PRACTICE

Professional Learning That Models Components of Course-Based Undergraduate Research Experiences (CUREs)

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Abstract

Course-based undergraduate research experiences (CUREs) can be invaluable for students, but implementing them across a university requires substantial faculty support. This case study explores the incorporation of CURE elements (discovery, iteration, scientific practices, broad scientific relevance, and collaboration) into the design of a faculty professional learning program intended to support CURE implementation. The findings suggest that incorporating CURE elements into a CURE Faculty Fellows Program can support the simultaneous development and successful implementation of scaffolded CUREs across multiple university departments. This program had an additional, unexpected benefit: it created opportunities for faculty from many disciplines to engage in educational research, augmenting their research and publishing agendas. This article summarizes the program, presents findings, and discusses implications for practitioners and researchers interested in pedagogical reform.

Keywords: *faculty development, course-based undergraduate research experiences*

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Undergraduate research is a high-impact practice (Kuh 2008) with benefits for both faculty and students. For faculty, supporting undergraduate research can advance one's research agenda and build collaborations with current and future scholars. For students, participation in undergraduate research can lead to increases in grade point average, retention, a sense of belonging, and persistence in science, technology, engineering, and mathematics (STEM; Haeger and Fresquez 2016; Haegar et al. 2015; Kuh and O'Donnell 2013). Even more importantly, undergraduate research shows increased benefits for historically marginalized students, transfer students, students who are from low-income families, as well as those who are the first in their family to go to college (Bulger and Watson 2006; Haeger et al. 2018; Kinzie et al. 2008). Historically marginalized students remain less likely to participate in undergraduate research compared with their more privileged peers, even at minority-serving institutions (Shortlidge et al. 2016).

Course-based undergraduate research experiences (CUREs) have emerged as a strategy for addressing this inequity by making research experiences more widely available (Bangera and Brownell 2014; Bhattacharyya et al. 2020; Corwin-Auchincloss et al. 2014). As summarized by Corwin, Graham, and Dolan (2015), CUREs have probable outcomes (e.g., persistence in science) similar to those associated with traditional extracurricular undergraduate research experiences. However, a single CURE may not be sufficient to provide the extensive experience or long-term skill and relationship building often associated with participation in extracurricular research projects. In other words, isolated CUREs may not be as beneficial as integrated (Hutchings and Huber 2008) or multiyear (Thiry et al. 2012) research experiences.

These issues could in theory be addressed if universities implemented multiple CUREs, both within a given discipline at introductory and advanced levels (Bhattacharyya et al. 2020) and in multiple departments across the institution.

By doing so, a university would create multiple pathways for students to engage in scaffolded, developmentally appropriate research experiences that may be comparable to those which occur in traditional extracurricular research. However, implementing multiple scaffolded and integrated CUREs across the university is a tall order when many faculty may be new to CUREs as an instructional model. Faculty need time and support to design (or redesign) their courses to function as CUREs. Shared in this article is a collaborative model for supporting the simultaneous development of multiple CUREs in diverse departments across a university. This model involved a professional learning opportunity that was focused on CURE development and was itself structured according to CURE principles.

Literature Review

Research on professional learning in education suggests several criteria are necessary (though not sufficient) to produce meaningful, lasting changes in teaching. For example, effective professional learning programs tend to be long term; rather than stand-alone one- or two-day workshops. They often involve sustained interaction between instructors and professional learning providers over the course of many weeks or months (Putnam & Borko 2000; Yoon et al. 2007; Guskey and Yoon 2009). Of course, this does not mean that long-term learning programs are automatically better; more likely, long timescales simply provide increased opportunities for deepening knowledge, engaging in active learning, and building connections to like-minded colleagues and to additional sources of knowledge (Downer et al. 2009; Garet et al. 2001; Bondy and Ross 1998; Bandura 1978, 1997). In other words, long-term programs may be necessary in order to provide sufficient opportunities for faculty to construct and enact a situated understanding of new pedagogical practices (Levine & Marcus 2010; Windschitl 2002; Confrey 1995; Brown, Collins, and Duguid 1989). By exploring content and pedagogy, faculty development often focuses on a particular discipline, skill, or reflective process (Hoffmann-Longtin et al. 2019; Nadelson et al. 2012).

This brings us to another characteristic of many effective professional learning programs: they are constructivist in nature. This means that, rather than didactically presenting faculty with information about new instructional techniques, they instead provide opportunities for faculty to read about, think about, talk about, write about, and even rehearse new pedagogical techniques in order to gradually develop their own understanding(s) of what these techniques entail (Windschitl, 2002). Meta-analyses of constructivist pedagogies in college STEM disciplines have shown clear evidence that instructional models grounded in constructivism tend to produce higher and more equitable achievement outcomes than traditional didactic instructional methods (Freeman et al. 2014; Theobald et al. 2020).

One approach to constructivist professional learning involves directly modeling the very principles or practices faculty are supposed to be learning. Numerous studies have applied this methods-focused approach to support faculty development of practices such as online learning and problem-based learning (Gast et al. 2017; Russell & Weaver 2011; Saroyan & Amundsen 2004). However, an application of this approach to faculty development of CUREs has not yet been encountered. Therefore, the decision was made to develop and implement a faculty development program that models the characteristics of CUREs as defined by Corwin-Auchincloss et al. (2015) through experiential learning for faculty (Kolb 1984). The goal of such a program was to help faculty across multiple departments construct a situated understanding of CURE pedagogy (Lave & Wenger 1991; Sunal et al. 2001; Thomas & Brown 2011) and implement this pedagogy across the university.

Methods

This inquiry focuses on exploring the use of CURE pedagogy in a faculty development program that was itself intended to support CURE implementation. An instrumental case study method is used (Yazan 2015; Savan & Sider 2003; Stakes 1995). This type of case study examines a program of interest with a goal of elaborating upon existing theories to generate new and potentially valuable insights. The instrumental cases were three cohorts of participants in the CURE Faculty Fellows Program (CFFP), a professional development program organized to support widespread implementation of CUREs at California State University, Monterey Bay (CSUMB), California.

CSUMB is a Hispanic-serving institution (HSI) on California's central coast, serving large populations of first-generation college students, Pell-eligible students, and students of color, particularly Latinx students. As part of this case study, several corpora of data were used: (1) course syllabi and other written artifacts produced by faculty in the CFFP; (2) enrollment data in courses taught by these faculty; and (3) records of scholarly presentations, publications, and in-progress manuscripts created by CFFP participants. Syllabi were requested from faculty teaching all lower- and upper-division life science, physical science, and math courses. The syllabi the researchers received were scored for explicit language clearly indicating the presence of the research practice, implicit language that inferred the research practice or alluded to the research practice, and no evidence of the research practice in the syllabus. Syllabi were analyzed by at least two researchers following a norming and calibration process identifying evidence (Suskie 2018).

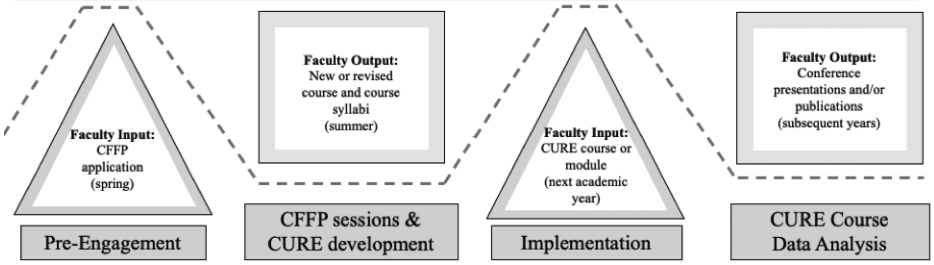
Norming aligns scorers prior to the formal rating process of syllabi, whereas interrater reliability statistics assess the precision of the ratings after the fact. Interrater reliability has been determined through a count of ratings receiving

FIGURE 1. CURE Faculty Fellows Program Activities and Map of Professional Learning Experiences

A

CURE Component	CURE Faculty Fellows Program (CFFP) Session Activity
Discovery	Research and student goal alignment with "meaningful and measurable" data poster and Jamboard; **S**pecific, **M**easurable, **A**chievable, Relevant, and Time-bound (**SMART**) learning outcomes; Research Questions and backwards mapping to align student activities.
Collaboration	Peer and facilitators course syllabus and poster/Jamboard feedback; complex instruction
Research Practices	Literature jigsaw; CURE survey distribution and self-reported student gains exploration
Broad Relevance	CURE disciplinary integration; CURE instruction best practices; community engagement
Iteration	Redesigning CURE activities; CURE course or module repetition; Scaffolding of CUREs

B



Note: CFFP activities organized by CURE component (A) and a visualization of CFFP timeline with faculty inputs and anticipated and encouraged outputs (B). Note the progression from the spring semester prior to the CFFP, summer of professional development, and community of practice through implementation and analysis of student data and outcomes.

the same scores divided by the total number of ratings completed. This measure of interrater reliability has been shown to be the most commonly applied when calculated to exact or adjacent agreement (Jonsson & Svingby 2007). The target for agreement is 100 percent, but Stemler's (2004) guidance that agreement between raters should reach at least 70 percent has been adopted. There were no nonadjacent scores. The two adjacent scores were resolved upon reconciliation. All other scores were exact, resulting in an interrater reliability of 96 percent. Given the variation in number of faculty participating in CFFP, the syllabi scores were converted to percentages for comparison. In addition, the researchers asked faculty to complete a brief survey regarding the CURE components in their course. Enrollment data in the courses were obtained from the Office of Institutional Assessment and Research. Records of scholar presentations, publications, and in-progress manuscripts were solicited annually as part of the College of Science record keeping.

Design and Structure

To support faculty in constructing situated understandings of CUREs, professional learning opportunities, which modeled CURE components during the years 2018–2021, were implemented. The program was designed using the working definition of course-based undergraduate research from Corwin-Auchincloss et al. (2014) in order to clearly differentiate CUREs from traditional laboratory courses, scientific inquiry pedagogy, and research internships. This definition included five components: use of scientific practices, discovery, broader relevance or importance, collaboration, and iteration.

Faculty applied to the CFFP in the spring of each year from 2018 to 2021. Successful applicants convened for faculty development activities during summers and the following school year. In 2018 and 2019, faculty met face-to-face for 16 hours of initial cohort building, knowledge building, and course planning early in summer. Faculty fellows also met individually with the authors for mid-summer consultations, followed by a final eight-hour, face-to-face professional learning retreat at the end of summer, for a total of 28 to 32 hours of paid contact time within a professional learning community.

The length and frequency of meetings were changed during the third year of the CFFP in response to constraints imposed by the COVID-19 pandemic (see the Recommendations section for discussion of these changes). Faculty were also paid for up to 40 hours of planning time during the summer to design a CURE that they planned to implement during the subsequent academic year. The following sections explain how the professional learning activities in the CFFP aligned with the five components of CUREs previously mentioned. Figure 1 includes the structure and framework of faculty learning, including CURE components and associated CFFP activities.

Research Practices

Scientific researchers use a variety of practices to generate new knowledge, from reading and discussing research literature and posing new research questions to collecting and analyzing data and communicating results. Corwin-Auchincloss et al. (2014) argue that engagement

in multiple scientific practices is a key distinguishing characteristic of a CURE, although Bhattacharyya and colleagues (2020) point out that a CURE could include research practices from nonscience disciplines as well. Therefore, in the CFFP, participants were directly engaged in a variety of research practices.

One of the first professional learning activities in each iteration of the CFFP was to engage faculty in reading and discussing research literature on CUREs using a "jigsaw" structure designed to maximize each faculty member's active engagement in discussions (Aronson 2002; McConnell et al. 2017). Faculty were engaged in analyzing data. For example, survey data about student demographics, career interests, and experiences in faculty members' classes were periodically gathered beginning after faculty enrolled in the CFFP but before they began implementing CUREs. During CFFP meetings, faculty fellows examined and analyzed these data.

During early CFFP sessions, faculty worked with program facilitators (the authors) to plan ongoing data collection in their courses, including the gathering of additional quantitative survey data and (in some courses) qualitative focus group data. By supporting faculty fellows' engagement in multiple research practices, the authors cultivated an environment in which faculty members became critical consumers of educational research, and in many cases began to act as educational researchers.

Discovery

Undergraduate research is "an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline" (Hensel 2012). Corwin-Auchincloss et al. (2014) therefore argue that CUREs should involve answering research questions with outcomes that are unknown to the instructor as well as to undergraduates. Although some scholars have argued that discovery is not an essential component of CUREs, this element is still included in most descriptions of CURE pedagogy, so it is included in this work (Ballen et al. 2018; Corwin et al. 2018).

As faculty fellows in the CFFP worked on designing CUREs, they were asked to identify research goals—both for students and for faculty—with outcomes not known in advance. In many (though not all) cases, faculty identified original research goals that could plausibly be pursued by students within their CUREs, goals that would support student learning and, in some cases, also supported faculty members' preexisting research agendas.

Meanwhile, within the context of the CFFP, faculty were encouraged to pose and answer original educational research questions that could be answered by studying student experiences or outcomes in their CUREs. An activity titled "meaningful and measurable" guided faculty in identifying outcomes of interest as well as available student data and potential tools for evaluating those outcomes. CURE Faculty Fellows also engaged in a planning activity in which they tried to identify specific, measurable, achievable, relevant, and time-bound (SMART) learning outcomes that were either knowledge based (e.g., students will understand a particular type of chemical reaction) or affect based (e.g., students will self-identify as a "researcher") (Doran 1981; Drucker 1980).

While not all faculty ultimately conducted educational research, many chose to do so. For example, five CURE courses in biology taught by CFFP participants have already resulted in two research articles (one accepted for publication and one submitted for review, as of this writing) as well as three practitioner publications, two poster presentations, and a workshop; three CUREs offered by faculty fellows in mathematics have resulted in two scholarly presentations and two manuscripts submitted for publication; and two CUREs offered in chemistry have resulted in one published article and one presentation. Every one of these publications, presentations, or posters was a collaborative effort among at least two (and usually three or more) authors.

Broad Relevance

To be a CURE, a course must also create opportunities for students to produce "broadly relevant or important work" (Auchincloss et al. 2014). Just as professional scientists envision their work as contributing to a community of scholars, to issues of public discourse or policy, or both, students should understand the work they do in CUREs as having some goal(s) or audience(s) beyond the classroom. Having a clear and important goal can increase the likelihood that students feel intrinsically interested in their coursework, while speaking or writing to an audience other than one's instructor can increase the likelihood that students construct a deeper, more detailed understanding of the content they are studying (Gunel et al., 2009; Morales-Doyle, 2017).

Throughout the CFFP, the goal was to emphasize the broad relevance of the data being collected in CURE courses and the value of the educational research questions that faculty could potentially answer by researching their own CUREs. For example, faculty participating in the CFFP considered calls to action such as "Vision and Change in Biology Undergraduate Education" (Woodin, Carter, and Fletcher 2010) and the importance of evidence-based practices supporting how people learn (National Academies of Sciences, Engineering, and Medicine, 2018). A winter "Data Retreat" was organized in January 2020, which brought together members of the first and second CFFP cohorts to share ideas and examine data collected within their courses. At this retreat, faculty read and

discussed 20 excerpts from de-identified transcripts of qualitative interviews and focus groups conducted with students in several CURE courses. Many faculty identified common themes within the qualitative data and identified these themes as relevant to their own instruction, regardless of whether these themes were praises or critiques. Several faculty guessed (incorrectly) that most of the quotes, both good and bad, must have come from their own students. In doing so, faculty were able to examine ways that data collected from their students could answer educational research questions that might be pedagogically useful not only to themselves but to other faculty in other departments or even at other institutions.

Opportunities were created for faculty to explore the institution's history of engagement in local partnerships across a variety of disciplines. For example, all members of the second cohort of CURE Faculty Fellows were invited to attend a community event organized by faculty in cinematic arts and psychology in partnership with a local community organization. This event served as an exemplar for CURE Faculty Fellows to consider how their CUREs can have an impact beyond their course, beyond the university, and beyond their discipline. The emphasis on transdisciplinary research leverages convergence, where the merging of ideas, approaches, and technologies from widely diverse fields of knowledge catalyze innovation and discovery.

Collaboration

Corwin-Auchincloss et al. (2014) argue that CUREs must include collaboration as a scientific practice. Collaboration played a key role in the design and the implementation of CURE courses through the CFFP. Faculty Fellows designed their CUREs with assistance and feedback from facilitators, mentors, and peers. Collaboration among college students was also an important element of many of the CURE courses developed in the CURE Fellows Program. Beginning in the second year of the program, participants were engaged in professional learning activities focused on "Complex Instruction," a set of research-based strategies for designing and implementing effective collaborative group work (Cohen and Lotan 1995; Lotan 2006; Cohen and Lotan 2014). A subsequent review of course syllabi suggested that virtually all faculty fellows ultimately included some form of collaborative group work in their CURE courses. Several faculty members actually co-taught CUREs, and all research projects, presentations, and publications stemming from CURE research involved collaboration by at least two researchers.

Iteration

Corwin-Auchincloss et al. (2014) also argue that CUREs must help students understand the iterative nature of scientific research. Participants in the CURE Fellows Program were encouraged to incorporate iteration into their courses; on a broader scale, the CFFP engaged participants in an iterative process of designing course activities, soliciting feedback from colleagues and stakeholders, teaching their courses, analyzing data, and revising their courses. Many faculty fellows engaged in this process multiple times, teaching multiple iterations of their courses (as many as four iterations for some courses, as of this writing) and examining data gathered from these multiple iterations. Analyses of these data informed pedagogical revisions to courses, and analyses were sometimes shared with other faculty both inside and outside the institution through professional learning activities and conference presentations as previously described. By creating a regular mechanism for collecting data that were available for analyses approved by the Institutional Review Board, the CFFP created an environment in which it was relatively easy for faculty from any discipline to engage in iterative educational research.

Results

At its most basic level, the central outcome of the CFFP was the creation of numerous CURE courses. Prior to the creation of the CFFP in 2018, there were (as far as is known) only two courses consistently taught at CSUMB that met the Corwin-Auchincloss et al. (2014) criteria for CUREs. However, between the fall of 2018 and spring of 2020, the institution offered 22 distinct CURE courses that enrolled over 3000 students. Thirteen of these courses were developed by faculty in the College of Science. The remaining nine were developed by faculty in psychology, cinematic arts, history, and human communications. Of course, the fact that faculty developed these courses as part of the CFFP does not necessarily mean they are being taught with fidelity to the CURE model. However, CFFP deliverables, such as syllabi completed by CFFP participants, indicated that most intended to incorporate CURE elements into their courses (see Tables 1 and 2).

Note: Forty-seven courses in the College of Science were sampled for syllabi from Fall 2019 and Spring 2020 including 13 courses with a CURE module or designed as a CURE course. E = Explicit language, I = Implicit Language, N = No Evidence. * denotes number of CURE courses.

Another important outcome was that the CFFP supported faculty members' research productivity. Proponents of CUREs argue that they benefit faculty as well as students because they can help faculty advance their own research agendas and publish or present work within their disciplines. Faculty fellows and their colleagues wrote conference presentations (Ramirez et al. 2020) and disciplinary publications based on research findings discovered in CUREs (Haffa et al. 2020). Furthermore, CFFP participants in noneducation disciplines have also presented and published educational research on CUREs, using data on student learning gathered by faculty and data

TABLE 1. Faculty Implementation of CURE Elements (1 = Not at All, 5 = A Great Deal; Standard Deviations in Parentheses)

To what degree does your course or module have elements of a CURE?					
	Research practices	Discovery	Broad relevance	Collaboration	Iteration
2018 (n = 9)	4.22 (0.83)	4.22 (0.83)	3.56 (0.88)	4.33 (1.12)	3.67 (1.00)
2019 (n = 9)	4.22 (0.97)	3.89 (1.05)	3.67 (0.87)	4.56 (0.53)	3.22 (1.09)
2020 (n = 11)	4.18 (0.75)	4.45 (0.93)	5.00 (0.00)	4.36 (0.81)	4.55 (0.69)

TABLE 2. Percent of Explicit and Implicit Language in Syllabi Referencing Research Practices

Analysis of evidence in College of Science syllabi for research practices in a CURE					
(Number of courses) *CUREs	Asking questions	Planning and carrying out investigations	Analyzing and interpreting data	Arguing from evidence	Dissemination
Life Science (32) *6	E (87%), *(100%) I (13%) N (0%)	E (56%), *(80%) I (41%), *(20%) N (3%)	E (81%), *(100%) I (19%) N (0%)	E (72%), *(67%) I (19%), *(33%) N (9%)	E (88%), *(67%) I (9%), *(33%) N (3%)
Mathematics (5) *3	E (88%) I (12%), *(100%) N (0%)	E (0%), I (60%), *(67%) N (40%), *(33%)	E (100%), *(100%) I (0%) N (0%)	E (0%) I (100%), *(100%) N (0%)	E (60%), *(67%) I (40%), *(33%) N (0%)
Physical Science (11) *4	E (64%), *(50%) I (36%), *(50%) N (0%)	E (82%), *(75%) I (18%), *(25%) N (0%)	E (100%), *(100%) I (0%) N (0%)	E (64%), *(50%) I (27%), *(25%) N (9%), *(25%)	E (82%), *(75%) I (18%), *(25%) N (0%)

Note: Forty-seven courses in College of Science were sampled for syllabi from Fall 2019 and Spring 2020 including 13 courses with a CURE module or designed as a CURE course. E = Explicit language, I = Implicit language, N = No evidence. * denotes number of CURE courses.

on affective outcomes gathered by the CFFP facilitators through surveys and focus groups (e.g., Sedlacek et al. 2020; Haeger et al. 2020). Based on communications with CFFP faculty participants, at least five more publications by CURE Faculty Fellows are currently in various stages of preparation ranging from data collection and analysis to writing and final edits before journal submission. Notably, this research has in many cases been initiated and carried out by CFFP participants with no prior background in educational research. The implications of this finding are discussed later in this article.

Another outcome appears to have been a broader impact on pedagogy across the university. As described earlier, CFFP participants have integrated CURE pedagogy into a large number of courses. Six of these are large, mandatory courses that are taught annually by teams of multiple faculty and lecturers—teaching teams that tend to shift over time as instructors' schedules and availability change. As new faculty take on teaching responsibilities in these courses, CFFP participants have been observed helping these faculty learn how to teach them as CUREs. An example of this is CURE Facutly Fellows discussing the principles of Universal Design for Learning (King-Sears 2009) alongside various hurdles to student success in a CURE based on research and institutional data documenting barriers faced by undergraduate researchers (Haeger et al. 2020). For example, a faculty member in the third CFFP cohort was mentored by a faculty member from the first cohort who helped them develop and implement their course, specifically addressing representation and expression of student voice. By transforming these large perennial courses into CUREs, a context is created in which new faculty and lecturers are likely to learn about CURE pedagogy from their colleagues without directly taking part in the CFFP. This is no guarantee that these courses will consistently exhibit CURE characteristics and desired outcomes, but it does suggest a possible strategy for supporting institution-wide CURE implementation.

Perhaps most importantly, the CFFP led to the creation of multiple scaffolded CUREs, meaning students can have multiple research experiences over the course of their time at CSUMB. For example, the biology department now offers six CUREs, including introductory and core major courses as well as electives in genomics and bioinformatics. The math department now offers a three-course CURE series across lower- and upper-division discrete mathematics courses. The psychology department developed three CUREs: an introductory course, a more advanced research methods course, and an elective. The newest department on campus, agriculture plant and soil sciences, has already developed three CUREs in upper-division courses targeting transfer students from community colleges. Given the diverse array of disciplines in which CUREs are now offered, it seems increasingly likely that CSUMB students will have multiple opportunities to experience research in different disciplines.

Discussion

Structuring the faculty development program using the five elements of CUREs appeared to help faculty not only develop and implement CUREs but also expand their own research agendas beyond disciplinary boundaries (Bangera and Brownell 2014; Bhattacharyya et al. 2020). By introducing faculty from many different disciplines to the educational research literature, assisting them in collecting student data, and providing them with opportunities to analyze these data, the CFFP created an environment conducive to faculty pursuing educational research. This educational research may support individual faculty members' publication and tenure goals, even in cases where research conducted by undergraduates within CURE courses does not result in publications.

Beyond the benefits for faculty career aspirations, the growing body of educational research conducted at CSUMB may also have benefits for students (Hutchings and Huber, 2008). It is possible that engaging in educational research can support faculty members' growth as reflective practitioners interested in the use of data to improve their teaching. Future research should explore the long-term implications of involving faculty from the physical sciences, natural sciences, social sciences, and humanities in educational research.

Professional Learning during the Coronavirus Pandemic

Just prior to the beginning of the third cohort of CURE Faculty Fellows, the COVID-19 pandemic disrupted education throughout the world. Despite the pain and disruption experienced by many, the pandemic also provided a silver lining—an opportunity to transform professional practices in generative ways. Recognizing the social nature of human learning, the CFFP was restructured, replacing its original intensive full-day, face-to-face sessions with numerous virtual Zoom meetings of shorter duration and greater frequency spread over a period of several months. Despite the fact that this reorganization of the program was driven by a public health crisis, in some ways the new format may be better aligned with research on professional learning within communities of practice (Kezar 2018). Instead of meeting for many hours on a few occasions with long spans of time in between, meetings occurred many times over many months. This long-term, frequent engagement may have shaped the way faculty fellows made sense of the content of the program, creating a series of ongoing opportunities for them to construct an understanding of CURE pedagogy in relation to other elements of their teaching, research, and university service work. Faculty sensemaking may also have been shaped by the public health crisis; for example, faculty may have been especially interested in receiving feedback on course design during the summer of 2020 because they had recently learned their courses would be taught entirely online in the 2020–2021 academic year. The authors anticipate additional scholarship emerging from innovations and iterations associated with the shift to virtual learning.

Conclusion

Structuring a CURE-focused faculty professional development program using the pedagogical principles of CUREs had both anticipated and unanticipated outcomes. The CFFP supported the rapid development and implementation of numerous CUREs across the university. It also enabled faculty not only to pursue their research agendas but also to expand their research agendas in unanticipated ways. Just as CURE courses provide opportunities for undergraduates to develop emerging identities as researchers within specific disciplines, the CFFP provided opportunities for faculty to develop new identities as researchers within the discipline of education. By facilitating annual cycles of data collection and data analysis across the many CURE courses within the institution, an environment was created where conducting educational research became possible for faculty with little or no previous social science research experience. This process of reading, conducting, and writing educational research encourages faculty to reexamine previously held understandings of their own disciplines and teaching practices. CURE proponents and faculty development providers are encouraged to consider building on this model for professional learning.

The data are not publicly available. They are available from the corresponding author upon reasonable request.

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