

STEM ACTIVE LEARNING VIGNETTE SERIES

Weaving More Effective Teaching and Learning Practices in Mathematics and Beyond

ADOPTING READING APPRENTICESHIP AT PASADENA CITY COLLEGE

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The Investment

Since beginning active grantmaking in 2008, the Leona M. and Harry B. Helmsley Charitable Trust has committed more than \$1.5 billion dollars to nonprofits and other mission-aligned organizations in the United States and around the world. Although no longer a focus for the Trust, from 2008-2016 the Trust's postsecondary education grantmaking focused on increasing the number of college graduates in science, technology, engineering, and math (STEM) fields — particularly female students and students of color.

The Trust's postsecondary grantmaking portfolio supported networks of higher education institutions committed to improving instructional practices, primarily for gateway STEM courses, and creating incentives to adopt model policies, practices, and systems that can help improve student retention and completion. Each network adopted one or more "active learning strategies," evidence-based teaching and learning approaches that can improve students' performance in STEM. While the Helmsley Charitable Trust's investment has concluded, most of the networks continue to move forward with implementing these strategies.

The Evaluation

As the STEM Active Learning Networks evaluation and learning partner, Equal Measure is tracking the impact of the Helmsley Charitable Trust's postsecondary grantmaking on faculty, departmental, and institutional change across networks. Since 2014, Equal Measure has used qualitative research methods to examine the results of network efforts as well as conditions that support progress at the educator, department, and institution levels. In 2017, Equal Measure visited five campuses representing four of the initial seven networks to delve into site-level implementation.



In May 2017, Equal Measure conducted a one-day site visit to Pasadena City College (PCC) Main Campus to explore the implementation of the Reading Apprenticeship model across the campus. A key component of WestEd’s Strategic Literacy Initiative (SLI),¹ the model integrates four dimensions (social, personal, cognitive, and knowledge-building) and is rooted in an understanding of how students learn and how to empower them to become independent learners (see Figure 2 on the next page). Instructors model metacognitive thinking related to discipline-specific literacy,² and use scaffolding techniques (e.g., “talking to the text,” “chunking,” and “think-pair-share”) to support student learning. Students experience a combination of guided, collaborative, and individual practice to build upon their background knowledge and increase understanding of new content. Productive persistence is a strong element of Reading Apprenticeship, and framework developers draw connections between Reading Apprenticeship and growth mindset theory.

The WestEd Reading Apprenticeship Community College STEM Network (RACCSN) grew out of the California Community Colleges Success Network (3CSN). 3CSN partnered with RACCSN to develop the network and to advance its mission throughout California. Overarching goals of the network are to:

- Influence STEM faculty to adopt the metacognitive approach to teaching and learning.
- Train and support STEM faculty in using the Reading Apprenticeship framework.

RACCSN activities focus on facilitating professional learning, producing training materials, and cultivating emerging leaders.

PCC is among 17 community colleges in RACCSN. At PCC, implementation of the Reading Apprenticeship framework took root prior to receipt of the Helmsley grant, including as an approach for non-STEM math acceleration. Proposal collaborators sought the grant as an interdisciplinary STEM team across math, chemistry, biology, and career and technical education. Over time, the math department emerged as the lead discipline engaging with RACCSN.

What distinguishes PCC in the network is its effort to integrate Reading Apprenticeship through various strands of work on campus, its large size and ability to scale pilots, and the role of leadership at multiple levels in adopting the active learning strategy to improve the quality of teaching and learning. (See Figure 1 below). It took on a holistic approach, which aligns with Reading Apprenticeship philosophy.

FIGURE 1:

Distinguishing Features of Reading Apprenticeship Implementation at PCC



About This Site

PASADENA COMMUNITY COLLEGE

2-YEAR
COMMUNITY
COLLEGE

400
FULL-TIME
FACULTY

25,000
STUDENTS
ANNUALLY

5,000
FIRST-YEAR
STUDENTS
2016-17

51%
LATINO
STUDENTS

49%
GRADUATION/
TRANSFER RATE

Located in Pasadena, northeast of downtown Los Angeles, California, PCC has slightly more than 400 full-time faculty and many more adjuncts. As one faculty member commented, *“We have more math faculty than some campuses have faculty.”* The RACCSN coordinator, Nika Hogan, is an English department faculty member at PCC. During the 2016-17 school year, PCC welcomed 5,000 first-year students. Serving more than 25,000 students annually, the two-year community college offers degree, transfer, and certificate programs. PCC provides courses of study in science and math, liberal arts, music and art, athletics, nursing, and the vocational arts.³

Its most recent president restored the college’s accreditation from a probationary status linked to non-academic issues.⁴ PCC’s points of pride are its above average graduation/transfer rate (49%, compared to 39% nationally) and its bachelor’s degree attainment rate among graduates who transfer to a four-year university (52%, compared to 42% nationally).⁵ Demographically, the student population has changed dramatically over the past 10 years, and PCC is now a Hispanic-Serving Institution (HSI) with a large population of Latino (51%) students who are underrepresented in STEM.⁶



FIGURE 2:

THE READING APPRENTICESHIP FRAMEWORK



Available at <https://readingapprenticeship.org/our-approach/our-framework/>



PCC's receptiveness to Reading Apprenticeship resulted from a "perfect storm" of conditions.

Despite ranking among the top community colleges in the state for completion, PCC leaders saw an urgent need to reduce the time it took students to complete degrees and credentials, especially for students of color. In 2009, PCC developed a new educational master plan, which prioritized student success, equity, and completion.⁷ An influx of funding opportunities, including a 2010 federal Title V grant as an HSI and 2016 Chancellor's Office Basic Skills and Student Outcomes Transformation grant, have helped propel PCC's efforts.

We tend to have a bit of a knee jerk reaction, 'Ah, this is being pushed on us from above.' And since this [Reading Apprenticeship] wasn't coming from administration, it made it much more palatable... It was us asking for support and the administration agreeing to help us out.

-FACULTY MEMBER

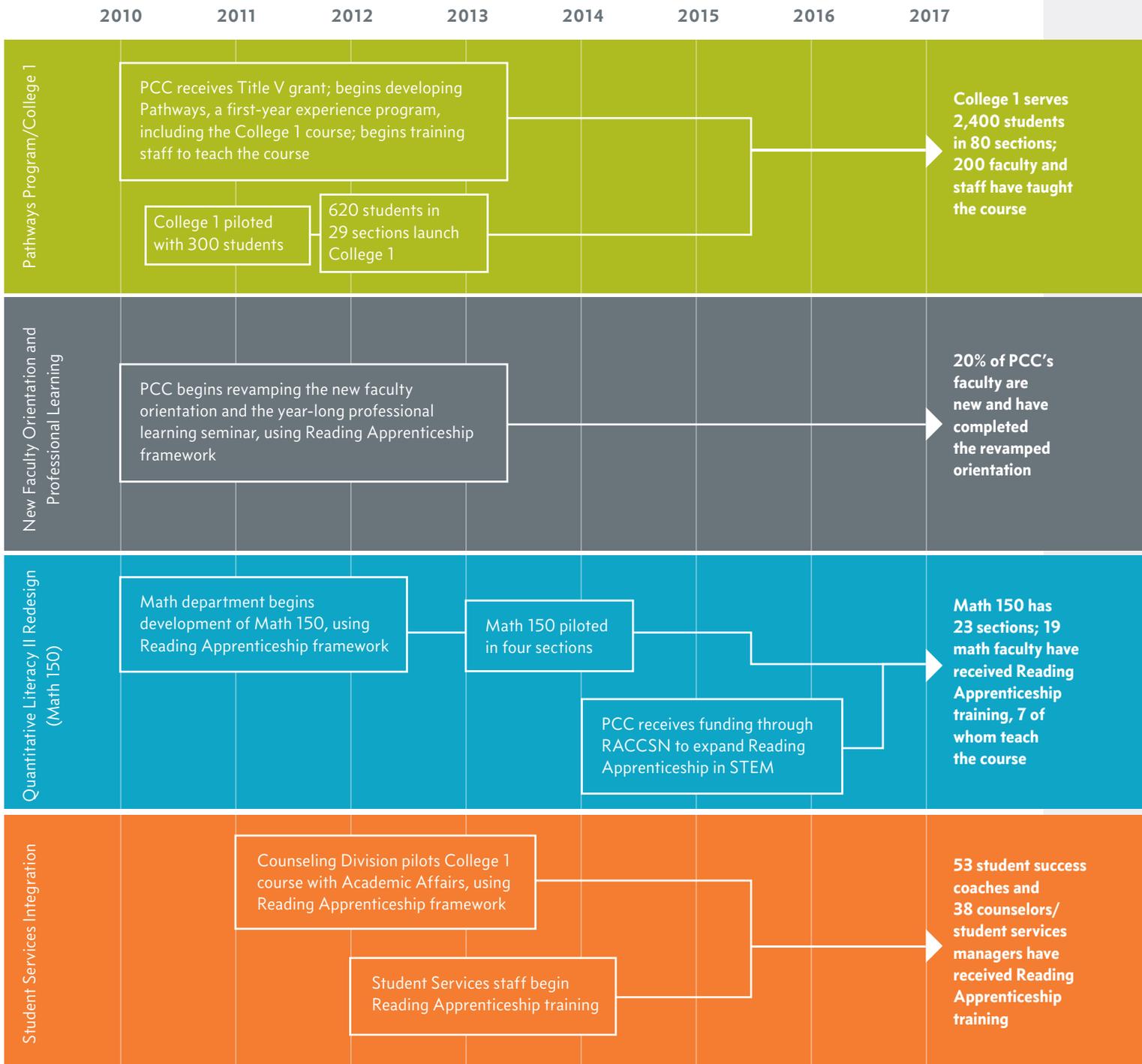
At the same time, PCC educators have spearheaded Reading Apprenticeship adoption. These faculty and institutional leaders were vocal in acknowledging the influential role of pedagogy on student learning. Faculty cited the Vice President of Student Services and the Director of Institutional Effectiveness as examples of Reading Apprenticeship advocates in executive leadership. Academic Senate leaders (Shelagh Rose, Valerie Foster), Dean of Math and Computer Science (Carrie Starbird), and individual faculty members (e.g., Richard Abdelkerim) have been influential "early adopters" and change agents. Abdelkerim, a math faculty member and RACCSN campus lead for PCC, visits other campuses to facilitate Reading Apprenticeship professional learning in math. He has become a key champion for the framework and an informal mentor to his PCC colleagues. Many faculty described the organizational culture as "faculty-led," and Reading Apprenticeship's expansion on campus as a direct result of the network starting from the ground up.

The Reading Apprenticeship framework aligned well with campus needs: curriculum redesign in math, biology, and chemistry; first-year experience program development; and better faculty orientation and professional development. The math department received \$1.5 million over three years to transform its basic skills courses. The department continues to work on reducing "exit points," or levels of math in the basic skills sequence that students must complete to reach transfer-level math.



FIGURE 3:
Reading Apprenticeship Adoption: A Four-Stranded Timeline

To understand and contextualize adoption of Reading Apprenticeship in math at PCC, it is necessary to look at how the work began on campus. Over several years, faculty and staff have integrated Reading Apprenticeship in four ways: College 1 course, faculty orientation and professional development, Quantitative Literacy II (Math 150) course, and Student Services.



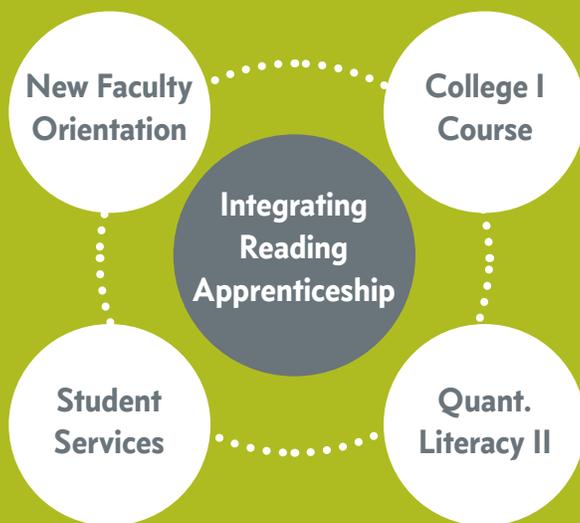
▷ COLLEGE 1 COURSE

Intensive Reading Apprenticeship implementation on campus began with the College 1 course, as part of the Pathways program. In 2010, PCC received a federal Title V grant as a Hispanic-Serving Institution to accelerate student outcomes. School leaders initiated a call to action when 20% of students were dropping out before the end of their first year. Four faculty members, Hogan (English), Rose (English as a Second Language), Starbird (Math and Computer Science), and Cecile Davis Anderson (Counseling) led the development of the first-year program and became pivotal figures in integrating Reading Apprenticeship on campus. They researched best practices for first-year students and their barriers to success in community college.

Hogan, Rose, Starbird, and Davis determined that an open access, transferable three-unit first-year seminar course focused on college-level literacy was an evidence-based approach for reducing academic barriers. The College 1 innovators used the Reading Apprenticeship model of metacognitive techniques to guide the design of curriculum and faculty training for the course. They opened up the course so that any employee with a master's degree could teach it: faculty, classified staff, managers, deans, and the vice president of student services. These individuals demonstrated a willingness to try something new to help students succeed.

FIGURE 4:

Integrating the Reading Apprenticeship Model



Synergistic activities related to student retention and college completion gained momentum through incorporating the Reading Apprenticeship model. For example, there was demand for a first-year experience program that would equip students with the skills to persist through college. This became the Pathways program, with the "College 1" course as a core component. Student services, which offers counseling and tutoring, also became an integral aspect of the Pathways program. The math department was already revamping its curriculum for basic skills students. Then there was demand to revise the new faculty orientation. Through these four strands of work, PCC began institutionalizing Reading Apprenticeship practices in programs and services.



SCALING COLLEGE 1

Today, College 1 serves as a campus-wide student success intervention.

In 2011, PCC piloted the course with 300 students. In 2012, PCC officially launched the College 1 course with 620 students in 29 sections. The course now has 80 sections with 2,400 first-year students — about half of the incoming class. Nearly 200 individuals have taught the course. Outcomes data have been positive, and the program has received recognition, such as the Chancellor’s Student Success Award.

One faculty member, who described Reading Apprenticeship as “the cornerstone” for College 1, indicated that retention for Pathways students is 84%, while only 40% for non-Pathways students. Accumulation of units and time to transfer are other areas of progress. During the first few years of the Pathways program, the target population has been traditional students who just graduated high school, accounting for about half of incoming freshmen. Because of its success, PCC is extending the program to students up to 26 years old and to those who miss priority registration during the 2017-18 school year.

▷ NEW FACULTY ORIENTATION

Based on College 1, the network of individuals who received training in Reading Apprenticeship began to grow. Alongside the development of the course, Shelagh Rose began working with the faculty coordinator to re-envision the new year-long faculty professional learning seminar. The College 1 leads integrated Reading Apprenticeship and best practices for first-year students into the professional learning series. Nika Hogan and Rose led the development of the redesigned faculty curriculum, which included a week-long summer session and up to four sessions during the school year.

Hogan and Rose infused the curriculum with cross-disciplinary metacognitive practices. With upwards of 20% of PCC’s faculty hired within the last two years, the reach of the orientation is significant. The current professional learning model emphasizes evidence-based pedagogy, providing instructors with “a *direction to move in their career as far as how they develop their practice,*” as one faculty member suggested. Today, Rose continues to co-lead the new faculty orientation, engaging colleagues with Reading Apprenticeship practices at every opportunity.



▷ STUDENT SERVICES

The current Pathways program includes high school to college transition programming, the College 1 course, as well as coaching, tutoring, and counseling provided by the Office of Student Services.⁸ Office staff find the social and personal realms of the Reading Apprenticeship model to be especially relevant to their practice (e.g., establishing rapport, building empathy, and meeting students where they are). Staff are adopting the model as a holistic, strengths-based framework that affirms their student-centered mission. The translation of the model to staff takes the form of “literacy apprenticeship,” which is about students making meaning of the world around them, according to one staff person. Reading Apprenticeship serves as a guide that staff use to help students build their self-efficacy.

To support the development of students’ educational plans, staff incorporated reflection exercises linked to the Reading Apprenticeship model, and helped students become more focused on their decision-making. Practices like think-alouds, think-pair-shares, and talking to the text, facilitate group activities with students. Some staff received Reading Apprenticeship training, with several counselors completing intensive off-campus, three to four day institutes offered by SLI. Myriam Altounji, counseling faculty lead, has completed multiple levels of training, and has participated in the leadership community of practice. Student workers have also received training, as have student success coaches, who work with students from all disciplines entering into any major. The Student Success Program has evolved over the past few years to better serve first-year students, as well as general population students who are not affiliated with Pathways. It now touches several thousands of students each year.



▷ QUANTITATIVE LITERACY II (MATH 150)

Out of demand for a non-STEM major math sequence, the department created SLAM (Statistics and Liberal Arts Mathematics) to help pre-algebra students accelerate toward transfer-level math in fewer semesters. To develop this course, the math department used the Title V grant to fund online training in Reading Apprenticeship for several faculty members. Funding from WestEd’s RACCSN through the Helmsley Charitable Trust’s grant for Active Learning Networks covered additional training and leadership development.

The department began piloting Quantitative Literacy II, called Math 150 for short, in 2013 with four sections. Infused with Reading Apprenticeship practices, Math 150 is focused on conceptual understandings of math, avoids the traditional lecture approach, and is broadly accessible to a range of students. Some faculty members report that they and their colleagues have carried Reading Apprenticeship practices from Math 150 to their other courses.

Having a group of math faculty taking the same online course was helpful because it was easier for us to have somebody that we could bounce ideas off and think about how this would work in a discipline specific course.

-FACULTY MEMBER

The Reading Apprenticeship model provides evidence-based principles and strategies for teaching—something that higher education STEM teachers typically do not gain through their graduate studies.

-FACULTY MEMBER

SCALING MATH 150

In spring 2017, the course had grown to more than 20 sections, with one faculty member commenting, “We are certainly nowhere near meeting the demand, but we’re trying.” With the scaling of the course, many faculty members received training, and therefore exposure to Reading Apprenticeship practices such as “how to lead a good discussion” and “how to use norming at the beginning of the semester.” Faculty who received the training simultaneously formed a community of practice. Today, faculty receive four to six hours of training before teaching the Math 150 course. They meet every week or every other week to discuss their experiences, assess how their students are progressing, and engage in troubleshooting. The course coordinator, who sequences the course units, facilitates these meetings.

The natural sciences department has also shifted toward Reading Apprenticeship integration. Course redesign has been a priority, and one faculty member indicated that many courses are now taught using metacognitive practices in their department.



The impact of Reading Apprenticeship on campus is substantial, given the scaling of Reading Apprenticeship-infused practices in course redesigns, the Pathways program, and Student Services:

- More than 200 faculty and staff have taught the College 1 first-year experience course. About 50% of freshmen currently complete the course.
- All new tenure track faculty complete the revamped orientation.
- Most non-STEM majors are exposed to better teaching and learning practices through the redesigned Quantitative Literacy II/Math 150 course. An increasing number of STEM majors engage with metacognitive practices through their teachers’ recent professional development.
- Student Services staff are gaining more opportunities to learn and apply the Reading Apprenticeship model, resulting in more students receiving coaching, tutoring, and counseling.

Transformative Experiences for Teachers and Students

STEM faculty who decided to adopt Reading Apprenticeship in their classroom practices described major shifts in their learning and teaching experiences. Faculty took baby steps in the beginning of their Reading Apprenticeship practice, trying out one strategy at a time. They reflected that the metacognitive techniques have helped them better connect with their students, which supports a safer and more productive learning environment in their classrooms. Rather than lecturing, they engage with students in meaningful discussions about the math concepts. One faculty member reflected that it was helpful to adopt the model early in his career, because it brought structure, guidance, and improvement to his practice.

According to several faculty members, Reading Apprenticeship practices create more meaningful learning experiences for students. The pedagogical shift from lecturing to facilitating enables students to assume greater ownership of their learning process.

According to one faculty member, “[It allows me] to reorient students to the value of learning, the value of conceptual understanding.” This is often a new experience for teachers and students. When students receive the tools to find answers on their own, they become more resourceful and empowered to lead their own learning. While students increase their self-efficacy, STEM faculty help them understand that they are capable of pursuing a career in science or math.

Meanwhile, the natural sciences department has led a parallel effort on basic skills course redesign for general biology, which has more than 30 sections and involves about one thousand students each semester. The department used a grant to redesign the course with the goal of closing the achievement gap between underrepresented minority students and white and Asian students. Today, all but two sections are taught in the new Reading Apprenticeship format, and the department has seen almost a 10% reduction in its achievement gap.



We're taking the approach of whoever the students are that are arriving, it's our job as instructors, and it's our job as a program, to help give those students whatever tools they need to do well. And so that's where I think Reading Apprenticeship has been a big help in reducing that achievement gap.

-FACULTY MEMBER

The Experiment: My Conversion from Skeptic to Believer

When I first learned about Reading Apprenticeship, I didn't see how it would fit in with math. Once I saw how it was effective in that type of course [College 1], I took it into our most basic level math class, just to experiment. How would this work in a math class? You don't typically think that reading and math would be in the same class. It was that first experiment that transformed my thinking.



One of the things we do is teach students about historical numeric systems. We give them Egyptian numerals and explain how they did numerals and counting in hieroglyphics. Then we talk about Roman numerals and proceed to Mayan numerals. The Mayan numerals were something that always tripped up my students. I think I taught the class 13 times before I first tried Reading Apprenticeship. I knew this was a topic that students struggled with, and that I would spend a day lecturing and explaining how to do the material. I would come back the next day and basically conduct the lecture all over again, because they didn't understand how to do their homework.

When I first introduced the idea of Reading Apprenticeship, I thought, "Well, this would be a perfect opportunity to try it." There was a good explanation in the book, and I tried, "Okay, you're going to do think-pair-share. You're going to talk to each other about what you know, and what this is saying to you." I modeled it for them, trying to encourage thinking visually to other people. I came back the next day, and there were no questions about the homework. Everybody understood the concepts! I thought, "I don't need to spend another 45 minutes going over this again?" That one day saved me 45 minutes, cutting the time I've been spending in half. All I had to do was teach them the tool on how to read the material, and then have them develop the tools to learn themselves. That was totally transformative for me.

— Carrie Starbird

While collaborating on course development for College 1, Starbird adopted the Reading Apprenticeship model in her own teaching practice as a math instructor. She is now dean of the Math and Computer Science department, where she has been influential in the spread of the framework.



▶ **Reading Apprenticeship practitioners at PCC want to broaden and continue to scale the framework on campus.**

Some practitioners see potential for Reading Apprenticeship to span the SLAM sequence, as well as courses for students pursuing STEM. This effort could become a significant step in enabling more underrepresented minorities to pursue STEM.⁹ While the faculty members we spoke with see the model as relevant to student success, others view its strategies as less useful for upperclassmen who, for example, demonstrate fewer academic challenges. In other departments, such as chemistry, faculty are examining their gateway courses, which are notorious for high attrition and failure rates. On the Student Services side, staff want to further infuse Reading Apprenticeship into counseling courses, such as using the learning skills class to help students contextualize their learning.

Additional evidence of effectiveness of the model across STEM courses could influence more faculty to adopt the model. Among other steps, this would involve more systematic tracking of progress in Reading Apprenticeship classes versus non-Reading Apprenticeship classes, and examining the extent to which it reduces the achievement gap for underrepresented students.

▶ **Cultivating leaders is another aspiration for Reading Apprenticeship champions at PCC.**

One faculty member described a “tipping point” with scaling Reading Apprenticeship practices, and that there is great opportunity to develop leaders in this space. Developing a critical mass combines the voice, resources, and influence of those working on the ground, and allows ideas and practices to spread more rapidly. Many Reading Apprenticeship champions on campus were mentored by or “apprenticed” with others, and several hope they can do the same for up and coming colleagues. However, leadership development is informal in its current state.

▶ **A major next step for Reading Apprenticeship at PCC is providing better post-training support and strengthening the learning community.**

Multiple faculty members cited the need for improving the system of support (e.g., through follow-up coaching and mentoring) once they have completed training. Related to this is an opportunity for faculty to discuss how they are using Reading Apprenticeship, whether discipline-specific or campus-wide. However, finding the time to reflect and collaborate with colleagues can be difficult.

At the time of the site visit, PCC was in the process of filling a director of professional development position. There were hopes that, once hired, this person could develop more systematic communication, and open opportunities for Reading Apprenticeship training. Due to various reasons, it can be challenging for part-time faculty, especially, to invest time in Reading Apprenticeship training.



Reading Apprenticeship on PCC's campus is an example of how seeds of reform can be planted in several places and grow extensively across a higher education setting. By generating evidence of effectiveness with pilots, and providing ongoing professional development opportunities to staff, systemic adoption of evidence-based teaching and learning practices can go from small to large-scale. Higher education reformers, STEM educators, and philanthropists who aspire to improve student success in STEM should be encouraged by the work that has taken place at PCC.

- ▶ **Identify multiple entry points for the active learning strategy to pursue systemic integration of the practice on campus.**

Visionary institutional changes aligned with Reading Apprenticeship helped it take root and gain momentum. PCC found four ways to integrate and institutionalize it: 1) College 1 course, 2) curriculum redesign, 3) new faculty orientation, and 4) Student Services programming. Reinforcement from multiple angles made a difference.
- ▶ **This case illustrates the effectiveness of a change strategy when leaders at multiple levels align around a shared vision.**

At PCC, alignment was evident among instructors, deans, and administrators to integrate Reading Apprenticeship in math courses to increase student success. The framework was compatible with the values and aspirations of the change agents. By funding training in active learning strategies, institutional leaders can elevate the importance of effective pedagogy, boosting its value among instructors.
- ▶ **This network has taken a “grassroots” approach to changing teaching practice.**

In higher education, relative autonomy is common for departments and faculty. PCC is an example of educators developing passion and commitment toward a new way of teaching and becoming champions among their colleagues for better instruction. Depending on the context, however, reform can be incremental when it takes place informally, one individual at a time.
- ▶ **Improving one's instruction may require a heavy dose of intrinsic motivation.**

Higher education faculty may not experience external pressure to improve their teaching. Showing and pursuing interest in becoming a Reading Apprenticeship practitioner may signal a special type of educator — one who is willing to go beyond what is required to improve her or his teaching. In addition, Reading Apprenticeship has a long-term trajectory, encouraging adopters to start small and grow their practice. It requires an investment of time and energy, as well as vulnerability, willingness, and commitment to change both mindset and practice.



Equal Measure would like to thank the interviewees who participated in the site visit:

- Richard Abdelkerim, instructor, Math and Computer Science
- Myriam Altounji, counselor, Counseling
- Jose Castanon, instructor, Math and Computer Science
- Valerie Foster, associate professor, Natural Sciences
- Linda Hintzman, assistant professor, Math and Computer Science, course coordinator
- Katie Rodriguez, assistant professor, Natural Sciences
- Shelagh Rose, associate professor, Languages and English as a Second Language;
Year One Pathways Lead
- Carrie Starbird, dean, Math and Computer Science

We also thank Nika Hogan (associate professor, English; RACCSN Coordinator) and Ruth Schoenbach (co-director of the Strategic Literacy Initiative) who participated in phone interviews prior to the site visit.



- 1 Based in California with several regional offices across the country, the Strategic Literacy Initiative is an expert program in literacy professional development and research and uses the Reading Apprenticeship instructional framework as the theoretical foundation for all its work. For more information: <https://www.wested.org/project/strategic-literacy-initiative/>
- 2 Discipline-specific literacy refers to knowledge of specialized vocabulary and skill in reading various types of texts used in particular subjects, as well as the metacognitive strategies that disciplinary experts use in their literacy practice.
- 3 For more information about PCC, visit <http://pasadena.edu/about/index.php>.
- 4 In 2015, the Accrediting Commission for Community and Junior Colleges placed PCC on probation for administrative issues (e.g., concerns with employee evaluations, administrator vacancies, and employee influence on professional development). Academic quality was not a concern. Source: <http://www.scpr.org/news/2015/07/10/53050/pasadena-city-college-placed-on-probation-followin/>
- 5 Source: <http://pasadena.edu/news-and-events/news/aspen-institute-recognizes-student-success.php>.
- 6 Additionally, 24% Asian, 15% White, 4% Black/African American, 3% Two or More Races, 3% Unknown/Other. Source: <http://pasadena.edu/about/quick-facts.php>.
- 7 Source: [http://www.dof.ca.gov/Programs/Education/Submitted_Applications/documents/\[34\]%20Pasadena%20City%20College.pdf](http://www.dof.ca.gov/Programs/Education/Submitted_Applications/documents/[34]%20Pasadena%20City%20College.pdf)
- 8 Source: <http://pasadena.edu/academics/support/pathways/index.php>.
- 9 The approach to scaling proven practices from a specific population to the general population has been labeled “Targeted Universalism,” and is considered to be a meaningful diversity, equity, and inclusion practice. [See Powell, J. A. (2008). Post-Racialism or Targeted Universalism? *Denver University Law Review*, 86, 785.].

