: Could we allow students to use

online graphing technology on devices they already own and adapt our assessments to account for this change in technology? We began by having a 1-hour workshop during a Fall 2015 SAC meeting called “Rethinking Technology.” Participants were divided into groups across different courses (MTH 95, 111/112, and 251+). They were given sample exam questions and asked to reconsider how else they could assess such concepts if students did not have a wifi-free graphing calculator. The general response was very positive—in short, that this wouldn’t be a very big change. Developing and rolling out pilots of this technology became the main charge of the committee from that point forward.

Pilots Using OER graphing software:

In Fall 2016, the committee ran their first, highly-controlled pilot. This pilot involved 1-2 faculty at each campus teaching MTH 111 and was done in computer classrooms using lockdown software (Lanschool). While we knew we could never scale up this exact pilot, the goal was simply to see if exclusively using Desmos and/or GeoGebra was feasible. If it was, we would then expand with further pilots. Simultaneously, we ran a single pilot in which one instructor teaching MTH 111 did not use lockdown software or a computer classroom. Both of these pilots went very well, and in Spring 2017 we had about twelve faculty run pilots in MTH 111 in non-computer classrooms that involved having students use their own wifi-enabled devices and faculty adapt their exams.

At the end of this pilot, students who participated in pilots were surveyed. One of our lingering concerns with scaling this pilot out to the entire MTH SAC was whether every student would have access to a phone/tablet/laptop. Of the 209 respondents, 100% reported having access to such a device. Based on this, we felt confident that the library and other campus resources could be used to support the small number of students who don’t have access to such devices.

Policy Change and Implementation:

In Spring 2017, the Technology Use Subcommittee asked that the MTH SAC add the following to the MTH 95 and 111 course description addendums:

“Effective Fall 2017, students will no longer be required to have physical graphing calculators in either MTH 95 or MTH 111. Where physically possible, instructors will demonstrate using Desmos, GeoGebra, or other online programs in class. Assessments requiring the use of a graphing calculator will be done outside of the proctored exam grade component.”

During Fall 2017, the Math SAC voted to implement similar changes for MTH 112, 251, and 252. The full implementation schedule is given here:

1. Fall 2017: MTH 95 and 111
2. Winter 2018: MTH 112
3. Spring 2018: MTH 251
4. Summer 2018: MTH 252

The permanent changes to course descriptions (in addition to statements in the addendums) were recommended by the curriculum committee and phased in by Fall 2018.

Supporting Faculty in this Change:

To support faculty in this technology change, a separate Technology Resource Subcommittee was formed during Summer 2017. Their main task was to create resources to support both teaching and learning with this new technology. These were made available on a Spaces page, along with other information. Additionally, printed fliers stating this technology change and listing points of contact (subcommittee members and piloting faculty across each campus) were posted at all four campuses and put in each faculty member's mailbox.

A 2-hour workshop/training was held following the SAC meeting during Fall 2017 in-service. Similar trainings were held at various campuses and various campus SLCs, as well as one held by our dual credit liaison.

WeBWork Development

The Higher Education Coordinating Commission (HECC) recognizes the key role that affordability plays in student success, and that textbooks are a significant factor in the affordability equation. Oregon House Bill 2871, passed during the 2015 Legislative Session, provides a legislative investment in the area of textbook affordability, with a specific focus on the development of Open Educational Resources (OERs). Open Educational Resources are free and accessible teaching, learning and research resources that can be legally adapted and redistributed for students' use at low or no cost.

A good online homework system is a necessity for a good OER textbook. By the end of the last program review, PCC had access to WeBWork homework sets for MTH 60 and MTH 65. Over the past 5 years, Alex Jordan, Heiko Spoddeck and Carl Yao completed homework sets for MTH 20, MTH 95 and MTH 111 and are also maintaining existing problem libraries for additional courses, fixing mistakes, and writing

new problems as needed. As of Fall 2018, there are ninety-eight WeBWorK math homework sets being employed, each offering students access to an online homework system for free.

MTH 243/244 OER Project

After attending AMATYC 2015, Emiliano Vega and Ralf Youtz began working on the idea of using an OER for MTH 243 and 244. They immediately began recruiting faculty who were interested in piloting an OER. We applied for and received an Open Oregon Grant. Soon after, Emiliano reconvened the MTH 243/244 Textbook and CCOG committee to see if using an OER would be feasible.

During the 2016 – 2017 academic year, the SAC ran pilot courses for MTH 243 / 244 using OpenStax and OpenIntro (two OER texts) at all four PCC campuses involving 13 Instructors (both FT and PT) for approximately 40 sections. That year alone, student savings was estimated to be approximately \$130,000.

In February 2017, the Math SAC voted to adopt an OER text for MTH 243 and 244 for all face-to-face classes, saving students an estimated \$250,000 a year, as well as immediately improving access and equity for the PCC student body.

Math 105 OER

Over the summer of 2018, math instructor Cara Lee led three other instructors to revise an OER for Math 105: Math in Society. We edited the original text, Math in Society, by David Lippman, extensively. The simplified sections made the textbook more accessible to our students. In addition, the accompanying Word documents were made accessible for screen readers. The committee diversified the names used in the textbook and localized the places used to be more culturally responsive. In the financial math chapter, the committee rewrote content to emphasize spreadsheets and wrote a new section on taxes. The book is being printed by the bookstore and will be bound as soon as they have bookbinding capabilities. The book is being piloted during the 2018-19 academic year, moving toward adoption for 2019 – 20 or the next year. This will result in a significant cost savings for students from \$135 to \$0-18 per student.

MTH 251 Lab Manual: conversion to PreTeXt

In the first half of 2015, SAC member Alex Jordan used an internal curriculum development grant to convert the MTH 251 lab manual (written by Steve Simonds) to PreTeXt. This was the first experiment

with using PreTeXt at PCC. The result was that now the MTH 251 lab manual exists in both print form and a mobile-friendly eBook form. Students are able to access the lab manual smoothly using their phones, tablets, and laptops. Or if such is their preference, they may still obtain inexpensive print copies. The success of this conversion and acceptance of its print and eBook forms contributed to several other PreTeXt projects at PCC being undertaken.

MTH251 OER Textbook

A second calculus project was APEX Calculus, a relatively widely adopted OER textbook for calculus. Our ambition was to convert APEX to PreTeXt while enhancing it with additional exercises and tailoring it to some particulars of PCC curriculum. In this way, we hoped to raise a strong OER calculus textbook that could compete with commercial textbooks. We were largely successful in making the conversion but were unable to complete the desired enhancements in the grant period. Some calculus (MTH 251, 252, 253, 254) instructors use APEX in its current state and find it adequate. Other faculty would like to see the improvements before adopting APEX. During the 2018 – 19 academic year, the author of APEX has freed up time to work with SAC member Alex Jordan and other individuals nationwide on picking up where PCC left off.

WeBWorK Integration with Desire2Learn

Over summer of 2016, SAC member Alex Jordan worked with Online Learning (formerly Distance Learning) to integrate WeBWorK into Desire2Learn. Specifically, two features were enabled: first was single sign-on, so that a student may simply click a link in D2L in order to enter their WeBWorK course and not need to log in to WeBWorK with a separate password; second was grade passback, where WeBWorK reports student grades to D2L for use with the D2L grade book. In WeBWorK- and D2L-using courses, having both of these features makes the student experience simpler and more seamless.

Moving forward, we would like to further integrate WeBWorK with D2L to make the instructor experience smoother. We would like to streamline the process for initializing a WeBWorK course, ideally by loading some widget in D2L. The current process involves the WeBWorK server manager manually initializing courses and the D2L instructor manually configuring an external learning tools link. In theory, all of this could be automated.

Online MTH 251-254 Offerings

Before 2016, several math courses up to MTH 243 were offered online to provide more options for students. For those pursuing a career in STEM, online math offerings stopped at MTH 112, requiring students to sign up for face-to-face calculus classes. Seeing a need for online calculus course offerings, math faculty member, Austina Fong received SAC approval and took the lead in designing and creating Online MTH 251: Calculus I and Online MTH 252: Calculus II. The course design features instructor-created video lectures, technology labs that utilize the free graphing technologies Desmos and GeoGebra, discussions where students can view one another's work to improve their understanding and documentation of calculus, homework and quizzes through the online homework system WebAssign, and proctored in-person exams.

The first offering for Online MTH 251 ran in Winter 2016, with the section filling up very quickly, and continued to run one section every term until Fall 2016 when demand called for two sections to be offered. Two sections of Online MTH 251 now continue to be offered every term, including Summer term. The first offering for Online MTH 252 ran in Winter 2017 with two sections being offered every term since Spring 2018. Overall, student evaluations of these courses are consistently positive with students often mentioning the extremely organized layout/design, the helpfulness of the instructor-created video lectures, and the level of engagement provided in the course design through the technology labs and discussions.

With the success of Online MTH 251 and MTH 252, the Math SAC recently approved the design and creation of Online MTH 253 and MTH 254 with Dennis Reynolds of Rock Creek as the lead. These courses will likely be offered in 2019, with a team of faculty across multiple campuses collaborating on the design.

Online MTH 105 Development

In February 2017, the Math SAC approved the creation of Online MTH 105. Jessica Bernards and Sonya Redmond worked together to create the course, and the first section of MTH 105 online was offered in Spring 2018. A single section was offered during Spring 2018 and one more in Summer 2018. Due to the popularity of the online offering, three sections of the course were offered in Fall 2018, and we hope to continue the increase in number of sections offered as the popularity of the non-STEM pathway increases.

1st Week Lecture Series at Cascade

Math Instructor Tammy Louie started the 1st Week Lecture Series in 2014 knowing that students would benefit from a review of prerequisite skills during the first week of courses. She also saw it as an opportunity to provide an additional measure of proper placement. The lecture series is held from 9am-4pm on the first Friday of every term, except for Summer. Each session ranges from 30-50 minutes depending on the topic. The topics covered include signed numbers, fractions, graphing linear functions, writing linear functions, exponents, factoring, functions and simplifying techniques. The target audience is anyone in MTH20-111 and any students wanting a quick refresher. In the beginning, full-time faculty volunteered to teach sessions and more recently, the Cascade Math Department has partnered with the Student Learning Center/ Tutor Center to pay part-time faculty to lead sessions. On average, the 1st Week Lecture Series serves one-hundred twenty students each term. In 2016, the Cascade Math Department applied for a student services grant that expanded our typical eight sessions to sixteen with topics running concurrently. Attendance more than doubled that term. The goal of the event is to help students begin the term prepared and also lessen the amount of time spent on review topics during the first week.

ALEKS Piloting at Cascade

The first pilot of ALEKS as a tool for use in MTH 112 courses was in 2013 and the software’s usability has improved to better address the needs of students. ALEKS ran into some accessibility issues that it needed to overcome before it was approved for a larger SAC-wide pilot in 2015. During the three-term pilot, we had about 510 students among 17 sections of MTH 111 and MTH 112. The program uses an initial knowledge check of 30 questions to create an individualized math path for each student but also aligns with the larger class objectives. In 2018, an online class shell was created by Greta Swanson with ALEKS for MTH 111. Other Instructors are using this shell and provided positive feedback from students.

Tammy Louie has collected initial data looking at student pass rates from 2013-2014. Note that dual credit pass rates were removed from this data set. In some cases, pass rates were slightly lower for classes with ALEKS. This isn't entirely surprising since some students need the extra time to catch up on prerequisite skills. The data did suggest a higher pass rate among those students going from 111 to 112 when using ALEKS. More data should be collected to check for significance of these findings.

TERM	ALEKS	COUNT of Pass Outcome	Total Outcomes	Pass Rate
201604	No	965	1428	67.60%

20160 4	Yes	147	220	66.80%
20170 1	No	937	1463	64.00%
20170 1	Yes	85	135	63.00%
20170 2	No	776	1305	59.50%
20170 2	Yes	110	163	67.50%
20170 3	No	342	532	64.30%
20170 3	Yes	23	36	63.90%
20170 4	No	1004	1654	60.70%
20170 4	Yes	142	227	62.60%

Math Study Abroad Program

Kaiwen Amrein and Emiliano Vega are in the process of creating a program for PCC students to take math credit classes abroad in the UK in Summer 2019. The program aims at MTH 98 and MTH 243 as a combined sequence delivered during the same term. If approved by the Education Abroad Review Committee, students will have the opportunity to earn credits for both classes.

The curriculum will be a hybrid program that starts and ends on PCC campus, with 4 weeks abroad. Students will learn the concepts and contexts through project-based coursework. Applications on the course material through cultural awareness and social justice topics will be implemented.

Math Fest

Math Fest is a free, PCC sponsored, math contest held every spring for high school and middle school students in the Portland metro area. This event features a variety of math games and a one-hour skills test ranging in levels from pre-algebra to calculus. Participants have the opportunity to win awards, t-shirts and other PCC prizes. Top performing high school students may also qualify for the Oregon Invitational Mathematics Tournament (OIMT). We average about 300 students each year from 38 different schools. The location for Math Fest rotates among each of our campuses.

Activities after testing vary throughout the year and have include relay races, team challenges and math puzzles. During the last two years, the Math SAC has worked with the Aviation Maintenance Technology Department, Art Department, STEAM Lab, Math Club and other Departments to develop a set of carnival-esque events after the students complete the testing phase of Math Fest. The booths include: fire-tubes generating trigonometric flame patterns; 30-foot Lissajouse curve generators using “PCC blue” sand; rotating pendulum curve generators; symmetry explorations using mobile printing presses; laser etchers; math-focused face-painters; balloon polyhedral challenges; pendulum waves; chaos demonstrations using “ooblec” or water on up-turned amp speakers; Chladni plates; spirographs and more. The event has generated a great deal of appreciation from area high school teachers, wow and awe from parents, and laughter and smiles from students. The Math SAC plans to continue the tradition next year.

Chapter 5: Reflect on the Composition, Qualifications, and Development of the Faculty

Provide information on how the faculty instructional practices reflect the strategic intentions for diversity, equity and inclusion in PCC's Strategic Plan, [Theme 5](#). What has the SAC done to further your faculty's inter-cultural competence and creation of a shared understanding about diversity, equity, and inclusion?

PCC Math Says YESS!

As PCC works to "open the pyramid" of student success (one description of President Mitsui's hand motion), we need to confront inequitable outcomes for our math students. Data show that math courses are one of the main barriers to success for students of color and female students at PCC.

Math instructor Ralf Youtz won the President's Fund for Excellence with the project PCC Math Says YESS! The PCC Math SAC will, as a group, improve our capacity to bring an equity lens to our decisions about curricula and our understanding and application of best practices and policies for equitable outcomes.

The Math SAC is bringing educational equity professionals to every Math SAC meeting during the 2018 – 2019 year. A group like Oregon Center for Educational Equity (OCEE) will lead one- to two-hour workshops during four Math SAC meetings to build our group capacity to apply an equity lens to Math SAC work. Then, an invited speaker, an expert in math education and equitable practices, will present a colloquium to the Math SAC's final meeting, giving us a chance to see how equitable practices could work broadly here at PCC, but specifically in math.

During the year, the Math SAC will form an Equity Subcommittee tasked with envisioning curricular and pedagogical changes to improve equitable outcomes for all PCC Math students. Also, to broaden the impact of the project, the Math SAC would extend invitations to meetings featuring equity workshops and speakers to our PCC Student Learning Center tutoring staff and to other local community college math instructors.

In one year, the Math SAC will have a powerful impact on our local mathematical community's capacity to improve equitable outcomes for students in our district and beyond.

Study of Grade Distributions for Students of Different Races

The 2014 – 2015 Learning Assessment Subcommittee (LAS) project focused on student placement and grade outcomes. The LAS obtained a large data set from Institutional Effectiveness with each student's

self-reported race, gender, and grade outcomes. The LAS was curious about grade distributions for PCC students of different races.

Data from Institutional Effectiveness included 41,605 individual PCC math students from the last five years. Of those students, 37,113 self-reported their race. These data include 61,640 minimum course grades earned by those students who self-reported race in MTH 20, 60, 65, 95, 105, 111, 112, 243, 244, 251, and 252.

Math faculty member Ralf Youtz shared numerical and graphical analyses of these data to the Math SAC:

Counts (for scale)

Minimum Course Grade*	Hispanic	Multi-Racial	African-American	Native American	Asian	Pacific Islander	White	Total
A	1501	539	578	251	1831	47	14465	19212
B	1660	467	871	253	1205	47	11550	16053
C	1321	313	990	226	797	47	7887	11581
D	572	144	476	89	318	15	2993	4607
F	1167	381	1304	192	536	34	6573	10187
total	6221	1844	4219	1011	4687	190	43468	61640

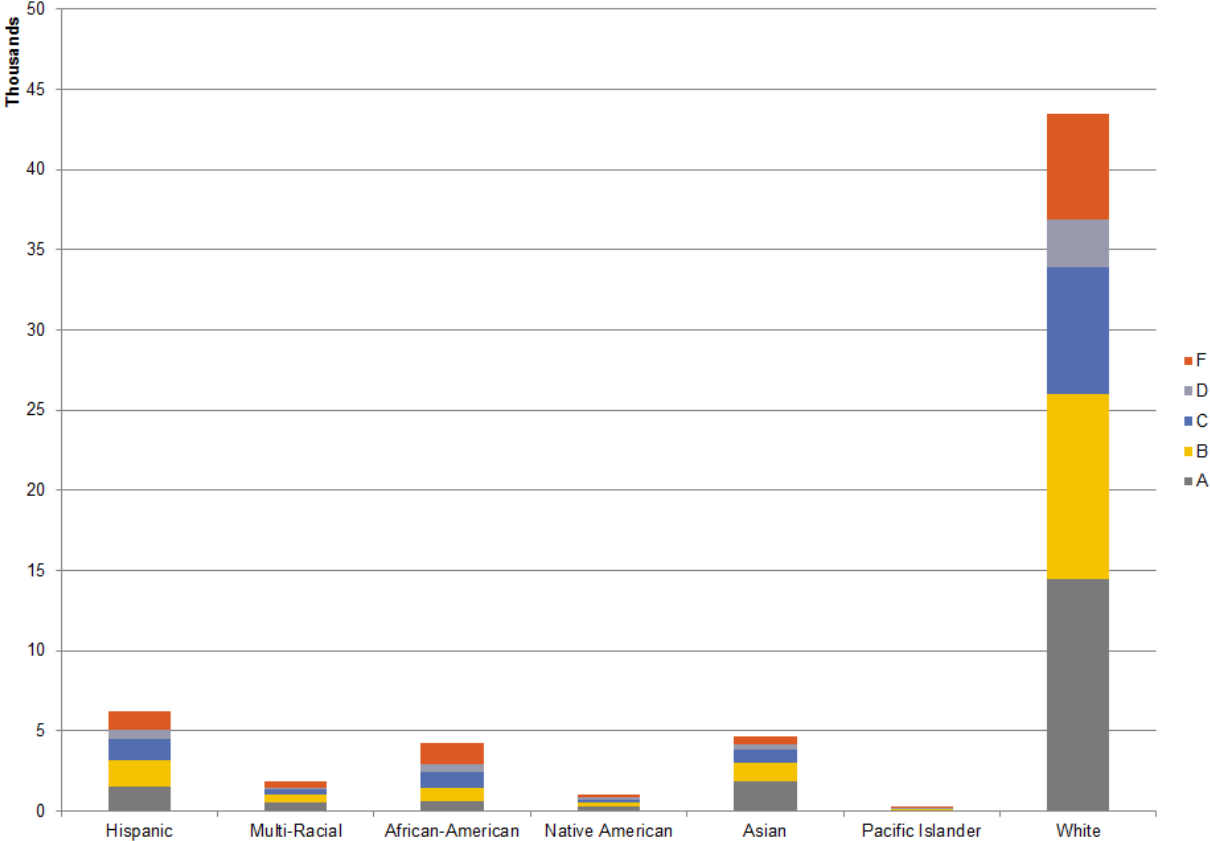
Proportions (for comparison)

Minimum Course Grade*	Hispanic	Multi-Racial	African-American	Native American	Asian	Pacific Islander	White	Total
A	24%	29%	14%	25%	39%	25%	33%	31%
B	27%	25%	21%	25%	26%	25%	27%	26%
C	21%	17%	23%	22%	17%	25%	18%	19%

D	9%	8%	11%	9%	7%	8%	7%	7%
F	19%	21%	31%	19%	11%	18%	15%	17%
total	100%	100%	100%	100%	100%	100%	100%	100%

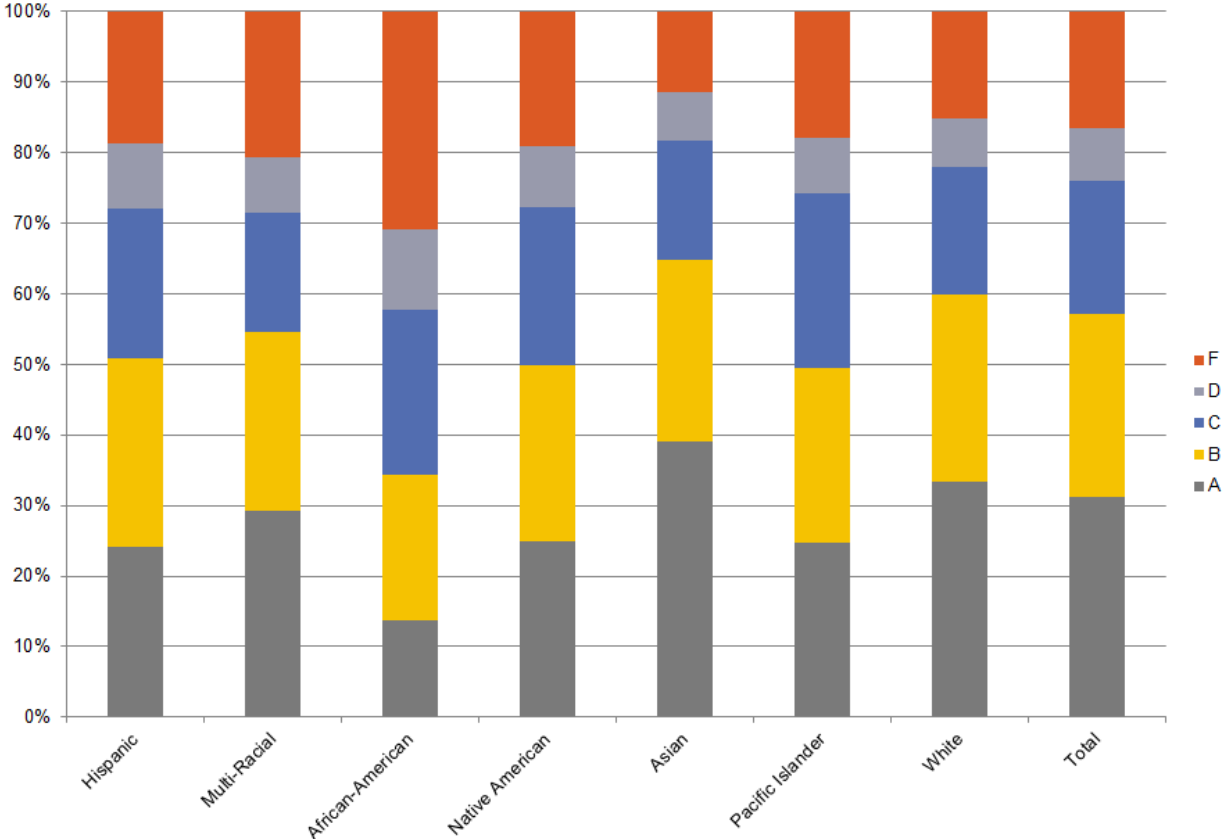
Below are visualizations of the distributions from above:

**Counts of minimum course grades by race
(MTH 20, 60, 65, 95, 105, 111, 112, 243, 244, 251, 252)**



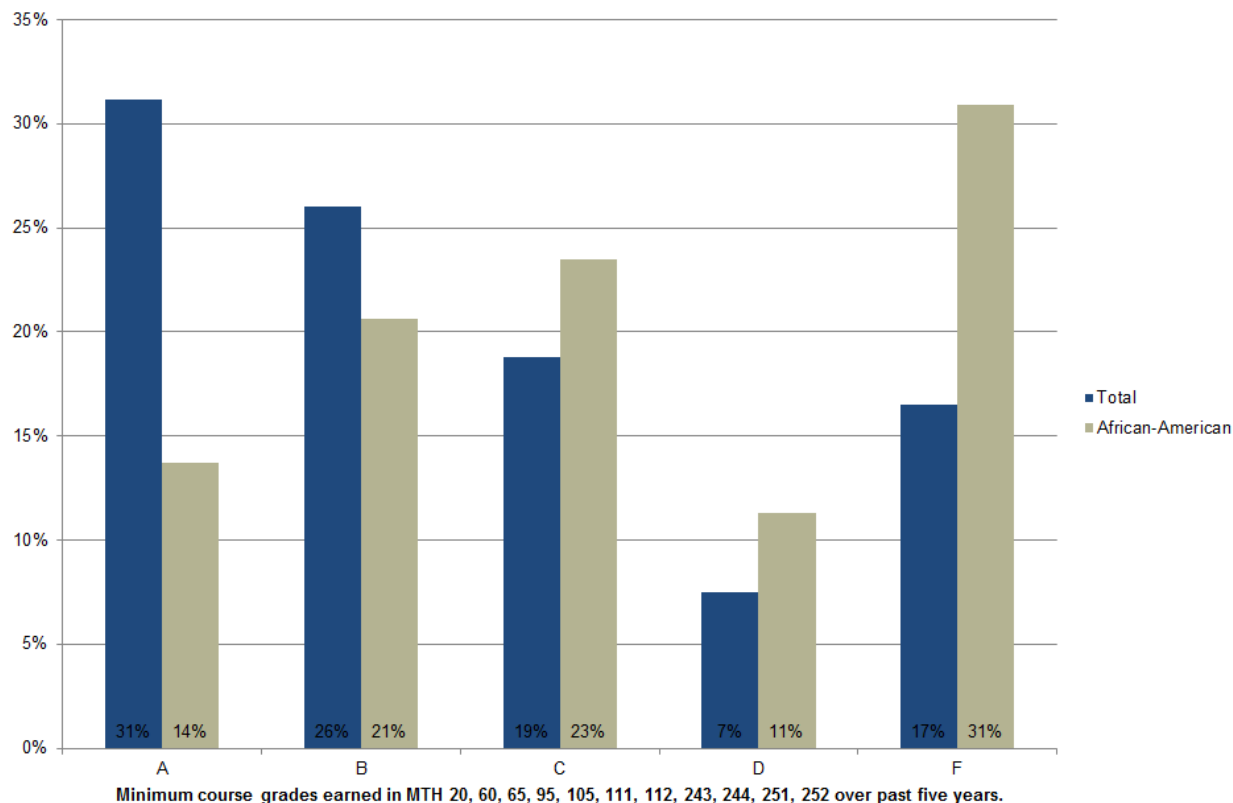
Proportions (for comparison):

Proportions of minimum course grades for students of different races compared to total proportions



Focusing on outcomes for African-American students:

Comparing proportions of minimum course grades earned by all students self-reporting race with minimum course grades earned by African-American students



The Math SAC discussed the question: "Is mathematics at PCC colorblind?" Grade disparities for PCC math students are most stark for African-American PCC students. Hispanic, Multi-Racial, Native American, and Pacific Islander students also face noticeable grade disparities. The SAC agreed that improving this situation is within our power to improve not only as individual instructors, but as members of our department, members of the Math SAC, as PCC community members, and as residents of Portland, Oregon, USA, and Earth.

The SAC continues to struggle with answers to address this disparity. But we generated a lot of questions to reflect on as individuals:

- How well do each of us understand the historical and cultural causes of these disparities? How can we each learn more?
- How comfortable are each of us discussing race? With friends? With colleagues? With students?
- How does one become more comfortable?
- What resources are available to help with these goals?

The presenter also offered questions that every PCC math instructor can ask themself:

- How can I, as an instructor, improve outcomes for students of color in my courses?
- How can teaching practices foster equity and inclusion for students of color in my classes?
- How can my courses be more culturally relevant to students of color?
- How can I give students of color a voice in my classroom?

Recommended PCC resources to access for help finding answers:

- Campus Multicultural Centers
- Teaching and Learning Centers
- Center for Careers in Education
- Office of Equity and Inclusion

More questions:

- How can we, the Mathematics SAC, improve outcomes for students of color, particularly for African-American students?
- How do we improve such outcomes in specific math courses? Through curricular changes? Changes to CCOG?
- How can we improve all of our math courses? Teaching practices? The diversity of faculty to better reflect the diversity of the student body?

The SAC as a whole and as individuals is committed to continuing to discuss improving outcomes for students of color. As a Math SAC, we aim to continue to make time for meaningful discussions at future SAC meetings about this ongoing crisis.

Statistics of the Counted: Opening the Whiteness History Month Conversation to MTH 243 Students

At a Math SAC meeting on May 13, 2016, Presenter Ralf Youtz shared some details of his and student Michael Alcobendas's Whiteness History Month (WHM) presentation, "Statistics of The Counted: Student perspectives on police killings data." Youtz shared his experience using real-life data about a challenging social issue to help engage statistics students in their coursework.

An anonymous quotation that student presenter Michael Alcobendas chose to share during his and Youtz's WHM presentation set the stage: "Part of whiteness and part of systems of oppression is to say 'what is best is not see difference' ... When we don't see difference, we're missing out on a lot of information. We're also denying the consequences of difference. So when we engage in comments or behaviors that are informed by this [value] of colorblindness, we're engaging in bias."

Statistics (as a discipline) provides us with tools to analyze difference. Connections between the goals of WHM and MTH 243 are apparent when considering the WHM themes:

1. Context: Engage students in genuine statistical work with real-life data.
2. Consequences: The Counted project collects data about police killings in the US, including racial data, allowing students to analyze effects of race on police killings using statistical techniques.
3. Change: The Counted project unifies MTH 243 topics with a single data set to help develop deeper understanding.

Statistical literacy can empower people to ask (and sometimes answer) questions about real-life issues. MTH 243 students first engaged in this work throughout Winter 2016. Youtz has continued to develop this project, also using local data about student housing insecurity.

MTH 243's The Counted project is a quarter-length, critical thinking statistics project designed to give students the opportunity to analyze a real data set to better understand a current social issue. Learning outcomes include: Use concepts and techniques from course to analyze real, current data; use statistical thinking to ask and answer data-based questions; bring a critical perspective to statistical work; and make connections between stats concepts and techniques.

The project's data set: "The Counted is a project by the Guardian [...] working to count the number of people killed by police and other law enforcement agencies in the United States throughout 2015 and 2016, to monitor their demographics and to tell the stories of how they died." (from [The Counted About webpage](#)) These data are publicly available, making The Counted an ideal data set for student work. Police killings are a challenging discussion topic, especially when considering questions about race, so the class began work with a workshop led by former PCC Sylvania Multicultural Center Coordinator Miguel Arellano. Workshop topics included:

1. dealing with hopes and fears;
2. building a brave space;
3. recognizing dialogue, discussion, and debate;
4. comfort zones and learning edges; and
5. navigating our triggers during difficult dialogue.

The Counted project begins by encouraging students to ask critical questions about the data.

Project prompt: "After reading about The Counted, what questions do you have about these data?"

Student responses considered the accuracy, the process, possible biases, the law enforcement

perspective, statistical/analytical questions, and questions about change. Example student responses included:

“How accurate is the data, and how [does The Guardian] verify its credibility?”

“Is The Guardian approaching this topic with any bias and what is their agenda?”

“How does this data relate to the amount of police officers or law enforcement officials killed by civilians?”

“What trends can be seen, particularly regarding race/ethnicity, age, geographic location of incidents and type of death?”

“Now that we have access to this information, what can we do as citizens to reduce the number of unnecessary deaths by Law Enforcement?”

Youtz shared some example probability questions from the project, highlighting some excellent analytical and statistical student thinking in response to prompts to consider varying proportions of people killed by police of different races. Here is an example of such student work:

“[...] looking at the idea that 51% of the people shot are white and 27% are black doesn't give us the full context of the situation [...] when we compare the proportions with the populations it gives us a better understanding of these numbers.

$$51\% / 72.4\% = 0.72$$

$$27\% / 12.6\% = 2.14$$

$$2.14 / 0.72 = 2.97$$

So now we can say that if you are black you are almost three times more likely to get [killed by the police] than if you were white [...]

The original numbers don't give you this idea though, you have to compare the number[s] with the population.”

This kind of quantitative literacy through statistical thinking is a course goal and a department goal.

Youtz shared with the Math SAC some observations on the project as a MTH 243 instructor and as a Math SAC member. As an instructor, Youtz noted that statisticians use data to ask and answer questions about our world. Using real data about a real issue, students had deeper, data-based questions, and could engage more deeply in the statistical process. Statistics work with The Counted data provided students with a space to critically consider social questions, and to engage in dialogue and discussion. As a Math SAC member, Youtz noted that designing a quarter-length project using real data required lots of work on curriculum design, in-class and out-of-class structure, and unique time-consuming grading, but the work was well worth the effort. Meaningful application of statistical techniques to real

data increases student engagement and connects coursework to the student's lives.

Many people and organizations helped develop this work:

- PCC Center for Careers in Education
- AMATYC
- PCC Sylvania Multicultural Center
- Amara Perez, Gabe Hunter-Bernstein, Ann Cary, James Harrison, Sue Ann Jones Dobbyn, Brittany Mosby, Claire Suddeth, Miguel Arellano, and many students

Teaching Men of Color at the Community College: Five Key Dispositions

At the Math SAC meeting on Feb. 9, 2018, Ralf Youtz presented an adapted Teaching Men of Color in the Community College live sessions led by Frank Harris III & J. Luke Wood. Following is a summary of that presentation.

The Math SAC addressed the idea: "We create the learning environment!" and discussed how every instructor of every gender and race can engage men of color in learning. Five key dispositions help us do so. Each disposition can be described with one word: engage, counter, empower, recognize, and care.

First, **engage** students with relevant coursework. To do so, work to connect mathematical and statistical coursework to current issues of social concern.

Also, make coursework personally relevant by helping connect students' knowledge and abilities to mathematical and statistical concepts. At the same time, provide opportunities for critical, social, and personal reflection on those connections.

Second, **counter** misconceptions around identities like race, gender, class, ability, etc. Encourage help-seeking, especially for students who might be uncomfortable seeking help. For men of color, tutoring, office hours, counseling, etc. may not be perceived as "masculine."

And seeking help may be perceived as fulfilling negative stereotypes around the intelligence and ability of male learners of color. Instructors should explicitly reject such stereotypes. A mantra for connecting students to resources: "If it's important for student success --- make it mandatory!" Show men of color that PCC Math can be an equitable domain for all learners, not just for White people (a debilitating perspective that affects the United States) or women (a perspective reinforced in the K-12 school system where most teachers are female).

Third, **empower** students to engage in learning. Validate both effort and ability of men of color. Communicate: "You can do it," "You belong here," "I believe in you," etc. Help both ourselves as instructors and our students overcome cultural stereotypes and implicit biases about intelligence and ability of men of color. Develop equity-mindedness, meaning don't blame students, especially men of color and other marginalized groups (exclusively) for their lack of success. Instead, recognize our roles as individual instructors and as members of an institution in creating and maintaining systems that do not meet the learning needs of men of color.

Fourth, **recognize** talents and assets of men of color. Give honest praise for high quality work, engagement, and improvement. Connect coursework to current research by men of color in the discipline. Resources like [Lathisms](#) and [Mathematically Gifted and Black](#) provide information about the work of current mathematicians and statisticians of color.

Lastly, **care**. Convey a sense belonging and mattering to men of color. Explicitly reject stereotypes that portray men of color as unintelligent. Show authentic care for men of color and remember that strong personal relationships are the foundation for successful teaching and learning, especially with men of color.

Teaching Practices for Equitable Math Student Success

At the Math SAC meeting on March 24, 2018, Ralf Youtz presented a workshop he adapted from *Teaching Men of Color in Community College*, Dr. Frank Harrison III & Dr. J. Luke Wood, CORA Learning. Below is a summary of that workshop and the mini-workshops that followed.

Ralf Youtz shared some guidelines for Math SAC work on race and teaching practice: assume good intentions; step up and step back; speak from experience; when possible, make assumptions clear; don't expect closure; respect confidentiality (share ideas while protecting participants' privacy).

Assuming that everyone here hopes to be a better instructor for all students, the Math SAC must confront ongoing racial, gender, etc. inequities in our students' outcomes. Research shows that the teaching and learning practices presented today benefit all students, and they are critical for men of color and other traditionally underserved groups.

Workshop goals were to review some key dispositions for instructors, then to generate ideas for implementing two promising teaching and learning practices: critical reflection and collaborative learning.

The presenter shared key dispositions to foster that help instructors explicitly welcome and support men of color and other marginalized students. These dispositions are: engage students with relevant coursework; counter misconceptions around identities (race, gender, class, ability, etc.); empower students to engage in learning; recognize talents and assets of men of color; convey belonging and mattering to men of color; and build strong personal relationships. Authentic care for our marginalized students is the foundation for their learning (and our teaching) success.

The presenter led two "mini-workshops" to provide the Math SAC with time to consider and discuss ideas for implementing two promising practices: critical reflection and collaborative learning. Other promising practices to explore include culturally relevant teaching, pro-actively connecting students with resources, and early alerts to help make such connections.

Critical reflection encourages deep reflection on core values, assumptions, and the actions of self and others. Critical reflection also provides space to consider one's field of study and one's professional goals. And critical reflection reveals misconceptions of social stereotypes and empowers students to work for justice in their lives, communities, and wider society. Ideally, reflection should encourage both personal and critical engagement with mathematical/statistical content of the course.

Math instructors can apply critical reflection to coursework a few ways. As examples: an instructor might begin the quarter, or even each week, with a brief "values writing" exercise; incorporate reflective questions and comments into homework, quizzes, projects, and exams; or stimulate critical reflection in a learning journal.

Participants generated ideas using a Think-Pair-Share structure guided by these prompts:

Think: "I could provide a new opportunity for critical reflection in [my course] by _____." Write down your first idea(s), ignoring challenges for now.

Pair: Share at least one idea with a partner, discussing ideas, considering possibilities and challenges.

Share: Ideas for more critical reflection in our courses, considering questions, observations, and connections to your practice.

Collaborative learning increases belonging and sense of mattering, and can be used both in class and out-of-class. Group discussions, assignments, projects, presentations, and assessments can all provide

opportunities for collaboration. Instructors should encourage effective collaboration and hold students accountable. Students can use rubrics to score themselves and one another as effective collaborators. Collaborative learning, like the Think-Pair-Share structure of the workshop, should balance individual work and collaboration, using multiple modalities when possible. Group-based assignments, projects, and especially presentations are recommended. Lecture-only formats generally fail with men of color and other marginalized students by devaluing student perspectives.

Think-Pair-Share prompts included:

Think: "I could incorporate collaborative learning about [course topic] by _____." Write first idea(s) while ignoring challenges.

Pair: Share with a partner, discussing both possibilities and challenges.

Share: Ideas for more collaborative learning. Consider questions, observations, and connections to critical reflection ideas.

More critical teaching practices to discuss at future Math SAC meetings include culturally relevant teaching (to connect coursework to students' lives), intrusive teaching practices (pro-active actions to connect students with resources), and early alerts (to be able to take action as early as possible).

Microaggression Training at Math SAC Meeting

Math Instructor, Payal Roy gave several presentations on Microaggression at a Math SAC meeting in 2017, and at ORMATYC April 2018. She covered three important questions:

1. What is microaggression?
2. Why is it relevant in today's workplace?
3. How to deal with it?

Microaggression stems from subconscious biases. It is natural to form biases about strangers, judging them on their accent, attire, race, gender or religion. Most of the biases are harmless. In Payal's presentation SAC members participated in games that helped show that it is very natural to form biases.

The problem happens when biases lead to statements and actions which cause discrimination against members of marginalized groups. This may cause a stressful response, which, if repeated, can cause illness such as depression and autoimmune disorders that compromise physical and psychological well-being.

Payal concluded the presentation with discussions on strategies to deal with microaggression.

Development of Intercultural Competency

We often create biases when we come across symbols and norms from other cultures and have not spent the time to really understand and appreciate them. These biases can negatively impact how we interact and work with people from other cultures.

Payal Roy gave a presentation at the Oct. 24, 2018 Math SAC meeting about intercultural competency. The following is a summary of her presentation:

Development of intercultural competency can help:

- a. Reduce conflict and misunderstanding
- b. Heighten awareness of our own culture
- c. Stimulate curiosity about & sensitivity to cultural differences
- d. Avoid unintentionally offending others
- e. Reduce chance to take offense at perceived “insults”
- f. Help ourselves & others work through conflict
- g. Increase workplace productivity
- h. Improve student experience in colleges

Southeast Math Workshops and Follow-Up Project

In 2017-2018, The Southeast TLC in conjunction with the Southeast Math department developed a series of four, two-hour workshops for math faculty focused on creating inclusive classrooms and culturally responsive teaching. Part-time faculty were supported from the Math, Science, and CTE and Dean of Instruction budget. Each event averaged 10 attendees, 1/3 of the math faculty at Southeast, resulting in 80 hours of professional development. Because of the success of those events, funds were secured through the President's Fund for Excellence to support part-time faculty and bring the events to the rest of the district. Events are planned throughout 2018-2019 to engage math faculty in critical reflection on their teaching practices.

With support from math instructors Cara Lee, Ralf Youtz and Stephanie Yurasits, the Southeast TLC Coordinator, Sam Ericksen won the President's Award in Excellence with the project *Math: A Problems and Solutions Manual*.

This project seeks to challenge and change the dominant educational paradigm, which is embedded particularly deeply in math courses. This requires an awareness of how embedded the dominant perspective is in teaching practices that faculty may take for granted. This project would implement a district-wide professional development series of four workshops in 2018-2019 academic year specifically designed for math faculty, with a focus on creating inclusive classrooms, investigating assessment strategies, establishing or strengthening learner-centered practices, and implementing best practices in a community of peers in order to improve outcomes for historically marginalized student populations. The project will also increase collaboration among math faculty, disseminating innovative ideas and approaches, and reducing inequity for part-time math faculty. Workshops will be offered at all campuses at a variety of times to provide ease of access for the greatest portion of math faculty.

Individual Instructor's Efforts to Promote Diversity in Math Classes

Damien Adams: I begin by including and highlighting a Learning Environment section in my syllabus, highlighting that we are complex individuals, and we must treat each other with respect and celebrate our differences. During class, I do the best that I can to ensure that the voices of all of my students are heard, especially the women and people of color. Whenever possible, I speak about the history of math from the perspective of non-Europeans. I talk about why we only know the names of Lagrange, Euler, Euclid, Newton, etc. I encourage my students to listen to my podcast on Women in Math.

Jessica Bernard: I have dramatically changed the way I teach my classes. I now use a "flip" model which allows students to watch my lecture videos at home for their homework and then come to class and work on problems over these new concepts (what traditionally was considered homework). While in class, students work in inclusive groups as a team over some type of activity that engages the students in the concepts and then the second half of class they work individually on problems as I walk around and get to work with each student one-on-one. This has been great for lots of different types of students. By doing the lecture at home, now students can pause me, rewind me, read the subtitles if English isn't their first language, etc. This also helps disability students with pacing and not feeling left behind. Additionally, by switching up the groups weekly in my class, students build relationships with one another and as students in the past have described it..."my classmates end up feeling like family by the end of the term!" This has also significantly helped my pass rates from the 50-70% range to the high 80%/low 90% pass range!

At the AMATYC conferences, I've gone to multiple presentations over flipping the math classroom and have been wanting to try to do it. Luckily, the Rock Creek TLC created a 4-week class on flipping in the

summer of 2017 that got me to finally have the courage to try it out! Please see above for how much it has changed the dynamic of my class.

d'Marie Carver: By teaching my courses in group settings where the emphasis is on learning the material by working together, the students are given the opportunity to communicate their strengths and weaknesses in a safe environment. I encourage the students to ask questions of one another, share their ideas, and build their knowledge base. Students who had never worked with other students on their coursework are learning that there is much that they can learn from one another and teach each other.

Ann Cary: During Summer 2017 I completed a 40-hour, online STEM equity and inclusion professional development project. This professional development enabled me to delve into research regarding retention of students in STEM courses and identify a number of techniques that I implemented in my teaching practice.

Kara Colley: Last year, I tried flipping my class. I see this as an instructional technique that helps with equity in the classroom. Some students come in knowing a fair bit about certain topics. By having the students watch a video before talking about the topic in class, all students are brought up to a more even playing field.

Noah Dear: I would definitely say that utilizing group work, bettered via my investigations within the faculty inquiry group as mentioned above, has improved the inclusion of students in the classroom.

William Diss: I have given more time to students outside of class for individualized tutoring. I have prepared more typed notes to assist students who have trouble taking handwritten notes in class. I have also produced special red high-intensity flash cards to help students with basic operations.

Diane Edwards: My instructional practices focus on treating each student fairly, and with empathy and respect. Students are also provided to opportunity to create math questions that are relevant to them.

Oswaldo Garcia-Contreras: I make sure that examples cover a variety of cultural representations and awareness. I use culturally responsive curricula, ensure there is equal access. I use a combination of take-home and on-campus assessment and practice.

Alex Jordan: I have become more flexible with homework due dates and late submissions. I hope that this flexibility supports equity for students without strong academic preparation, and also students with external impediments to success. With online homework, I let students adjust their due dates from the course default. With other assignments, I accept anything up to whenever I grade the stack of submitted papers.

Jeff Lacks: I have made several changes to my teaching style over the last 5 years that were designed to create a more equitable classroom experience. This includes spending more class time on group activities (and time outside of class developing these activities), and increasing the number of measures that I use in my student assessment.

Cara Lee: I have implemented several changes in my classroom around culturally responsive teaching. The first is arranging students in table groups so they build relationships with each other and work together and help each other during class. I have flipped my Math 105 and Math 60 courses to allow students to work together for most of the class period. I have changed my late policies to be more flexible and encourage students to complete missed work for full credit. I have been thinking about contract grading and how it might apply to my classes. In many of my classes I have a math and identity paper which helps me get to know my students better and learn about stereotypes they may have experienced. A project in my 105 course is a student-chosen topic and poster board presentations for the campus community. This student-centered project is also community-based-learning and motivates students to educate their peers. I welcome students into the classroom at any time during the class, even if they are late and make it clear that they are welcome anytime.

Scot Leavitt: Each year, I try to add additional components and practices to both my online and face-to-face courses that expand my ability to be more responsive to individual student's needs. From increasing the amount of direct communication (in person and via email) with my students to increasing the amount of collaborative/group learning in the classroom to regularly re-evaluating the success of all of my practices, I am constantly trying to improve my ability to help my students, especially those who are from traditionally marginalized groups, to be successful in their coursework.

Tammy Louie: In both the Summer Academy and connecting with Oak Creek Correctional Facility the goal was to work with underrepresented student populations. To increase our success we had to understand the barriers students faced with math and how to encourage a more positive experience going forward.

Part of PCC's strategic plan includes the ability to drive student success. Cascade campus has had a lot of success with our 1st Week Lecture Series held the first Friday of every term. The First Week Lecture Series was built under the assumption that students came into our courses with weak prerequisite skills. The Series also gives students a chance to reevaluate placement if they feel the prerequisites are not actually a "review."

In our Rethinking Technology Committee, we successfully phased out the use of \$150 calculators in all of our courses. This work took almost five years to research, pilot calculator alternative and phase-in changes throughout our sequence. Ultimately, we went with more dynamic, student-friendly free software to drive student success.

I have also participated in the following trainings related to diversity:

- Attended an all-day training by Diversity, Equity, Inclusion 2017-2018
- Intercultural Competence Committee lead by Jackie Sandquist 2017-2018.
- Facilitate ALC like courses for Oak Creek Correctional Facility 2016-present
- Facilitate the math portion of Cascade's Inaugural Summer Academy 2018-present
- Rethinking Technology Committee 2013-Present

Michele Marden: My instructional practices have changed in several ways. Here are some:

-Creating a welcoming environment on day 1 where students can say "yes" when they ask themselves "Do I belong here? Can I be successful?"

-Developing supportive teams so that students can engage in active learning in the classroom

-Creating reflective places for students to learn about and dismantle cultural influences that might have led to self-doubt of their abilities

-Experimentation with alternative grading structures that motivate to students to be in the "learning space" and that hopefully reduce anxiety from trauma or math fear

-Practicing "authentic care" as defined in the Teaching Men of Color in CC course

-Updating online class to incorporate universal design (course passed)

-Looking for places where I can bring in the student's lived experiences for math content

Henry Mesa: I participated in a workshop concerning LGBT issues which allow one to view issues from a different lens. But the most impactful activity around the transgender issue came from an episode of This American Life, the episode of The Gondolier. If you want to understand a transgender person, listen to that podcast. The intent of the podcast was never to do this, but it evolved naturally and unexpectedly; there is humor in the situation as the interviewer is caught by total surprise at their own emotion.

I am currently reading *The Forest and the Trees* written by sociologist Allan Johnson in order to get a more thorough view of white privilege and critical race theory in a less polarizing setting.

I have attended TLC seminars from time to time. Just recently attended one at SE for Creating an Inclusive Classroom Environment. I attended an impromptu discussion concerning White Privilege when PCC first introduced the idea a few years ago, "White privilege is not a celebration of white history..." very interesting discussion. I have visited the Multicultural Center on few occasions to get a pulse of the community concerning the death of a young black man that was gunned down; another memorable visit was the day after Donald Trump was elected President.

How does it impact my teaching? Who knows. Each encounter is a chance for a subtle change in view.

Pardis Navi: I provide a safe classroom environment where students are encouraged to engage in their own learning process. I deliberately avoid classroom situations where one or two voices can dominate the classroom conversation. I expect students to work in small groups in a collaborative way to ensure that each person can be heard. In addition, I believe in treating every student with respect and reverence.

Wendy Peterman: I emphasize respect and small group work to include all students and improve equity. I also intentionally highlight a student's specific competence to equalize status.

Jeff Pettit: A strong change I have evolved over the last years centers around examining the structure and policy of my classes. In order to increase equity, I have better established policy to grading criteria and better outlined my policies in class. By establishing policies (instead of reacting to situations as they arise) not only can I better avoid unintended bias on my part, but I can also examine my policies for issues of equity. For example, I once assumed students would step forward to request submitting late work and I would generally allow students to accept late work for full credit if they had a reasonable excuse. I realized this practice skewed grades toward extroverts or students from a personal culture that advocated for self-advocacy or students that were averse to approaching me for whatever reason... So, instead I actively pursue all students to submit work late if they miss a deadline. I have found that this has improved my pass rates (particularly in my online classes) as well as students' opinions of the course and college overall. This and other policy changes came as a direct result of literature brought to the Math SAC ("Multiplication is for White People" for example) as well as informal one-on-one discussions with colleagues.

Bret Rickman: One improvement area with regard to diversity, equity and inclusion is the practice of communicating earlier in the term with struggling students with an offer to help guide them through one-to-one instruction during and/or after my regularly scheduled office hours. This idea was brought up while attending a TLC session led by my colleague Ralf Youtz on "...Reaching Men of Color...". I have

also utilized concepts that I learned during the 2018 Anderson Conference. One idea that I've implemented was to include a portion of the "Story of Maths" video (extra credit) essay for my students to write about a mathematician of interest to them personally (women and men of color and/or other cultures). I am also implementing strategies to better reach older adult students to allow more time for responses during class (longer 'thought process' time).

Rebecca Ross: With the goal of increasing awareness that regular attendance and participation affect learning and understanding, I have included grading components in my courses that encourage regular attendance and participation in class.

Laura Smoyer: The introduction of the Math Literacy pathway has created a type of instruction and classroom environment that I believe is more accessible to students who have historically been marginalized by the traditional algebra sequence. The Math Literacy pathway is committed to teaching in an intentional group learning environment which greatly enhances the diversity of learning styles honored, and allows more students to feel safe and heard. This, in turn, enables them to learn.

Virginia Somes: Students often ask for or may be helped by math videos that can be found online (say on YouTube). In the last few years I have tried to focus on finding and referencing math help videos created by individuals who may be more identifiable to our students (math teachers who are women and who are of color). For instance, Fort Bend Tutoring has many great math videos on YouTube (taught by Mr. Larry Whittington) that my students have really liked.

Thomas Songer: I am constantly evolving and improving my instructional practice, based upon my experience in every class that I teach. My training in Critical Theory (including Critical Race Theory), Diversity Equity & Inclusion, Disability Cultural Competency, and Supporting the Unique Needs of Foster Youth in Education, all enhance my perspective and effectiveness as an educator. I employ principles of universal design within a collaborative learning space, all of which promote inclusion and an interactive, enjoyable, social learning experience. I find examples connecting curriculum to authentic life experiences and current world events, which provides important relevancy and engages learners.

Heiko Spoddeck: I use activities and questions to engage students in their learning and through that create an atmosphere where students like to come to class and feel encouraged and supported in their learning. I am doing my best to be mindful of my own biases and consciously counteract them. If I see a student on the sidelines, I reach out to them and talk to them about how I can support them in their learning. If possible, I do some of my office hours before and/or after class. Especially before class has helped create an atmosphere where especially diverse students come early and interact with me in an

informal way where they can share something from their life or ask a math question or both. I am responsive to my students' feedback and will adjust my class either the same term if possible or the next time I teach a class. When I listen and talk about what I can change, they feel freer to give more feedback and through that participate in the class structure. I am working on including more group activities in my classes and create new activities that engage different learning modalities, encourage collaboration, and are fun to work on. I am working on not just showing applications but building my classes around them so that students are never in any doubt how what they learn can be applied. This is currently my weakest point and it will take me some time to create the classroom I envision.

Greta Swanson: I attended the two-day Social Justice Workshop in November 2016. One of the activities that I took away from the workshop was a stack of yellow cards. Each card listed a group or identity to which a person might belong e.g., disability status, skin color, family status, etc. They encouraged us to lay the cards out on the table when making decisions. I brought these to my MTH 211-213 book/CCOG committee when we were discussing changes to the CCOG and course materials. It was helpful to consider the way our decisions could affect different groups of people and work to brainstorm ways to minimize negative impacts. I liked being able to share something from the workshop with other instructors. I followed up this workshop with the Faculty Summit in May 2017.

Emiliano Vega: I have used data collected by students and faculty about evictions and housing insecurity in Portland to give students a way to connect all their topics in Statistics to their life.

Ralf Youtz: I do my best to build strong personal relationships with students, especially with students who are traditionally marginalized and poorly served at PCC Math (Black students, Latinx students, female students, etc.). I engage students with culturally relevant coursework. In my statistics courses, for example, students develop statistical understanding by working with real data about current social issues like police killings in the USA and Portland's housing crisis. I provide space for critical reflection. Coursework encourages students to bring their own perspectives, and to connect course concepts to their own academic and career goals. I counter misconceptions about women and people of color in mathematics/statistics at every opportunity. I communicate personal and institutional responsibility for my students' success. I reduce costs by allowing students to use open educational resources whenever possible. I do my best to build a collaborative learning environment. I accommodate student learning needs whenever possible, adjusting course policies and timing as necessary to give individual students the best chances to succeed.

Dennis Williams: I have examined the type of questions used on assessments and worksheets to determine if there is any race, ethnicity, gender, sexual orientation bias. I try to be aware of potential learning disabilities that might arise. I try to build some flexibility into my assessment practices to accommodate a diverse population of students, many that are balancing work, family and school.

Report any changes the SAC has made to instructor qualifications since the last review and the reason for the changes. Current instructor qualifications are available at:

<http://www.pcc.edu/resources/academic/instructor-qualifications/index.html>

Under the direction of the PCC administration, the Math SAC no longer provides direct Instructor of Record oversight and support for dual credit courses, but instead relies on oversight from faculty on-site at high-schools with guidance and oversight from the Dual Credit Liaison, Bret Rickman.

How have professional development activities of the faculty contributed to the strength of the program/discipline? If such activities have resulted in instructional or curricular changes, please describe.

Innovative Growth Solutions Training

In April of 2017 Innovative Growth Solutions consultants, Shirlene Warnock and Jeanne Nyquist, assisted Tammy Louie, Math SAC Chair, with facilitating a 2-hour session, as part of the PCC Math SAC 2017 Spring session. The session focused on 'navigating change and conflict' for 65 members of the Math SAC. The objectives for the session were to:

- Understand the elements of a high functioning team and how change and conflict impact even the best of teams.
- Review and practice key strategies for effective communication during times of change and conflict.
- Make commitments to address change/conflict in a positive and productive way.

Prior to the retreat, participants were asked to reflect on the most significant change currently affecting their area of responsibility and come prepared to discuss the biggest challenge and greatest opportunity the challenge presented. During the retreat, participants broke into groups to discuss challenges and opportunities further. The large group debrief that followed gave participants time to thoughtfully listen to colleagues' concerns.

The retreat ended by participants making commitments on how they would work together in the future to move toward their collective goals.

Sylvania Level Teams

To help full-time and part-time math Instructors learn from each other, Sylvania Math Department started level teams.

Year 1 (academic year 2015-16): This was the first year Sylvania formed a level team. Each quarter, a "level team leader" is recruited from each of the major courses (20, 58, 60, 65, 70, 95, 98, 111, 112, 243, 244, 251 and 252). Each leader sends out an email to everyone teaching that course that term and tries to set up meetings. The meetings did not have any set agenda, but instructors would talk about issues facing their classes. Part-time instructors were compensated at the stipend rate through the division. There are no records regarding participation but it was significant for only the first year.

Year 2 (2016-17): The job of "level team leader" was expanded and a new title was settled on: "course coordinators." Again, each term a course coordinator was recruited for each of the major courses. New responsibilities for the course coordinators included emailing out their syllabi/calendars/etc. early to everyone, letting instructors know of any changes to CCOGs, and acting as a point person for any questions any instructors might have. The Sylvania Math Department applied for funding through the Office of Professional Development and was able to pay PT faculty the stipend rate from those funds. Participation in level team meetings was about the same or maybe a little less than the previous year.

Year 3 (17-18): During the third year, Sylvania simply recruited a single course coordinator for the entire year for each course. The POD funding ran out but funding for PT faculty was secured through the division, this time at the special projects rate. Despite the extra money, participation in level teams saw a slight decline.

Year 4 (18-19): The Math Department decided to return to the practice of recruiting course coordinators every term. Funding for level team meetings was discontinued, and the Department is looking into different professional development ideas.

Southeast Math Course Lead

Starting Fall 2017, Stephanie Yurasits started course leads for math faculty at the Southeast campus. Both full-time and part-time faculty volunteered to become course leads. If an Instructor needed resources for a particular class, he/she would contact the course lead. This has been a great opportunity for Instructors to learn from each other, increase community within the faculty and connect with colleagues.

Cascade Team Leaders

Cascade full-time faculty serve as level team leaders for MTH courses such as MTH20/58/60/65/95/98 and so on. Level team leaders reach out to their assigned faculty to confirm book orders and later they follow up to provide support with sample calendars, syllabi, and other course support that faculty might need throughout the term.

Rock Creek Level Teams

Rock Creek established level teams and several attempted to meet face-to-face but found it difficult to find time to do so. Collaboration was moved online via email and eventually was no longer pursued. Other ways Rock Creek part-time instructors have been supported include: extensive training and assistance in adopting to the flipped model of teaching; new instructors have been partnered with mentors who teach the same course; new instructors have also been observed informally, during their first term at Rock Creek followed by informal support meetings with the FDC and quality Q&A time; new online instructors have been partnered with same-course experienced online instructors to develop and update online courses, which include follow-up meetings each term.

Chapter 6: Facilities, Instructional, and Student Support

Describe how classroom space, classroom technology, laboratory space, and equipment impact student success.

Technology has, and will continue to, reform math instruction, and our needs have evolved and increased over the last five years. The Math SAC has removed the requirement for physical calculators, instead offering instructors a choice between Desmos and GeoGebra, two free online graphing utilities. This shift requires the use of computers, tablets or smartphones. In addition to the need for access to Desmos and GeoGebra in higher math courses, many instructors are moving to a flipped classroom model which requires in-class access to online homework systems. MTH 58/98 heavily rely on technology (including lessons centering on generating Excel spreadsheets), requiring Chrome books for many lessons.

At Southeast Campus, one classroom is scheduled to run only MTH58/98 courses. In the classroom, tables remain organized into groups. Two class sets of Chrome books were purchased for Southeast faculty to use. This greatly helped MTH 58 and MTH 98 Instructors. MTH 111 and MTH 112 are two classes heavily relying on technology. Starting Fall 2017, all MTH 111/112 classes are taught in computer labs at Southeast Campus.

At Sylvania, ST204 became a dedicated math computer lab helping to serve the increased need for computer access during math instruction.

Cascade has three dedicated math computer classrooms used for ALC, Statistics and Calculus classes. Many of our online instructors use department-issued Surface Pro tablets to enhance their classes. Training for computer classrooms and tablets occurs between instructors as needed.

At Rock Creek, with a few exceptions, all math courses with level 100+ continue to be held in computer labs. Rock Creek recently added an additional computer classroom to meet this need, raising the number of computer classrooms dedicated to math classes up to six, which is more dedicated computer classrooms than the other three campuses combined. This advantage has allowed faculty at Rock Creek to innovate and employ ALEKS for experimental pilots as well as use ALEKS in conjunction with increasing demand for ALC courses. It has also allowed a disproportionately large number of faculty to experiment with the flipped classroom model. Raising all campuses to this level of access to technology would improve the possibility of innovation and equitable access to technology for students.

Rock Creek added a computer classroom and added computers in two of our current computer classrooms. Rock Creek Library also checks out laptops to instructors as needed. Hillsboro Center added a classroom set of Chromebooks for part-time faculty classroom use. Part-time faculty were included in the discussion of what technology they would need and use during class, in order to better support the needs of math classes at Hillsboro. Additionally, within the Math Department a closed-door office space has been created for instructors. This space has multiple uses: instructors can meet privately with students or hold study sessions with small groups of students. Additionally, a computer with video capability has been installed for instructors to record their own lectures.

Describe how students are using the library or other outside-the-classroom information resources (e.g., computer labs, tutoring, Student Learning Center). If courses are offered online, do students have online access to the same resources?

Increased Use of Library's Technology Materials

As the Math SAC continues to move away from graphing calculators and toward free online graphing utilities, the role of campus libraries has increased for math courses as students rely on tablets and smart devices checked out from the campus library.

Math Support at Student Learning Centers

Academic support services are a critical piece of students' academic success. Through one-on-one tutoring, group learning experiences, and online resources, the Student Learning Centers (SLCs) are integral to the success and retention of math students across the curriculum. In addition to offering content support, each center contributes to creating an inclusive learning environment on campus, which further supports student completion and retention.

There are four Student Learning Centers (SLCs)- Cascade, Rock Creek, Southeast, and Sylvania- which work in close partnership with the Math Department on each campus. All four centers collaborate with the department in the following ways:

- Attend Math Department and SAC meetings whenever possible to stay abreast of priorities within the discipline and to build relationships with faculty and staff;

- Utilize early alert methodology with math faculty to connect students to resources and academic support services;
- Hire part-time faculty as tutors;
- Offer space for faculty office hours and/or for full-time faculty to volunteer hours in the Center;
- Work closely with faculty to recruit a diverse and qualified casual tutor team;
- Increase student-tutors' engagement and increase their completion rates by offering leadership and employment opportunities;
- Partner with Math faculty to recommend, train, and support tutors as needed; and
- Share attendance and demographic data to make informed decisions regarding programming.

In the Spring of 2018, the SLCs, in partnership with the Math Departments on each campus, submitted and were granted funding through the President's Fund to provide embedded tutoring during the 2018-2019 academic year. The SLC SAC identified a critical need for additional wraparound academic support services with a direct connection to the classroom for gatekeeper courses. The aim is to increase equitable student success and persistence in historically difficult classes by providing a collaborative learning environment to improve learning outcomes, build community, and strengthen critical thinking. The SLC coordinators are working with math faculty members to embed student tutors in twenty-four MTH 95 classes across the four campuses over the course of the 2018-2019 academic year. Using data from pre/post student surveys, faculty feedback, and supplemented by completion records for selected courses, the SLC coordinators will be able to study student success and wraparound support services from students who engaged with the embedded model, did not utilize the model, and did not have the model of support.

Does the SAC have any insights on how students are using Academic Advising, Counseling, Student Leadership, and Student Resource Centers (e.g., the Veterans, Women's, Multicultural, and Queer Centers)? What opportunities do you see to promote student success by collaborating with these services?

Students taking math courses or who have taken math courses comprise a majority of students at the College. Students rely on the support offered by the college to succeed. We share the common concern across the College that consistent policies are an advantage to student success; that policies determined by evidence for success are an advantage; and that equitable funding and resources from campus to campus is an advantage.

Of specific concern of the Math SAC is the support offered by Advising; Student Resource Centers; and the Testing Centers.

Advising: We rely on Advising to offer students complete, accurate and supportive information to regarding options for initial placement and options for lateral movement. We rely on Advising for support for MTH 58/98/105 which is often the best option for a student but we worry is too often not offered by Advising.

Student Resource Centers: Access to quality math tutors is essential for some students. We hope for more stats tutors, more hours offered, and security that tutoring will be available Monday through Saturday.

Testing Centers: Nearly all online Math courses at PCC require two proctored exams. Many students need support from Testing Centers to schedule an exam if they cannot attend a scheduled exam. As the online student population grows, we hope for extended hours and access to testing Monday through Saturday at all campus.

In addition to established Resource Centers, we have active Math Clubs at two campuses:

Rock Creek Math Club

The Rock Creek Math Club is a student club whose aim is to explore and spread the appreciation of mathematics. First chartered in October 2017, in their first year, the club has hosted an e-Day event (2/7/18), a Pi-Day event (3/14), built a pendulum wave for Math Fest, assisted with running activities for Math Fest, competed in AMATYC's Student Research League, taken a field trip to OMSI, held a couple club-only contests, and even had a team-building event doing an escape room. Going forward, the club looks to become an AMATYC-recognized Mu Alpha Theta club, host and compete in more events, and to continue to explore and appreciate mathematics beyond the classroom.

Cascade Math Club

Math Club at Cascade does three things: it brings students together with a shared interest, it provides a place for students to discuss their math classes and study strategies, and it hosts events for the campus community.

It's a diverse group, because Math is inclusive - mathematics is about deep structure, not surface appearances, and there is a pleasant collegiality amongst those of us who study and embrace

mathematics. Math Club also provides a space for students to discuss their math classes - comparing the methods and pedagogy of the PCC math faculty, sharing tips about studying and the various skills needed to succeed in a math class - as well as helping each other out with the mathematics content. Sometimes they play games - like 'Set' or 'Blockus'.

Math club hosts several events during the year:

- On March 14th, they spent an afternoon handing out slices of pie to the PCC community.
- At least once a year, they organize and host a STEM panel, where various members of the Portland community to work in STEM fields introduce themselves and answer student questions about getting advanced STEM degrees, finding STEM jobs, and working in their fields.
- At least once a year, they host a movie night, usually with a mathematics theme ('Pi' and 'Hidden Figures' most recently).
- They provide a place to study for the AMATYC SML exam.
- They help out at Math Fest.

Moving forward, depending on student and faculty interest, they might host a faculty lecture series, run games tournaments, or participate in ASPCC fundraising and community outreach activities.

Chapter 8: Recommendations

What is the SAC planning to do to improve teaching and learning, student success, and degree or certificate completion, for on-campus and online students as appropriate?

We've integrated our response to this question with our response to the next question.

What support do you need from administration in order to carry out your planned improvements? (For recommendations asking for financial resources, please present them in priority order. Understand that resources are limited and asking is not an assurance of immediate forthcoming support. Making the administration aware of your needs may help them look for outside resources or alternative strategies for support.)

Our SAC has a variety of recommendations for improving teaching and learning, student success, and degree/certificate completion. We've organized our recommendations into four categories:

- A. Support for Faculty
- B. Support for Instructional Tools and Classroom Design
- C. Support for Students from outside the Math SAC
- D. Support for the Student Social Safety-Net.

A. Support for Faculty

1. **The Math SAC recommends more training of faculty on innovative teaching strategies like “just in time” teaching, flipped teaching models, the POGIL method, culturally responsive teaching strategies, and facilitating group work.** With the awareness of culturally responsive teaching, many instructors are using more class time for group work and flipping classes so that students work together for much or most or even all of the class time. These innovations help students build relationships with each other and be more engaged, but also come with challenges in small-group and interpersonal dynamics. Many math instructors are interested in developing skills to better facilitate these small groups in order to create a supportive and productive environment and increase success. Additional instructors may be willing to move toward group-centered classes if they had more training and support.
2. **The Math SAC recommends that the college provide more funding for part-time faculty to participate in SAC activities, attend trainings, and access professional development opportunities.** Our part-time instructors are teaching more than half of our sections: in order to empower them to provide the best experience for our students, they need to be just as familiar as full-time instructors with college policies and practices, curricular changes, and pedagogical techniques. Currently, no planning time is provided for major curriculum changes or for training or course-revision in order to integrate culturally responsive practices into class activities. Our part-time instructors need to be compensated for the increased planning time to integrate culturally responsive practices into their lessons. This affects the quality of the mission, the vision of YESS, and planning and delivering a world-class education for the College overall. We request additional funds be made available for part-time faculty involvement in, and for, SAC related activities. This may include efforts such as increasing the frequency and/or the amount of funds awarded to part-time faculty who attend SAC meetings, increasing the funds available via POD

for conferences, supporting the growth of MYC faculty, and paying part-time faculty for their time spent doing committee work for the SAC. For part-time faculty, getting to know other instructors and having time to discuss practices and experiences is necessary for improvement but often challenging. A structured means for instructors to meet, such as level teams and book groups, is extremely helpful. A structured means to get full-time and part-time Instructors together to discuss teaching will benefit everyone.

3. **The Math SAC recommends that the college provide faculty with training on learning assessment and on the requirements of the soon-to-be-remodeled General Education program.** Our SAC has excelled and won awards for our Learning Assessment work, but we struggle to maintain faculty interest in the College's learning assessment projects; this year, no one in the SAC has volunteered to participate in the Learning Assessment Subcommittee. SAC members have grown exhausted by the effort and time required by the learning assessment because we haven't seen benefits proportional to the effort invested from our previous learning assessment projects. Our SAC has great concern about the future of Learning Assessment and General Education courses. There are currently about 15 MTH courses on the General Education List: our faculty will need training on how to create assessments that will satisfy the requirements of the future General Education program in a way that remains meaningful to our students and SAC. We have a great number of instructors who teach courses on the General Education list, all of whom will be expected to give their students an assignment that satisfies the General Education requirements; this prospect is overwhelming, so we are going to need support to be successful in this endeavor.
4. **The Math SAC recommends that the college hire more full-time faculty.** Improving the ratio of full-time to part-time faculty is a consistent request but we ask again that this request is considered. The quantity of SAC work has increased as more administrative and support tasks are falling to instructors, but the number of full-time faculty has decreased. Completing the requested workload is challenging and frustrating.

B. Support for Students from outside the Math SAC

1. **The Math SAC recommends that the Testing Centers offer more testing hours.** Currently, testing resources are limited and unbalanced from one campus to another. In particular, the Cascade Campus Testing Center offers only three days during the week when a student can schedule to take an exam; the Sylvania Testing Center is the only campus offering a weekend testing time; and the Southeast Testing Center is the only campus with an evening testing time -- Wednesday evening at Southeast is the *only* evening testing option at a PCC campus. This limited testing support can be very challenging to our students who are often navigating busy schedules of their own: they need options at all of our campuses including times in the evening and on weekends. Effective Winter 2018, Online Learning implemented new requirements for instructors teaching online courses regarding proctoring options for students, but our Testing Centers don't have sufficient funding or staff to support the increasing need for proctored testing. The Math SAC recommends that the College increase the make-up testing opportunities at all campuses, especially with regards to testing times at Cascade Campus and evening and weekend testing times throughout the district.

The SAC also recommends that a greater effort is taken to involve stakeholders (like Math faculty) in the decision--making process that leads to the policies and practices of the testing centers.

2. **The Math SAC recommends college-wide support for MTH 58/98.** There are still courses at PCC that should include MTH 58/98 as a prerequisite but do not. This oversight prevents MTH 58/98 from being a viable option for nearly all degrees and certificates despite the inclusion from many degrees and certificates themselves and the support and acceptance from Departments across the college. This oversight is simple to fix, but takes knocking on doors both within PCC but also at institutions outside PCC. This oversight prevents students from being successful in their math coursework. The College should offer support to increase enrollment in MTH 58/98 as a viable pathway for students, particularly those who will need statistics for their degree or certificate. The college should offer support from other STEM and non-STEM Departments to add MTH 58/98 as a prerequisite for *any course not requiring calculus*. The Math SAC senses that, initial support for MTH 58/98 has waned and the responsibility has fallen too heavily onto Math faculty to knock on doors or push non-STEM pathways at other colleges and internal courses. PCC's advising department should help recruit more students into MTH 58/98. The administration should put in the effort required to motivate PCC programs and SACs to change math requirements to include MTH 58/98 so advisors can make this recommendation responsibly. This could be the single biggest way to move towards our goal of equitable student success.
3. **The Math SAC recommends that the college reconsider the placement levels used for new students and to give adequate support to students who are placed into their highest course but might have weaknesses/holes in prerequisites.** Many Math faculty are concerned that the changes to the placement system have resulted in students receiving incorrect placement, so we ask that the College reconsider the levels that students are being placed in. Given the increased complexity of the placement system (which is designed to place students into the highest math course they are logically prepared for), mandated advising for students placing low in the math sequence, and a new non-STEM math pathway, the burden on advising has increased multiplicatively. To best increase success, students need access to extend advising hours and an improved advisor-student ratio.
4. **The Math SAC recommends that the college reconsider the Week 1 drop deadline.** The College should revisit the Week 1 drop deadline and examine the negative impact on students. We suspect that the Week 1 drop deadline negatively impacts marginalized student populations more than others and recommend the College consider a three-week step-down refund policy similar to PSU's refund policy.

C. Support for Instructional Tools and Classroom Design

1. **The Math SAC recommends that the College continue to provide support for the adoption of Open Educational Resources (OERs) for math and other disciplines.** Two of the goals in PCC's mission statement are *equity* and *quality education*: one of the quickest ways to help achieve these goals is to increase the usage and support of OERs. Students regularly make their voices heard that too often they are burdened with expensive textbooks, which they may only

lightly use. Students have to decide each term whether to buy books in place of utilities, food, or maybe even rent. And certainly, studies show that OER's increase the number of courses students can afford, and this seems to increase the number of students enrolled full-time. Numerous OER materials across disciplines already exist and can be implemented by instructors in one term, yielding an immediate improvement in equity in access to materials. The college should continue to actively and strongly support grants and funds that allow faculty to create OER material; whether it be full books, online content or otherwise. This in turn will allow cross-campus collaboration, encourage dialogue and faculty communication about classes, and allow PCC to be a leader in the development and use of OER materials.

2. **The Math SAC recommends that the college increase the availability of ALCs and/or co-requisite tutoring sessions.** Many of our students need extra support. The Student Learning Center is an invaluable resource, but for some at-risk students, it is not enough. In order to succeed in their math pathway, students need to attend an extra class to fill in gaps in their learning while simultaneously taking their regular math class. The co-requisite model is gaining traction on the east coast. We want to increase the availability of ALC's and explore other corequisite models in order to better join in this innovative national effort.
3. **The Math SAC recommends that the College create more computer classrooms or purchase more Chromebook class sets.** The Math SAC recommends that each campus convert more classrooms into computer labs or purchase more class sets of Chromebooks in order to support innovative and effective methods of instruction like flipped classrooms and employ technology like Desmos, GeoGebra, WeBWorK, Connect, and Excel.
4. **The Math SAC recommends that the college increase the number of classrooms with tables for group work and computers around the perimeter.** More and more instructors are integrating group work into their classrooms, and MTH 58/98 require group work explicitly. It would be convenient to organize some classrooms into groups instead of the traditional desk-forward layout. Currently, only Southeast Campus and Rock Creek campus have classrooms dedicated to math instruction in groups where students do not need to move tables and chairs each day. The Math SAC recommends more classrooms dedicated to group-work-based instruction. If computers were installed around the perimeter, the classroom could function both for group-work and for computer/online work.

D. Support for the Student Social Safety-Net

The Math SAC recommends that efforts are taken to address students' basic needs. The Math SAC supports President Mitsui's call for student housing and encourages the college to look critically at this and other basic needs for students. The Math SAC suspects that students not only need added support and programs that could be cost-neutral, like creating student housing or disseminating Food Pantry items into classrooms, but students are also hindered by negatives that might silently prevent students from success: the Week 1 drop deadline; multiple student support mandates for students to achieve before progressing in their academic pursuits; tight deadlines and poorly-advertised financial resources lead to deletion for non-payment unnecessarily; transportation obstacles including parking fees and fines can cost more than books. As experts in fractions, we worry that improved ratios might accidentally come from

decreasing the number of marginalized students from denominators instead of increasing the number of marginalized students in numerators.

Professional Development Records

Damien Adams:

- I am a Project ACCESS alumnus.
- I have been to three AMATYC National Conferences, a CMC3-S Conference, an ORMATYC Conference, and the Andersen Conference.
- I have presented a short presentation and a poster at AMATYC in Denver.
- I serve as a member of the Equity Task Force under AMATYC.
- I have started a Math Club at both Cabrillo College and at PCC Rock Creek.
- I have created and am currently working on my podcast "Women in Math: the Limit Does Not Exist."
- I was a Faculty Union Representative at Cabrillo College for two years.
- I have served on a Math FT Faculty Hiring Committee at Cabrillo College, seeking four positions.
- I served on the Calculus Textbook Committee here at PCC in the Spring.
- I have attended several Higher Math Conferences in the Bay Area.
- I was a curriculum reader for two years at Cabrillo College.

Julie Armstrong: I attended the regional Teachers of Mathematics Conference in Portland last fall (2017).

Jessica Bernards: Professional Development Highlights:

- AMATYC Member and AMATYC Project ACCESS Cohort 9 Alumni
- Attended and presented at the AMATYC conference over the past five years
- Attended and presented at the ORMATYC conference the past five years.
- Attended and presented at the ICTCM conference the past five years
- Completed the "Flipped" class PCC put on by the TLC at Rock Creek and now I am leading other instructors on flipping their classrooms to increase pass rates.

Professional Development Accomplishments:

- Recipient of the Leila and Simon Peskoff Award (a National AMATYC award)
- Improved MTH 111 pass rates from 50/60% to 90% by changing my pedagogy to using the "flipped" model.
- My OER Math Study Skills Program (found at spot.pcc.edu/mathstudyskills) is now getting used at over 22 colleges nationwide including PCC!

- Created PCC's DL MTH 111 Shell
- Created PCC's DL MTH 105 Shell

Julie Bonds: Attended the ORMATYC conference and Anderson conferences.

Ann Cary: I have served as the online faculty mentor for MTH courses since 2014. To be prepared to take on this role, I completed two 20-hour trainings on the Quality Matters rubric and online course design. This responsibility involves working directly with OL staff to onboard new online instructors, help identify ideal course shells for course takeovers, and reviewing both new course developments and revisions to existing courses.

I have also served on the college-wide curriculum committee since Fall 2013. This role has involved reviewing monthly curriculum agendas, attending monthly meetings, and keeping the MTH SAC up to date on the work of this committee. In September 2017, I assumed the role of chair of this committee. In addition to chairing monthly meetings, this responsibility involves monthly meetings with various college leadership (VPAA/VPSA, district president, and DOIs), attending monthly EAC meetings, and participating on the YESS district team. This role has also given me the opportunity to be nominated for the statewide transfer workgroup tasked with developing a 30-credit foundational curricula (now referred to as the "Core Transfer Maps.") This work is now complete, and I was nominated for and will serve on the Oregon Transfer and Articulation Committee (OTAC) starting Fall 2018.

Other focuses of my professional development over the last 5 years have included: participating in the ORCCA project and pilot as an author and project lead; chairing the Technology Use Subcommittee; presenting at ORMATYC in 2018; attending multiple conferences; developing course material for and teaching Statistics I and II for the first time; and co-developing new online course shells for MTH 60 and 65.

Amy Cakebread: I have attended ORMATYC for the last 3 years and have presented once. This conference offers me the opportunity to take the best that other instructors have to offer and implement them in my classroom for the benefit of my students.

I have been a member of the Oversight Committee for High School Based College Partnerships and am currently serving a two-year term as co-chair. As a member of this committee, I have had the privilege of

working with the HECC and Department of Education in creating a self-study model for institutions offering dual credit around the state.

In addition to being a member of good standing in numerous MTH SAC sub-committees, I chaired a Math SAC sub-committee whose task was coming up with a philosophy statement regarding our notation standards. After our work, I had a larger understanding of the methodology behind our standards. I was able to communicate this to my students, every PCC dual credit high school teacher, and to other K-12 district affiliates. I served as Math Dual Credit Liaison for 2 years. This work allowed me access to over 40 classrooms where I was able to observe and discuss best practices and pedagogy with our partnering dual credit high school teachers. I was excited to be a member of the level teams at Sylvania. Our teams met frequently to discuss ongoing lesson plans, assessments, and alignment. I attended the NACEP Conference in 2016. This conference offered many opportunities to learn how other states utilize dual credit.

d'Marie Carver: In 2013-2014, researched and helped write the NSF grant proposal for creating an alternative Math Pathway for students not needing the traditional algebra courses for their majors. When that was abandoned, I was part of the steering committee that created the Math Literacy Pathway (MTH 58/98). This committee went to Champaign-Urbana, IL for a 3-day training session. Included in the development of these courses, I worked with the Advising and Counseling departments to help create a College Success Course to be linked to our MTH 58 course. In 2015 I was a co-presenter at the ORMATYC and Anderson conferences on our Math Literacy program. I worked closely with other SACs to help guide our decisions about the content of the courses and to promote the courses on our campus. Once new instructors wanted to teach the courses, I helped with their training. At a training session for Math faculty on the Math Lit courses, I presented a session on the importance of teaching the reading process for understanding in our math courses. I was also a member of the Basic Skills Math Committee and attended several workshops pertaining to the redesign of developmental math in Salem.

I attended the ORMATYC conference in 2016 and 2017 with an emphasis on attending sessions for Mathematics for Elementary Teachers and Math Literacy.

Kara Colley: I attended a POGIL curriculum writing conference in 2015. I attended ORMATYC in 2017. I attended a Center for Undergraduate Research conference in 2018 to train me to run a math research group.

Noah Dear: I took part in a faculty inquiry group over the 2015-2016 school year where we explored ways of making the teaching of mathematics more inclusive and accessible to a diverse student body. We looked into how to create meaningful and engaging activities for the students to discover mathematics and take ownership of the material. We investigated group norms and how to help students feel appreciated and valued in the contributions they were able to make. We looked into the difficulties students have in group work and how to attempt to alleviate their difficulties via time to work solo before interacting as a group. Recognizing that no matter what, some students will not feel that group work is the most effective learning style for them and to make sure that the classroom engages multiple modes of teaching to reach as many students as possible. I also took part in the Social Justice Workshop where we delved into being sensitive to a diverse population's differing backgrounds and becoming more aware of microaggressions.

Twice I've gone to ORMATYC and learned about how to code a textbook (which I'm using to some extent as I do curriculum development), use different apps and software for classroom engagement, and little tidbits of math and physics that are fun to include within different classrooms.

William Diss: I attended the Oregon Mathematical Association of Two-Year Colleges Conference [ORMATYC] in 2017. I attended sessions on motivation, using online books, using technology in the classroom, and others. I also was able to contact people around the state and have been able to communicate with them after the conference.

I have taken classes in the Communications Department at PCC on listening. I have attended many of the SAC meetings for our department and I have served on different committees. I also have taken classes outside of PCC on teaching students with learning disabilities. I have attended seminars from the REACH Family Institute on teaching students with learning disabilities. I participated in a grant for STEM. The impact on my classes is that I do try and help students with learning disabilities with flash cards. I also have added some highlights of underrepresented populations who have done well in STEM. I have taken classes on listening. I have served on committees addressing technology, dual credit, and standards for mathematical assignments.

Diane Edwards: The highlights of my professional development include research around: 1) Placement, as part of the placement committee, and 2) math support courses, used in the development of RC ALC courses, and 3) dual credit, as part of the Oregon Metro Connects PLC grant, which came up with dual credit recommendations, (ie. Willamette Promise, college course options, course prerequisites, transfer

credits and teaching credentialing). Additionally, I have had training on culturally responsive teaching and Coaching for supervisors. I have also attended and learned from conferences such as ORMATYC.

Ross Folberg: No professional development activities reported.

Austina Fong: Before 2016, several Math courses up to MTH 243 were offered online to provide more options for students. For those on the STEM track, their online math offerings stopped at MTH 112, requiring them to sign up for face-to-face Calculus classes. Seeing the need for Online Calculus course offerings, I received SAC approval and took the lead in designing and creating Online MTH 251: Calculus I and Online MTH 252: Calculus II. The course design features instructor-created video lectures, technology labs that utilize the free graphing technology Desmos and GeoGebra, discussions where students can view one another's work to improve their understanding and documentation of Calculus, homework and quizzes through the online homework system WebAssign, and proctored in-person exams.

The first offering for Online MTH 251 ran in Winter 2016, with the section filling up very quickly, and continued to run one section every term until Fall 2016 when demand called for two sections to be offered. Two sections of Online MTH 251 now continue to be offered every term, even Summer. The first offering for Online MTH 252 ran in Winter 2017 with two sections being offered every term since Spring 2018. Overall, student evaluations of these courses are consistently positive with students often mentioning the extremely organized layout/design, the helpfulness of the instructor-created video lectures, and the level of engagement provided in the course design through the technology labs and discussions.

With the success of Online MTH 251 and MTH 252, the Math SAC recently approved the design and creation of Online MTH 253 and MTH 254 with Dennis Reynolds of Rock Creek as the lead. These courses will likely be first offered in 2019, with a team of faculty across multiple campuses collaborating on the design.

Will Freeman: No professional development activities reported.

Wendy Fresh: I have been fortunate to be able to attend AMATYC (American Mathematical Association of Two-Year Colleges), ICTCM (International Conference on Technology in Collegiate Mathematics), and ORMATYC (Oregon Mathematical Association of Two-Year Colleges) for the last 5 years, as well as present in most of those years. These conferences provide a national perspective regarding the trends in

mathematics education as well as giving the opportunity to connect with colleagues across the United States. In addition, in 2017 I was able to attend a Quality Matters conference that gave me training in Quality Assurance in Online Learning. This training was key as I developed a MTH 112 Online course for PCC in 2018. The videos that I created for this course I've also put to use in a "flipped" on campus course that has seen great success in the form of higher pass rates.

In 2015, I was co-chair with Jessica Bernards of our SAC (Subject Area Committee). Being in this leadership role gave us a better understanding of how the college works as a whole, as well as get to know our colleagues better. In addition, in 2018 I joined the DAC (Degrees & Certificates) committee. As with being SAC chair, being on this committee has opened my eyes to the thought behind creating and maintaining the degrees and certificates at PCC.

Dave Froemke: I worked on a set of student-friendly course descriptions, and a decision tree, designed to help students entering PCC decide which Math class was the best choice for them.

Matthew Funk: In May 2014, I was given the opportunity to present a Lightbulb lecture at the SE campus, along with a few other colleagues from other disciplines. My talk was about "How to Be Successful as a College Math Student." The main point of my talk was to show the audience that being successful in mathematics is very much like being successful in life, in general; there are certain characteristics that I discussed during the talk, incorporating some humor here and there. The talk is available on You Tube, and I still share this talk with my classes, especially during those moments when the students need an extra bit of motivation. I received plenty of positive feedback from those who attended, and it was a big step in my professional development; It definitely pulled me out of my comfort zone, and I feel confident that if another opportunity like this comes my way, I will handle it even better.

I also served on a couple of hiring committees at my campus (SE), one for a full-time math Instructor, and one for a full-time CADD Instructor. Besides this, I attended all of the math conferences sponsored by ORMATYC, one of which was a regional math conference involving both OR and WA area community colleges. I had the chance to preside at a couple of the ORMATYC presentations. I will be looking to be a presenter again in the very near future.

Oswaldo Garcia-Contreras: Most of my professional development has been received as a member of the Forest Grove School District:

- Equity and Instruction
- Multicultural Issues in Education
- Assessment for Learning vs Assessment of Learning
- Authentic Assessment
- Proficiency Based Grading
- Technology Implementation
- Data Teams

Jay Groom: My development has been on my own time developing curriculum. I have taught 105 for years and developed a similar class at the high school with more content.

Peter Haberman: No professional development activities reported.

Shane Horner: Since the last program review, I have attended ORMATYC three times and have been informed about new developments related to instruction. In particular, the conference has helped me stay current with the new math literacy pathways that have evolved around Oregon and abroad. These conversations have been extremely helpful for me to implement my own teaching strategies for MTH 58 and MTH 98 and stay involved with the CCOG development and changes for these courses.

The 2018 Anderson Conference worked with my schedule and I was able to attend a number of very informative sessions that have persuaded my instructional style.

Alex Jordan: I learned (and later co-developed) PreTeXt software for writing open-source textbooks. Of particular note, I integrated PreTeXt with WeBWork, an open-source online homework platform. Now PreTeXt can be used to write textbooks with built-in WeBWork exercise support.

Suzanne Kaster: D2L Training through TLC, one-on-one help in TLC, break-out sessions at SAC meetings to learn about ORCA and ALEKS, one-on-one help from full-time Instructors for flipped class.

Kenneth Kidoguchi: I continue my effort to ensure that the mathematics at PCC remains relevant to other disciplines. I have worked with Electrical Engineers, Mechanical Engineers, and Physicists to include examples of practical applications in my classes while continuing to meet CCOG requirements.

Kandace Kling: I was the 2015 and 2016 Math Fest liaison. I served on a hiring committee. I attended TLC workshops. I served on multiple committees.

Ross Kouzes: I helped organize and attended the Innovative Growth Solutions team-building activities in April of 2016 as SAC co-chair. We began to learn basic methods for better functioning as a group. I attended the 2018 ORMATYC conference and co-presented on the ORCCA project on which I worked.

Jeff Lacks: I have played a significant role in the development of our new Math Literacy courses, MTH 58 and MTH 98. Initially, this involved traveling to Illinois to observe how these courses were being taught at another school. Upon returning, I have spent time developing curriculum, serving on curriculum and steering committees, collaborating with the advising department, and training new instructors for these courses. In addition, I joined several other instructors here in presenting our work at the Anderson Conference and the ORMATYC conference.

Scot Leavitt: As a faculty member, I've tried to take advantage of all the TLC events that I can fit into my calendar. These have helped broaden my understanding of who I am, how I view the world, and what I can do to improve the world around me.

As a college-community member, I participated in the Campus-CERT training in 2016. This has helped me to be better prepared to help during emergency situations that we might face on-campus. As an FDC, I attended my first FDC Institute in Fall 2017, which helped ground me in much of the work I've done over the past year as a faculty department co-chair at Sylvania. Additionally, I participated in the Culturally Responsive Teaching event at the SE Campus, as well as a Trauma-Informed Teaching event in the Sylvania Math Dept, both in 2018. I also had the privilege of contributing to ORCCA in 2017. This expanded my technical knowledge, but also gave me a chance to directly contribute to our SAC's development of an OER.

Cara Lee: My professional development in the last five years has centered on diversity, equity and inclusion and culturally responsive teaching. I attended three sessions during Whiteness History Month in Winter 2016 and brought my statistics class to a session on using the U.S. Census data to see social impact of race. I participated in the PCC Social Justice Training, Part 1 and 2 in May and November 2016. I have done a lot of personal reflection and processing around race, privilege and social justice. I participated in a 2-day workshop on Transforming White Privilege in Fall 2017. I co-facilitated sessions on Culturally Responsive Teaching for a faculty summit in Spring 2017, and for Division Deans and Department Chairs in Spring 2018. I participated in the Teaching Men of Color class and led a session on the Intersections of STEM and Identity at the Anderson Conference in Winter 2018.

I also participated in two different trainings on Trauma-Informed Learning. Another aspect of my professional development has been in Open Educational Resources. I co-presented at ORMATYC in Spring 2018 for our ORCCA project, and at OpenEd in Fall, 2018. At the OpenEd conference I learned about open pedagogies and reflected on not creating the same structural inequities in open materials. On my own, I read *Flipping the College Classroom* and *Breakthrough Strategies: Classroom-Based Practices to Support New Majority College Students* and I am implementing ideas from these books in my classes.

Tammy Louie: Over the past five years, much of my professional development came from taking on new positions in the math department. Between 2015 and 2017, I co-chaired with Ross Kouzes for the MTH SAC. Immediately following SAC chair, I took on the role of Faculty Department Chair (FDC) at Cascade campus. Both of these roles include a fair amount of on-the job learning from fellow FDC's and from the Division Dean.

I participated in various college-wide training sessions with focus in and out of the classroom. Examples include PCC's Emerging Leaders seminar, PCC Reads weekly book group on *Small Teaching* by James Lang and FDC training by Diversity, Equity and Inclusion.

Other professional development opportunities came from outside the college in AMATYC's Project ACCCESS. Project ACCCESS is a fellowship program designed to mentor new full-time faculty. Since ending my two-year stint in ACCCESS, I continue to volunteer my time as Project ACCCESS's Program Assistant.

Michele Marden: As described in the last program review, my involvement with assessment of student learning lead to radical shifts in my teaching practice. This continues to be a lens by which I evaluate my teaching; however, since last program review, I was honored to serve as Teaching Learning Center Co-coordinator at Sylvania Campus. While assessment of student learning led to a 180-degree shift of my teaching practice over the period of 2-3 years, the experience providing and co-creating faculty professional development for TLC work has deepened my self-evaluation of my teaching practice, particularly for equity and inclusion. One of the most powerful experiences was co-facilitating an Equity and Inclusion focused Professional Learning Community as a TLC coordinator.

My desire to see PCC develop robust professional learning focused on the practice of teaching prompted my involvement with CIC, TLC, EAC, BPAC, CPAC, FFAP, and other district committees. In turn, my involvement with these groups lead to an interest in organizational structures that support student success. Most compelling was learning about the processes by which faculty and administration at other institutions worked collaboratively to scale and sustain organizational and culture change. The most impactful to me was studying the Dana Center information for how to create systemic change at scale for math reform and the TLC collaborative work (and outreach) to develop a strategic plan for professional development with consultant NXT.

Henry Mesa: I feel the following activities are the most meaningful given our current attempt to revamp our institutional model (YESS).

I attended two presentations by Dr. Rob Johnstone from National Center for Inquiry improvement on guided pathways which made me a proponent of the Guided Pathways Model.

Participated in an advisor committee and did some reading on community colleges that have revamped their advising, onboarding process, and student tracking which turns out to be tied to Guided Pathways.

Attended workshops on Flipping Courses at the TLC and visited courses that are using a flip model.

Pardis Navi: The highlight of my professional development for the last 5 year was attending The American Mathematical Association of Two-Year Colleges (AMATYC) conference. AMATYC is an organization dedicated to the improvement of education in the first two years of college mathematics. I have engaged in Courageous Conversation training sessions.

Emily Nelson: In the last few years I have been working on perfecting my video making skills and producing video that can be used either for flipped classrooms or as online content. When the Smart Board monitors were acquired in a few of the computer classrooms, I went to a training offered at Rock Creek and started using the Smart Board Monitors to record my lecture notes. A static recording of my lecture could be saved as a PDF and posted for my students. Later I had the idea of doing a Camtasia video of what I was doing. I decided that this would be an easy way to make video and flip my classroom so that students could watch my lecture outside of class and come into class to work problems and get help on areas that were a struggle. That worked very successfully in MTH 112. In the Spring of 2016, I purchased a Surface Book and was thrilled with this technology by comparison to what I had been using. I began creating videos for MTH 95 which I flipped that quarter. The videos became content for an

online MTH 95 course I developed for the following Fall. In April 2016, I gave a presentation at ORMATYC together with two other colleagues who had also been making video. Between the three of us, we outlined how to make video with a Surface, iPad, and using a document camera. In Spring of 2018, I was given release time to create video to accompany the ORCCA text for MTH 95 and make a sharable D2L shell for the online MTH 95 ORCCA pilot.

Since I began experimenting with flipped classrooms, several other Instructors have also tried this and have found students to be grateful for the ability to watch a lecture multiple times if needed and then come to class to get help on what they are still trying to master. Overall understanding and assessment scores have been found to increase by this method of teaching.

Jeff Pettit: I have attended several in-house professional development opportunities regarding Open Educational Resources organized by the TLC as well as members of the Math SAC. In addition, I have attended visiting lectures by Uri Treisman and visiting artists through the Rock Creek Art Department. I have attended ORMATYC conferences every year and presented or presided each year. I have also traveled to Achieving the Dream conferences in Nashville and St. Louis. Some atypical professional development I have participated relate to my personal life where I have completed renovations to my garage to become a 1-bedroom apartment; the financial details and physical construction have added to my teaching by bringing real-life applications to the math topics I teach. In addition, when my eldest son examined options for high school, I visited area high schools including Roosevelt, Jefferson, Benson and De La Salle where I gained a better understanding of the Dual Credit opportunities schools offered and could compare the limited offerings at PPS schools compared to the broader Early College program at Rock Creek campus.

Sonya Redmond: I was chosen to be part of AMATYC's Project ACCESS program. As part of this mentoring and professional development initiative, I attended the AMAYTC conference in 2016 and 2017, participated in a variety of activities with my ACCESS cohort, and presented my project on the effectiveness of studentship interventions (2017). This was a tremendous opportunity that allowed me to discuss issues related to student success and equity with math faculty from across the nation. These discussions inspired me to rethink how I approach teaching, and to look for better ways to inspire students to succeed.

In 2017 I attended the National Conference on Race and Equality in American Higher Education (NCORE) in Fort Worth, Texas. The conference provided me the opportunity to learn about race and ethnic

relations in higher education from a variety of perspectives and personal experiences. The experience has had an enormous impact on my understanding of what equity and inclusion means in my classroom and to the underrepresented students that I serve.

Dennis Reynolds: No professional development activities reported.

Bret Rickman: I was a presenter at two different ORMATYC conferences. During the 2015 conference I presented "Magic Squares and their use in Algebraic Instruction". At the 2017 conference I presented "Simulation Based Inference for Learning". Both sessions were well attended and spurred much discussion / participation. I am planning on presenting at the 2019 ORMATYC conference a session on "Flipping the Statistics Classroom" (work that I began during the 2017-18 school year).

Another area of professional development occurred for me during the 2015 ORMATYC conference at a presentation by Dr. Allan Rossman on "Simulation-Based Inference in the College Classroom". This session (and subsequent research and application I've done) have completely changed the way that I teach my statistics class - with very positive results! I also attended the Northwest Math Teachers Conference and Oregon Educational Technology Conference within the past two years - and will be attending the 2018 National Alliance of Concurrent Enrollment conference in November of this year.

Ushaben Patel: I have attended the workshop -Teaching the man of color. Attended Flipped classroom workshop during Summer 2018 and applied in my classroom. Flipping is a great idea of creating the community of learners and is helpful to students and Instructor with learning process as it prepares the students beforehand.

Wendy Peterman: The most helpful professional development for me was a course, Inquiry Math Learning and Teaching, PSU Continuing Education 510, which spent an academic year on learning in groups. We investigated the research support for group learning, developed group learning tasks and implemented these tasks. I was recorded in class and my teaching was reviewed. Level Teams meetings continue to help me improve my teaching. I also got a lot out of the Equity and Inclusion in STEM opportunity. Here we read and researched in this area individually and shared information.

Marc Rose: I often have students work in groups, and try to gently encourage them to talk with each other without being too forceful with certain students with anxiety issues etc. I usually post scanned lecture notes so anyone can access notes in spite of note-taking challenges. I try to never expect less of a student because of gender, color etc.

Rebecca Ross: Learned the role of faculty department chair which is an administrative role. Conferences attended were Guided Pathways and ORMATYC.

Vincent Rupp: I completed Teaching Men of Color at Community College and found it very rewarding. I have a new appreciation of how some of our students come to the college with different attitudes, expectations, and needs than I do.

Laura Smoyer: I am involved in a grant to see if a type of collaboration called Lesson Study is feasible for community college Instructors. Through this grant, I have had the opportunity to take a deeper look at our larger goals for students in the Math Literacy pathways, and to examine how our instruction supports reaching those goals. I have also been able to share ideas regarding Math Literacy in a structured, thoughtful environment with both PCC colleagues and Instructors from other community colleges.

Virginia Somes: I was a part of the MTH 58/98 Steering Committee from the beginning in 2014. As such I was involved in the initial trainings for the courses as well as coordinating with CG Instructors for study skills classes as well as CAS Instructors for Excel skills classes that paired with our math courses. I taught multiple courses over the first few years we offered them and also mentored faculty new to these courses at the Cascade campus. In 2014, I was one of PCC's representatives at a state-wide Developmental Education Team Meeting and described our new math literacy sequence. In 2015 I was one of the Math SAC's representatives on PCC's Math Path Team that helped create informational documents for PCC students on the math literacy path and the traditional math path. During the academic year 2014-15, I represented the PCC math program at several state-wide meetings to formally structure Math 105 into a course that was consistent at colleges throughout the state of Oregon. As our representative I gathered information from our faculty about the course and advocated for our goals at the state meetings. I worked with math instructors from other Oregon colleges to create a new common course structure for MTH 105. I then communicated the final state course description back to our PCC Math SAC. Afterward I chaired the committee that redesigned our CCOG for the course and picked a new book to go with the redesign.

Thomas Songer: My involvement with Learning Assessment at PCC has been especially transformative for me, particularly since becoming a member of the PCC Learning Assessment Council in 2015. I've led two award-winning annual, SAC-wide assessment projects for Math; supported efforts in using such project results to improve our program; and continuously served as a Learning Assessment Project Coach to many diverse SACs across the district. Throughout all this work, I've enjoyed wonderful support

and professional collaboration with myriad faculty colleagues, students, staff, and administration. My overall understanding of General Education, accreditation, and the role of assessment in our mission to deliver quality education, has grown tremendously from all these experiences.

I've also become notably involved in Diversity, Equity and Inclusion (DEI) efforts at our college. Some highlights include completing two substantial new DEI certificate programs at PCC; becoming an ongoing member of a new PCC resource called LITE (Listening Intervention Team for Equity); volunteering at student resource and support centers; giving outreach and advocacy for students in need; and becoming a Champion Faculty Member with our PCC Fostering Success Program. All these activities contribute to making PCC a place where all members of our community can feel welcome, supported and enabled to succeed. These activities have also further developed my own professional expertise in providing culturally responsive teaching, active learner engagement, inclusive practices, and collaborative learning methodology.

Heiko Spoddeck: Since July 2015, I had the opportunity to serve on the DLDC (District Leaders of Diversity Council). As part of that I attended and presented at many Trainings on Culturally Responsive Teaching and Social Justice. That particularly helped me transitioning from the Student Learning Center into the Math Department in Fall 2016 as it gave my work focus and expanded my skills as a teacher who has as a priority to create an inclusive and equitable classroom.

In Fall 2015, I was granted a sabbatical. That gave me the opportunity to learn about programming in WeBWorK and get familiar with some of the features in the background. I was then able to contribute problems to the MTH 95 problem sets as well as create a full set of MTH 95 assignments. I completed the sets by adding videos to each of them.

Barbra Steinhurst: In last five years: attended four national AMATYC conferences, 4 regional ORMATYC conferences, about a dozen professional webinars and small workshops, a regional multi-day POGIL workshop, 2 PCC Anderson Conferences, started and completed an MBA program, Teaching Men of Color in the Community College, Learning Assessment Peer Reviewer, WeBWorK Problem Authoring Workshop, E/I in STEM Education, Faculty Assessment Class, gave presentations at various conferences, miscellaneous reading of articles shared and journals and blogs followed, unstructured colleague conversations and meetings both in and outside of Math and in and outside of PCC.

Greta Swanson: I attended the two-day Social Justice Workshop in November 2016. One of the activities that I took away from the workshop was a stack of yellow cards. Each card listed a group or identity to which a person might belong e.g., disability status, skin color, family status, etc. They encouraged us to lay the cards out on the table when making decisions. I brought these to my MTH 211-213 book/CCOG

committee when we were discussing changes to the CCOG and course materials. It was helpful to consider the way our decisions could affect different groups of people and work to brainstorm ways to minimize negative impacts. I liked being able to share something from the workshop with other instructors. I followed up this workshop with the Faculty Summit in May 2017.

Starting in Fall 2016, I took the Fundamentals of Online Teaching class followed by the Online Instructor Orientation. At the time, the Cascade math department did not offer any online mathematics courses. Our department was experiencing changes in enrollment and started offering online courses to meet the needs of more students. I completed a partial course revision of a MTH 111 shell after undergoing a full QM and accessibility review in Winter 2018. The course uses ALEKS (an online adaptive HW system), weekly written assignments for prompt individual feedback and fully accessible videos developed by Jessica Bernards.

Emiliano Vega: I helped the Math Department transition to our first ever OER adopted textbook for MTH 243/244. Students will save \$250,000 per year. I presented at AMATYC 2017 about my experiences of OER textbook adoption.

Jonathan Wherry: In addition to being involved at the SAC level, I took over as one of the Faculty Department Chairs for MTH here at the Rock Creek campus in 2016. I have been on numerous committees as a result of this including FDCI, Strategic Scheduling, Campus Leaders, and others. I have attended conferences for saying Yes to Equitable Student Success [YESS], including an all-day training for FDC and Division Deans in the Spring of 2018.

Dennis Williams: I have taken staff development courses on Seven Strategies for Classroom Assessments, Diversity Practices Training, been in workshops with Jo Bolar from Stanford University. Also, I was part of a Math Science Cohort that worked on integrating curriculum.

Carl Yao: I attended the ORMATYC every year, learning teaching strategies and new technology from fellow community college instructors. I presented at 2017's ORMATYC about PCC's ORCCA OER textbook. During the writing of ORCCA and associated WeBWork development, I learned the latest technology about PreTeXt and improved my programming skills.

Ralf Youtz: The two foci of my professional development are educational equity and open educational resources (OER). I have attended and presented at local, state-wide, and national conferences, deepening my understanding of equitable and open teaching practices, and sharing ideas with colleagues.

Student recognition of this work is the highest honor for me. In 2016, I received a Social Justice Comrade Award from the Sylvania Multicultural Center student leaders. In 2017, SE Campus ASPCC recognized me as an OER Faculty Champion. And in 2018, Illumination Project students recognized my support for their work with the DeClare Award and the Sylvania Identity-Based Equity Centers recognized me as Ally of the Year.

Emiliano Vega (CA Math) and I were co-leads on an OpenOregon project to pilot and adopt an OER text for PCC Statistics courses, resulting in hundreds of thousands of dollars in student savings to date. I secured grant support from President's Fund for Excellence to improve our capacity for equity work in the Math SAC during the 2018-2019 academic year.

Stephanie Yurasits: No professional development activities reported.

We will conclude this appendix section with a summary of Michael Marciniak's professional development in the past few years. Michael retired on Jan. 1, 2019. Many wonderful math Instructors retired during the past 5 years, and Michael is simply one of them. They have contributed so much for PCC. Have a nice retirement, Michael!

Michael Marciniak: During the last five years (which are truly my very last five years as I am retiring from PCC as of 1/1/2019) the highlight with regards to professional development was the time I spent (ending in 2015) as co-chair of the Cascade Math Department with Virginia Somes (and prior to her with Holli Adams). As any new Department Chair will attest, one learns an enormous amount about the College itself and how it operates, how to schedule effectively, how to evaluate instructors critically but constructively, how to handle difficult situations with students and faculty, etc. Once you're the chair, you are viewed differently by your colleagues, by the administration, and by students. Each group has its own expectations of your role as chair, and at times those expectations will conflict. It was a most rewarding time, in particular because of the excellence of those two co-chairs with whom I served.

A second highlight was during 2014-15, when I was honored to serve as a faculty mentor as part of the college's diversity internship program. Besides mentoring responsibilities, I was required to attend several two- to three-hour seminars on Friday mornings at the CLIMB center. Our discussions in this group paralleled many of the important, difficult discussions that have been taking place on campuses

throughout the year, relating to identity politics, critical race theory, culture in teaching and learning, etc.

Also relating more directly to pedagogy, Jessica Bernards and others in the SAC have made a strong case that the flipped classroom model may be a more inclusive model for student success, and I have successfully introduced parts of this model in my classes as well.

I served as a faculty mentor as part of the college's diversity internship program during 2014-15. This included attending with the mentees several two- to three-hour seminars on identity politics, critical race theory, diversity, etc. Every year in the spring, I have attended the ORMATYC conference, and have either served on panels or introduced speakers during those years. At those conferences I have sought out workshops and presentations related to diversity, equity and inclusion, such as our own Ralf Youtz's "teaching Practices for Equitable Math Student Success" at the 2018 conference and Carolyn Hamilton's talk on retention at the 2017 conference.

In August of this year, I attended the DTLA Proud festival in Los Angeles, which "is committed to celebrating everyone's story, to spreading optimism, to growing our community and to expanding our definition of diversity." Arguably the arts are undervalued as a means of more deeply understanding these issues and formulating responses and changes in oneself. I regularly attend the Cascade Festival of African Films. In this year's festival was a remarkable film called Vaya written collaboratively with members of South Africa's Homeless Writing Project. In Chicago I experienced the Chicago Art Institute's stunning Charles White retrospective—White "powerfully interpreted African American history, culture, and lives over the course of his four-decade career." Before he became even more famous for his portrait of President Obama, I traveled to Seattle to see the formidable art exhibition of Kehinde Wiley. Google his art and see how "Wiley, engages the signs and visual rhetoric of the heroic, powerful, majestic and the sublime in his representation of urban, black and brown men found throughout the world."

I strongly promoted and attended several events in PCC's "Whiteness History Month. I followed this up with readings recommended by my attendance, such as "Critical Race Theory" by Delgado and Stefancic. I attended Ta-Nehisi Coates' speech/discussion at Portland's WordStock and have also read his influential works "We Were Eight Years in Power: An American Tragedy" and "Between the World and Me."

During the last five years at PCC I have attended every yearly ORMATYC conference. Besides learning about technological/pedagogical/curricular/etc. innovations, this conference continues to be vital in terms of the relationships established and nurtured with community college colleagues from all over Oregon.

I served for several years (ending in 2015) on the ROOTS/TRiO advisory committee at Cascade Campus.

In 2014 at our TLC Virginia Somes and I presented two talks/discussions entitled "Separate Pathways for STEM (science, technology, engineering, and mathematics) and non-STEM students: the big changes coming to mathematics at PCC." Since 2015 I have registered and attended inspiring annual sessions of eCOTS, the Electronic Conference on Teaching Statistics. To any one reading this who teaches statistics, it is highly recommended. I have found the Webinar format to be ideal for an instructor with limited time and tight PCC budgets, and have participated in several webinars involving issues of equity and social justice, culturally responsive teaching, and other related topics --- e.g., Staley, Schrock and Akaj-Anderson's webinar on "Excellence through Equity" and Serratore and Lincoln-More's webinar on "Collective Action to Develop Awareness: Teaching Mathematics for Social Justice: Conversations with Educators."

I regularly attend events relating to diversity/equity/inclusion, for example this year's DTLA Proud festival in downtown Los Angeles, several events at PCC's Whiteness History Month in 2016, a talk/discussion by Ta-Nehisi Coates at Portland's WordStock in 2017, etc.

Appendix: Professional Development Summary

Organization Membership

- AMATYC (American Mathematical Association of Two-Year Colleges)
- AMATYC (American Mathematical Association of Two-Year Colleges) Project ACCESS
- MAA (Mathematical Association of America)
- NCTM (National Council of Teachers of Mathematics)
- OCTM (Oregon Council of Teachers of Mathematics)
- ORMATYC (Oregon Mathematical Association of Two-Year Colleges)

Conference/Workshop Presentation

- AACU General Education Conference
- AHEAD [Association on Higher Education and Disability) Conference
- AMATYC
- Anderson Conference
- Association for the Assessment of Learning in Higher Education (AALHE) Conference
- Disruptions, Innovations, and Opportunities Conference
- Faculty Department Chair and Division Dean Training: Culturally Responsive Teaching
- ICTCM Conference
- Math Club
- NW Mathematics Conference
- Office of Equity and Inclusion 2016 Faculty Summit: The MCOD and the Hidden Curriculum
- Oregon Educational Tech Conference
- ORMATYC
- Systemic Change at Scale for Math Reform at the Student Success and Retention Conference
- Teaching with Purpose Conference
- TLC Presentations

Conference/Workshop/Course Attendance

- Accessing Higher Ground Conference
- A Call for a Collective Action to Develop Awareness: Equity, Excellence and Social Justice in Mathematics Education, 2016-2017
- Achieving the Dream Conference in Nashville
- Achieving the Dream Advising Redesign Conference in St. Louis

- Actualizing Social Justice in the Classroom workshop, facilitator Miguel Arellano-Sanchez, Sylvania TLC, Winter 2018
- Advanced Training: Supporting the Unique Needs of Foster Youth in Education
- AFT Winter School Conference
- Applying the QM Rubrics course
- Association for Institutional Research (AIR) Forum
- AtD Data and Analytics Summit Conference
- Believe: Strategies to Promote Resilience, Self-Efficacy, and Emotional Awareness-webinar
- Bridge 13 workshop
- Building Community in Your Classroom on Day One
- CMC3-S Conference
- Course: Assessing Core Outcomes at PCC
- Course: Critical Race Theory & Social Justice: An Equity Lens & Tool for Teaching & Learning
- Course: Disability Cultural Competency: Diversity, Equity and Social Justice
- Creating Equitable Learning Opportunities: Exploring the Scholarship of Teaching and Learning (SoTL) with Equity Mindset Workshop
- Critical Friends Training course, Summer 2015
- Critical Race Theory & Social Justice, An Equity Lens & Tool for Teaching and Learning, Spring 2016
- Critical Theory and Practice I, II, and III, Amara Perez and Gabe Hunter-Bernstein, 2014-2015
- Critical Theory I, II, III, Pedagogy of Inclusion, Equity and Empowerment
- Culturally Relevant Curriculum, Ann Cary, Mark Goodman, James Harrison, Gabe Hunter-Bernstein and Rut Martinez-Alicea, 2015
- Culturally Responsive Teaching and Critical Pedagogy Across the Curriculum A Summit for Faculty and Educators in Higher Education, PCC Rock Creek, Spring 2017
- Diversity Equity and Inclusion Community College Leadership and Social Justice Workshop
- Discussion Panel: The Educational Experiences of Men of Color in Community College
- EAC/LAC Integration Team Gap Analysis workshop
- Educators in Higher Education, PCC Rock Creek, Spring 2017
- eLearning Conference
- Emerging Leaders Seminar 2015-2016
- Emotional Intelligence Workshop at NISOD

- Engaging and Understanding Disengaged Students
- Equity and Inclusion in STEM (individual research with highlights shared on Google)
- Faculty Department Chair Institute
- Faculty Summit
- Finding Common Ground Through Effective Communication, LERC workshop
- Flipped Learning Institute
- Grievance 101 Training
- HECC OER Symposium
- Incorporating Study Skills Workshop at NISOD
- Intercultural Competence Committee lead by Jackie Sandquist
- Inquiry Math Learning and Teaching, PSU Continuing Education 510
- Institute of Electrical and Electronics Engineers (IEEE) Webinars
- Intersectionality course, instructor Jimena Alvarado, Sylvania TLC, Winter 2018
- Lewis and Clark Assessment Workshop
- Listening Intervention Team for Equity
- Local Google Educational Tools Conference
- Mathematical Education and Society Conference
- Mindful Mondays, Sylvania TLC, facilitator Karen Paez, Winter 2018
- Multi-Institution Professional Learning Group
- National Alliance of Concurrent Enrollment Partnerships conference
- National Conference on Race and Ethnicity (NCORE) Conference
- National Institute for Staff and Organizational Development (NISOD) Conference
- National Trends in Collegiate Mathematics Webseminar
- Northwest Commission on College and Universities Assessment Info Session for 7th year self-evaluation
- NW eLearning Conference
- NW Math Teachers Conference
- NISOD webinar: Women in STEM
- Online Course: Diversity: Skills for Collaboration
- Online Course: Intersections: Preventing Harassment and Sexual Violence
- Open Textbooks in MathBook XML
- Oregon Educational Technology Conference

- OLC Accelerate Conference
- PCC Equity & Inclusion
- PCC Read
- PCC Social Justice Workshop
- PCC Teaching & Learning "Teaching Men of Color" workshop
- PCC Whiteness History Month
- Pedagogy Book Club on Principles to Action: Ensuring Mathematical Success for All
- Placement Research Conference
- POGIL Conference
- Quantitative Literacy norming for Multi-State Collaborative student artifact evaluation
- QM Peer Review course
- Saying Yes to Equitable Student Success
- Social Justice Workshop
- STEM Equity and Inclusion Training
- STEMtech Conference
- Summer Institute for Intercultural Communication (SIIC) Conference
- Teachers of Mathematics Conference
- Teaching Men of Color in Community College CORA Learning online course, instructors Frank Harris III and Luke Wood, Summer 2017
- TEEE Web Seminars
- The Classroom & Navigating Student Behavior: Part 1 and 2
- TLC sessions (various topics)
- Trauma-Informed Learning
- Web Accessibility of Mathematics Workshop
- WeBWorK Authoring Workshop
- Women of Distinction Banquet

District/Campus Committee Service

- Academic Policies & Standards Committee
- Accreditation Review Panel
- Aviation Maintenance Technology Hiring Committee
- BPAC Strategic Funds
- Budget and Policy Advisory Council

- Campus Leaders Committee
- COMPASS Phaseout Committee
- Completion Investment Council
- Degree & Certificates Committee
- Developmental Ed Redesign
- Distance Learning Advisory Council
- District Leaders of Diversity Council LITE Subcommittee
- District Leaders of Diversity Council Policy Subcommittee
- EAC/LAC workgroup
- Educational Advisory Council
- Guided Pathways
- International Conference on Technology in Collegiate Mathematics
- Learning Assessment Committee
- OER Faculty Champion Award (HECC)
- PCC Commencement
- PCC CPAC
- PCC Curriculum Committee
- PCC Diversity Internship Program mentors
- PCC YESS Committee
- PCC YESS Campus Committee
- PCC YESS Data Team
- President's Entrepreneurial Advisory Council
- Rock Creek Campus President Hiring Committee
- ROOTS/TRIO Advisory Committee
- Social Justice Award
- Southeast Diversity Council
- Strategic Planning Steering Committee
- Strategic Scheduling Committee
- Sylvania Diversity Council
- Sylvania Space Utilization Initiative
- TLC District Development Council

Notable Community Service

- Books for Africa
- Friends of Trees
- National Peace Corps Association
- PESKOFF Award

Awards

- Community Based Learning Engagement Award (Amy Cakebread, Ann Cary, Cara Lee, Emiliano Vega, Ralf Youtz)
- Leila and Simon Peskoff American Mathematical Association of Two-Year Colleges (AMATYC) Award: Jessica Bernards
- NISOD Excellence Award: Jeff Lacks, Ann Cary, and Alex Jordan
- Oregon Open Educational Resources Champion Award: Carly Vollet, Alex Jordan, Emiliano Vego, and Ralf Youtz
- PCC Diversity Award: Cara Lee
- Research for SY Teaching Award: Michele Marden
- Women of Distinction Awards: Austina Fong and Galina Golant, Jessica Bernards and Wendy Fresh

Assurances

Please put X's next to all three boxes to verify that...

X faculty and FDCs at all of the campuses offering courses in this discipline/program have received a late-stage draft of the Program Review document.

X all of the division deans offering courses in this discipline/program have been sent the late-stage draft.

X the SAC administrative liaison has reviewed and had the opportunity to provide feedback on the final report.