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Texts, Tasks, and Talk: A Social Learning Pathway to STEM Literacy, Engagement and Belonging

Nika Hogan
Pasadena City College, California Community Colleges Success Network (3CSN), and WestEd

Emily Daniell Magruder
California State University

Silvana McCormick
Redwood Consulting Collective, Inc.

This article presents a community of practice (CoP) designed to help California State University and California Community College STEM faculty implement active, equity-centered pedagogical changes. Using the Reading Apprenticeship framework as a foundation, the CoP focuses on text-based metacognitive conversations to facilitate students' authentic participation in disciplinary sense-making. The CoP, which emphasizes sustained social learning and dialogue among diverse perspectives, was evaluated using the Value Creation Framework (Wenger et al., 2011). Preliminary findings suggest that participants experienced meaningful value, suggesting potential for overcoming the entrenched culture of lecture-driven instruction and inspiring culture change in STEM instruction.

Introduction

As professional development providers in the California State University (CSU) and California Community College (CCC) systems, we have the privilege to work with Science, Technology, Engineering, and Math (STEM) faculty who are determined to design more active and equitable learning environments, but who struggle to do so against an entrenched culture of lecture-driven instruction. This article describes the design and implementation of a California statewide community of practice (CoP) that shows promise for helping instructors implement meaningful, equity-centered, and culturally responsive pedagogical changes and inspire a larger culture change in STEM instruction, although grounded in an unlikely focus: STEM disciplinary literacy. CoPs have been well documented to be an ideal context for deep learning and transformative change for professionals across many disciplines (Costino, 2018; Li et al., 2009; Wenger, 2000). Wenger (2000) and Reed (2014) define a CoP as something "alive." Specifically, a CoP aims to create an environment that combines the familiar with the new, emphasizes sustained collaboration, allows for organic evolution, fosters dialogue among diverse perspectives, and provides a space for practitioners to share their problems, needs, and knowledge. In our CoP, participants engaged in text-based metacognitive conversations and learned to facilitate such conversations with their students, thereby building their ability to successfully engage their students as apprentices to the discipline.

Context

In the U.S., and specifically in California, many students who begin college with the intention of pursuing STEM fields either switch to a different major or leave college altogether; this is especially true among traditionally underserved and underrepresented student populations (California Center, 2018; National Academies, 2019). The CSU and CCC systems, which annually serve over 2.2 million students, struggle to address this issue and need solutions. For instance, recent CSU data show that only 41% of first-time, full-time first-year students seeking STEM degrees had been retained after four years, and only 30% graduated in that time (California State University, n.d.). Further, almost half (45%) of CCC STEM transfer students did not continue in STEM after two years in the CSU system, and only 20% had completed a STEM degree within two years of transferring (California State University, n.d.). These outcomes, combined with evidence that the association

between low performance in introductory STEM courses and failure to earn STEM degrees is stronger for minoritized students than others, underscore the importance of professional learning for STEM faculty, especially in a statewide network that allows CCC and CSU instructors to align curriculum and create a shared culture of teaching centered on the science of learning (Hatfield et al., 2022).

Brain-based studies show that learning is social, emotional, influenced by culture, and supported through inquiry-based tasks (Hammond, 2014; Immordino-Yang et al., 2019; National Academies, 2018). Learners need to connect to prior knowledge, organize knowledge in conceptual frameworks, engage metacognitively, and discuss their learning (Bransford et al., 1999). However, STEM instructors face challenges implementing inclusive, active learning due to content requirements, class size, and general resistance to change. Despite students learning more through active learning, they often resist it (Deslauriers et al., 2019), and faculty often lack institutional support to change their teaching practices (Bathgate et al., 2019). Our CoP model helps to address these challenges by building robust social support for long-term, intensive professional learning focused on designing meaningful social learning tasks around disciplinary texts.

Disrupting the Status Quo By Rethinking the Role of Texts

Disciplinary texts and discourse are essential to deep learning and a sense of belonging in a discipline. Teaching the language and practices specific to particular disciplines is critical for developing students' understanding in subjects like science, history, and mathematics (National Academies, 2018). However, faculty may have an "expert blind spot" regarding how academic discourse can alienate students who are outsiders to the discipline (Nathan & Petrosino, 2003; Paulson, 2013). A textbook explanation, lab manual, or assignment that seems clear, transparent, and accessible to the expert/"insider" often feels impenetrable to the novice/"outsider." Without appropriate support from more knowledgeable others, students' frustrating experiences with disciplinary texts can exacerbate stereotype threat (when individuals underperform due to anxiety about confirming negative stereotypes about an aspect of their identity) and contribute to equity and achievement gaps (Steele, 2010; Vygotsky, 1978; Yeager & Dweck, 2012). Instructors can provide students a pathway to disciplinary understanding by modeling specific reading and problem-solving practices with texts, such as graphs, simulations, and textbook chapters.

This is a way to focus on both students' active learning process and, through careful text selection, emphasize the most important ideas in a discipline. In other words, if we are successful in transforming the way that instructors make decisions around *texts, tasks,* and *talk* in disciplinary learning, we are effectively supporting them to facilitate students' authentic participation in disciplinary sense-making rather than "content coverage." See Table 1 for an illustration of this reframing.

Table 1
Instructor Decisions Around Texts, Tasks and Talk

Texts	Why choose this text? Is there value to spending instructional time on this text? Is there a more accessible and relevant text that would better capture students' interest?
Tasks	What is the task I want students to do with the text? What disciplinary thinking and problem-solving practices can I model, and how can I guide students' practice?
Talk	In this learning sequence, who gets to talk? How can I support equitable talk? How can I listen and respond to provide formative feedback?

Spending instructional time guiding students in their reading is uncommon in higher education. Reading is often viewed as a basic skill acquired by third grade, after which students are expected to read independently. However, research shows that reading is actually a complex activity that requires contextualized problem solving and social engagement (Pearson et al., 2020). Many STEM faculty cannot recall experiencing explicit instructional support to develop disciplinary ways of reading, writing, questioning, and problem-solving (Bransford et al., 1999; Land et al., 2014). To address this experience gap and help faculty overcome their expert blind spots (Nathan & Petrosino, 2003), we must provide opportunities for them to engage in social text-based learning themselves.

The Reading Apprenticeship Framework

Our CoP is grounded in the Reading Apprenticeship instructional

framework (see Figure 1; Greenleaf et al., 2023; Schoenbach et al., 2012), which emphasizes the importance of text-based metacognitive conversations that go beyond discussing what learners know to include how they came to know it. By fostering a strong *social dimension*, Reading Apprenticeship provides a supportive space for learners to share their thinking; develop confidence, motivation, and persistence; and negotiate the interplay between their personal and academic identities (the *personal dimension*). The framework's social and emotional aspects enable work on the *cognitive dimension*—collaborative sense-making of difficult texts, surfacing confusions, and practicing disciplinary problem-solving strategies. Through this work, we not only build the disciplinary *knowledge dimension*, but also leverage the knowledge that students bring with them into academic situations.

Figure 1
The Reading Apprenticeship Framework (Greenleaf et al., 2023)

In a Reading Apprenticeship classroom, students regularly reflect on their learning and share their thoughts with partners and small groups. To ensure equitable participation, structures such as reciprocal listening and discussion protocols are implemented, requiring everyone to take turns speaking and listening. Collaborative work includes metacognitive routines, such as the Think Aloud strategy, where an instructor briefly shares their approach to the text, speaking out loud the things going through their mind. Students then continue the Think Aloud with a partner, sharing their connections, confusions, and problem-solving strategies. The instructor listens in on these conversations to formatively assess where students are focusing, progressing, and struggling. Following pair work, the whole class debriefs their thinking and problem-solving processes, utilizing collective wisdom to gain a critical foothold of comprehension with the disciplinary text. This metacognitive conversation transforms the course text from a *gatekeeper* to a *gateway* to deep learning and a sense of belonging in the discipline. In Reading Apprenticeship professional learning, participants engage in the same practices and routines to overcome their expert blind spots and devise effective ways to apprentice students in the discipline.

The Reading Apprenticeship framework is strongly linked to improved outcomes for students and faculty (Campaign for College Opportunity, 2017; Corrin et al., 2009; Edmunds, 2017; Greenleaf, Hanson et al., 2011; Greenleaf, Litman et al., 2011; Hogan & Rose, 2018).

In California, the framework has been used as a basis for professional learning in a variety of student success initiatives since 2011. Although these initiatives have engaged over 4,500 faculty members from 114 CCCs and 10 CSUs, many participants received only introductory training and lacked support to make significant changes to their teaching practices. The project team's first-hand observations and previous evaluation studies (Edmonds, 2017; Schoenbach et al., 2012) have shown that despite enjoying the professional learning experiences, participants faced difficulty implementing text-based active learning when confronted with obstacles such as student resistance, lack of support, or their own comfort level.

The Project

In the spring of 2020, during the early days of the COVID-19 pandemic lockdown, we received an institutional change grant from the California Educational Learning Lab to introduce four innovations to

our Reading Apprenticeship CoP: First, we reconfigured professional learning into 10-month learning community courses (see Table 2) with assignments designed to support faculty in making real changes to their instructional practices. Second, we developed advanced "level 2" learning community courses focused on equitable facilitation strategies for faculty who wished to continue their engagement for a second year. Third, we offered these courses fully online both to provide support to instructors learning to teach online during the pandemic and to increase the accessibility of professional learning. Fourth, we developed a project website for participants to publish Open Educational Resources (OER) Text-Based Activity plans to be used as resources for other STEM instructors. We engaged "more experienced others" from the existing network to serve as coaches and offer support workshops on various topics to support the larger CoP beyond the learning community course participants. We also welcomed new participants to offer workshops and coaching based on their expertise.

Using the Reading Apprenticeship framework as our foundation, we sought to establish an "alive" CoP (Reed, 2014; Wegner, 2000). To achieve this, we instituted regular institutes and monthly meetings, which created a rhythm for the community. In response to challenges of the pandemic, we adjusted our expectations and assignments to meet the changing needs of members. Our community brought together faculty across California's CCCs and CSUs from various STEM fields, establishing private community spaces outside of their institutions to facilitate learning and growth. Finally, our community emphasized sharing problems and building a shared body of knowledge.

To support faculty in transformative revisions to their identity, understanding, and practice, we took inspiration from Costino's (2018) model of an identity-conscious CoP. In our CoP, we first focused on the science of learning and threshold concepts and gradually moved toward equity-centered topics such as confronting privilege and bias and developing cultural humility. We emphasized the role of text and metacognitive talk both in research about how people learn and in their current teaching, which appealed to STEM faculty's existing concerns and identities. After we had established a robust sense of safety in the learning communities, we invited faculty to examine their deeply held beliefs and take emotional risks, creating a culture of ongoing and transformative faculty learning to support the creation of more equitable and inclusive learning environments for students (Costino, 2018; Hammond, 2014).

Table 2

The Equity in STEM Through Metacognitive Conversations Project

Level	*Learning Community*	*Structure*
Level 1	**Apprenticing Students Into STEM Thinking** Introduction to the Reading Apprenticeship framework, supports instructors to choose OER disciplinary texts and design disciplinary tasks to better "apprentice" students into STEM learning.	Fully online: asynchronous (Canvas) and synchronous (Zoom) 3-day summer institute (July)
Level 2	**STEM Equity Facilitator Learning Community** Extends experience and knowledge of backwards designing, using scientific principles of how people learn to facilitate learning and advance equity in any setting—classroom, professional learning, department meeting, etc. Participants explore the inner work required to lead culture change.	Fall monthly workshops (September, October, November) 2-day winter institute (January)
	Leadership Community of Practice in Reading Apprenticeship Participants are "apprenticed" into the Reading Apprenticeship facilitator community, focused on designing powerful inquiries to help colleagues re-imagine their instruction.	Spring monthly workshops (February, March, April) 2-day Spring Institute (May)

Reading Apprenticeship provides an effective framework to support an identity-conscious CoP. Its focus on the social and personal dimensions of learning nurtures relationships and encourages all learners to participate fully in the community. Metacognitive conversations, which focus on the process of reading and thinking, promote new insights and different perspectives. Structured participation routines help to break down hierarchies and disrupt the common dynamic of a few voices dominating the conversation. These conversations can also address tensions that arise due to "discourse mismatch" (Paulson, 2013, p. 7) by surfacing confusions and negotiating meaning. For example, during a discussion about disciplinary problem solving, some participants thought "disciplinary" referred to solving student discipline problems instead of approaching problems differently in different STEM fields. Engaging in metacognitive conversations allowed the facilitators and participants to discover and discuss the different meanings of "disciplinary," which resulted in valuable insights from all members' contributions.

In sum, metacognitive conversations enable STEM faculty to engage in professional learning that integrates their academic and professional identities with their desire to promote diversity and inclusion. Research suggests that such equitable professional learning experiences increase the likelihood that STEM faculty will implement evidence-based practices and become change agents who influence their departments and communities (Borrego & Henderson, 2014; Kezar, 2014; Macdonald et al., 2019). Building on this research and our experiences, we propose the following two theories of change:

- *Proposition 1*: If STEM faculty are supported to design text-based lessons, where disciplinary thinking and problem solving are modeled and practiced through metacognitive conversations, try those lessons out with their students, and workshop the implementation experience with a supportive community, then they will change their practices and reconceptualize their courses in light of what they know about culturally responsive teaching and how people learn.
- *Proposition 2*: Similarly, if STEM faculty leaders are supported to consider how to design courageous conversations and/or professional learning focused on disciplinary literacy for other faculty, attempt to facilitate that learning, and workshop the experience

with a supportive community, they will disrupt the status quo of STEM instruction and accelerate the pace at which other faculty adopt culturally relevant and active learning techniques.

Project Evaluation

We evaluated the effectiveness of our redesigned Reading Apprenticeship CoP and its ability to produce change agents and disrupt the status quo using Wenger et al.'s (2011) Value Creation Framework (VCF). The VCF helps identify the types of benefits (value) expected within a CoP and the data needed to measure whether the benefits were realized. The framework has five levels of value: immediate, potential, applied, realized, and transformative. Together with CoP facilitators and coaches, we defined our aspirations for the CoP as examples of value (see Table 3). Our external evaluation partner used these aspirations as a rubric to develop evaluation tools and interpret findings.

The primary method used to evaluate our project was the Values Creation Framework Survey. The VCF Survey was developed by the external evaluator with our input and used the pre-established VCF elements and aspirations as its conceptual basis. Table 4 provides a sample of survey items for each of the five levels, along with the reliability coefficient (Alpha; Cronbach, 1951) of each survey scale for our data sample.

We achieved a response rate of 72% (n = 99) to the survey, which was distributed to all CoP members at the conclusion of our two-year project. Demographic comparisons between the survey sample and the CoP as a whole revealed that the sample was highly representative. With acceptable psychometric properties and a strong response rate, we conducted descriptive analyses at the item and construct level and inferential analyses comparing level one and level two participants and demographic subgroups of our sample to inform our evaluative conclusions. To supplement our VCF survey, we used three additional methods: (1) a qualitative investigation of 20 CoP members' written reflections, chosen through stratified random sampling to proportionally reflect each learning community cohort and subjected to deductive coding (Azungah, 2018) using the VCF values and aspirations, (2) CoP facilitator and coach interviews, and (3) CoP participation records and project artifacts. These supplemental methods were intended to provide further depth and triangulation to our evaluation.

Table 3
Values Creation Framework Aspirations for the Project Community of Practice

Immediate Value	Faculty will feel supported as members of a professional community.
Potential Value	Faculty will build knowledge about: the Reading Apprenticeship framework; principles of how people learn; equitable/culturally responsive practices.
Applied Value	Faculty will redesign lessons based on the Reading Apprenticeship framework and literature about the science of learning and will gain expertise and experience using digital tools and mediums to support active learning.
Realized Value	CSU and CCC students will experience greater success; equity and achievement gaps will be improved.
Transformational Value	Faculty will experience a new norm for designing courses and assignments.

Findings

As depicted in Table 5, our two-year project engaged 140 unique faculty from 20 CSUs, 43 CCCs, and 37 STEM disciplines. Our findings, albeit preliminary, indicate that faculty who persisted in our intensive learning communities experienced meaningful value creation at each level of the VCF framework.

The data indicate that our CoP fostered a safe and supportive professional community where participants gained knowledge and confidence in the Reading Apprenticeship framework, principles of learning, and culturally responsive teaching practices. As a result,

Table 4
Values Creation Framework Survey

VCF Value	*Items*	*Sample Items*	*Scale Reliability (Alpha)*
Immediate Value	9	I built relationships with other faculty. I felt safe to share my point of view. I felt like we were all equals in this learning community.	.88
Potential Value	16	Confidence to: • Facilitate a social and cooperative learning process • Address power dynamics in the classroom • Strategically select course texts to support STEM literacy	.94

Applied Value	7	I regularly experiment with new ways to use texts to support my students' learning. I provide my students with more time to actively engage with STEM texts. I have incorporated new digital tools into my classes to support active learning.	.93
Realized Value	8	Observed changes in students as a result of changes to practice: • Level of equity in student talk • Openness to new teaching strategies • STEM reading confidence	.93
Transformative Value	7	I am able to give my students more ownership over their learning. My perspective on text has been significantly transformed. Active learning and inquiry-based learning are becoming the norm in my classes.	.92

Table 5
Community of Practice and Values Creation Framework Survey Participation

Community of Practice Learning Communities	*Cohorts*	*Number of Participants*	*Number of Completors*	*VCF Survey Response Rate*
Level 1: STEM Instructors Learning Community	4	140	106	Y1: 53% (*N* = 26) Y2: 84% (*N* = 48)
Level 2: Facilitators Learning Community & Leadership Learning Community	2	33	32	78% (*N* = 25)

CoP members began implementing new teaching strategies aimed at promoting active learning and supporting student success, which shifted their professional practice toward a new norm. The evaluation of the project identified several emergent findings.

Immediate Value Finding: Sense of Community

The Reading Apprenticeship framework created a robust, supportive, and non-hierarchical virtual community for CSU and CCC STEM faculty, with survey respondents reporting a strong sense of immediate value (*M* = 4.67, *SD* = .39 [on a scale of 1-5]). Ninety-eight percent of survey respondents agreed or strongly agreed that their contributions were valued by other members of the learning community. Participants felt supported as members of a professional community, with one describing it as "welcoming and supportive in a manner that I have never experienced before," and another citing "catharsis in having a space to debrief and get support from my fellow peers." The virtual statewide network provided added value, exposing members to a range of perspectives and fostering a sense of belonging and relationship-building. The survey found no evidence of hierarchy between CSU and CCC participants or differences in the experience of immediate value, indicating inclusivity for a diverse group of STEM educators. Our study suggests that virtual CoPs can provide a much-needed community, connection, and support during challenging times, and they can effectively gather diverse perspectives that are geographically dispersed.

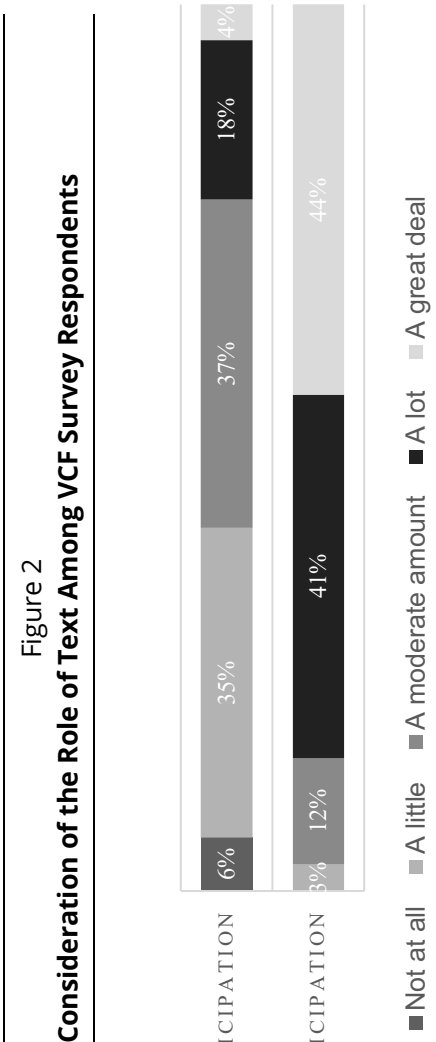
Potential Value Finding: Perspectives on the Role of Text

The project aimed to help faculty reflect on the role of text in their instruction. Results from the VCF survey show that participation in the CoP had a significant impact on members' consideration of this role. As one member noted, "I underestimated the usefulness of reading strategies and actually have become a better reader and instructor just by being part of this community." Figure 2 illustrates that prior to participating, most members considered the role of text only a little or a moderate amount (*M* = 2.79, range 1-5). However, after participating, the majority considered the role of text a lot or a great deal (*M* = 4.26).

Applied Value Finding: Use of Text in the Classroom

The data indicate that CoP members made substantial and mean-

Figure 2
Consideration of the Role of Text Among VCF Survey Respondents



ingful changes to their use of text in their courses. As shown in Figure 3, 75% of survey respondents reported increasing their use of text by a *moderate* to *substantial* amount.

CoP members were asked to describe how the CoP changed how they incorporated reading into their teaching. Several themes emerged (see Table 6), revealing significant changes not only in instructional practices related to text, but also the uncovering of assumptions and significant shifts in members' core teaching beliefs and philosophy, providing evidence not only of applied value creation, but transformative value as well.

Transformative Value Finding: Transformational Change

The evaluation of our CoP revealed compelling evidence that participation disrupted the status quo for many members. A majority of participants (63%) reported that their involvement in the learning community transformed their teaching practices to a large extent or a very large extent (see Figure 4). Furthermore, the length of participation had a significant effect on the transformative value of the CoP. Those who participated in the CoP for two years reported significantly higher levels of applied value ($M = 4.43$) than those who participated for only one year ($M = 3.99$, $p = .003$). Similarly, participants who engaged with the CoP for two years reported significantly greater transformation in their teaching practices ($M = 4.21$) than those who participated for only one year ($M = 3.58$, $p = .001$).

The study also found that after two years of participation, faculty members were more confident in their ability to implement culturally responsive teaching practices, such as addressing power dynamics and highlighting the cultural wealth of students. Additionally, participants who had been involved for a longer period mentioned feeling more comfortable leading discussions with their colleagues and having improved their listening skills. These findings suggest that the process of moving from potential value (knowledge and confidence building) to applied value (changes in teaching practices) is gradual. However, our data indicate that sustained participation in the CoP does support faculty in transforming their ways of thinking and their professional practices.

Limitations and Future Research

The study data show promising signs of the CoP's positive impact. However, a few limitations in the study should be noted and addressed

Figure 3
Increased Use of Text Among VCF Survey Respondents

Table 6

Changes in Use of Text as a Result of Community of Practice Participation

Theme	*Illustrative Quotation*
Scaffolded Use of Text (*N* = 19): Providing more space and time to support students' engagement with text	"I do spend much more time explicitly leading students to think through their own reading processes and try to be transparent about the texts I am using with them. I built in more opportunities for metacognitive engagement around reading early in my courses and spend some time in class discussions doing the same."
Increased Use of Text (*N* = 11): Using more STEM texts in their courses, particularly in-class text-based activities as a core part of instruction.	"There was no in-class reading before my participation in the RA learning communities; I had readings assigned as student homework, which many students never completed before class. After participating in this RA learning community, in-class reading now takes 60 to 70 percent of class time."

Table 6 (*continued*)
Changes in Use of Text as a Result of Community of Practice Participation

Theme	*Illustrative Quotation*
Shifted Beliefs about Role of the Teacher (*N* = 9): Feeling more responsibility to support their students' engagement with text.	"Before, I assumed that all students either read the text or ignored the text. After, I realized that I could and should take a greater role in scaffolding reading, to show students how it can aid learning, to remove the inertia of taking that deep dive into the knowledge conveyed by the text."
Uncovered Assumptions (*N* = 8): Reflecting on their past assumptions or misconceptions about students.	"Prior to my participation in this learning community (FLC), I was ready to accept that students do not read. I took that as a characteristic of our new generation of students and was getting ready to make videos of all the content that I once delivered via text. I used to believe that I had to redesign my classes to work around the reading deficiency that my students come with. Now, I am focused on helping my students learn how to read as part of the discipline specific learning goals. I formerly believed that learning how to read was a task that only grade school teachers were trained to do well. Beyond giving my students tips on how to read a textbook, I did not know how to teach my students to improve their reading skills."

More thoughtful choice of text (*N* = 7): Thinking more about the texts they chose for their courses.	"I choose my text more carefully!"
Increased appreciation of text (*N* = 7): Designing activities around engaging with text due to deepened appreciation for the importance of text.	"Before the course, I thought reading was important but after the course I realized that reading properly is extremely important. By making reading an interactive task, the learning process is improved."
Expanded definition of text (*N* = 7): Thinking much more broadly about what constituted text.	"Before this class I thought text was a paragraph in a book. Now, I know text can be a graph, image, equation, videos and more."

Figure 4
Extent to Which Community of Practice Was Transformative to Teaching Practices Among VCF Survey Respondents

by future studies. First, we were limited by the retrospective design of our VCF survey and would have benefited from the added rigor of a pre-post survey design, ideally with a comparison sample of faculty who did not participate in our CoP. Future research on this approach to professional development should include a pre-post comparative design. Future research should also involve refinement of the VCF survey, its adaptation for implementation as a pre-post measure, and perhaps even a formal scale validation process (Dima, 2018).

The second significant limitation of the study was the lack of student-level data, which would have allowed us to better understand the realized value of the CoP. Although we intended to collect student-level data on their experience in Reading Apprenticeship classrooms, as well as their learning outcomes, the context of the pandemic made this impossible. Therefore, additional studies are needed that explore the extent to which these changes in teaching practices lead to the hypothesized positive impact on student outcomes.

Discussion

In today's age of unlimited open-source information and artificial intelligence, college courses and texts should not be defined solely in terms of "content coverage." Rather than simply presenting information, we must prioritize developing critical competencies that enable students to make sense of this wealth of knowledge. Studies show that deeper learning experiences, rooted in students' prior knowledge and identities, are essential for successful engagement in STEM disciplines (National Academies, 2018). However, despite this knowledge, both STEM instructors and students often struggle to move away from passive, lecture-driven learning experiences that have long been the norm (Bathgate et al., 2019; Deslauriers et al., 2019).

Our STEM Reading Apprenticeship CoP provides a promising approach for addressing this challenge. By focusing on text selection, task design, and opportunities for student discussion, instructors can make meaningful changes in their teaching practices and professional identities. Rather than adding to the overwhelming amount of information available, instructors can leverage their disciplinary expertise to design learning experiences that help students uncover disciplinary ways of thinking. In this approach, specialized disciplinary texts are no longer gatekeepers of "insiderness," but rather vehicles for negotiating meaning and, ultimately, leading to new understandings and a sense of belonging for students.

When STEM instructors engage in sustained social learning to transform their understanding of texts, tasks, and talk, they have a new starting point for designing active and equitable instruction. As one CSU mathematics instructor stated, "I dream of students, all people, really, being able to interpret the technical information that is available to them and make decisions based on their own values using this raw data rather than depend on media, politics, authority figures, or teachers telling them what the information means." While more research is needed to fully understand the impact of this approach on student outcomes, our CoP provides a promising model for improving STEM education and fostering this vision for an empowered and critically literate citizenry.

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Nika Hogan *is a Professor of English at Pasadena City College. She coordinates the college level work on Reading Apprenticeship for WestEd, and from 2011-2023 she supported the California Community Colleges Success network (3CSN) in designing and facilitating professional learning for educators across the 116 California community colleges. Her passion is building capacity and helping educators and students alike reach their full potential. She holds a Ph.D. in English.*
Emily Daniell Magruder *is Director of Innovative Teaching and Future Faculty Development in the California State University Office of the Chancellor. She designs professional learning based on how people learn to build capacity of teaching and learning centers and academic departments to offer programming that instills inclusive and equitable teaching practices. She holds a Ph.D. in English, and she taught humanities at California State University Dominguez Hills from 2004 to 2015. It was at Dominguez Hills that her interest in teaching led her to make faculty development her primary focus.* **Silvana McCormick** *is the Executive Director of Redwood Consulting Collective, a California-based evaluation consulting firm. She specializes in the external evaluation of initiatives that aim to support faculty and students in STEM disciplines. In recent years, her primary focus has been supporting teams across the California State University and California Community College systems to implement impactful Communities of Practice aimed at transforming teaching practices in STEM higher education. She holds a Ph.D. in Psychology with a concentration in Program Evaluation and Applied Research Methods.*