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Track, Map, and Measure: Diverse Professional Learning Activities Are Associated with Positive Attitudes Toward Pedagogy and Faculty Learning Outcomes

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We examined how patterns of participation in instructional consultations, workshops, reading groups, and learning communities were associated with differences in faculty views of pedagogy. A total of 165 faculty completed the Appreciation of Pedagogy Scale (APS), which includes five subscales: 1) awareness of pedagogy research; 2) beliefs that research can inform teaching practice; 3) integration of new strategies with current ideas about teaching; 4) positive emotions about learning about teaching; and 5) the frequency, value, and enjoyment of engagement in professional development (Hurney et al., 2020). We mapped APS subscales to our CTL Faculty Learning Outcomes and then analyzed the impact of program participation on each subscale. We found faculty who participated in three or four different types of professional development had greater appreciation of pedagogy than those with no participation. Faculty who participated in workshops, consultations, or learning communities responded more positively to some subscales than those who participated in fewer of these types of programs. We conclude with advice for centers interested in investigating the impact of program diversity on faculty attitudes toward pedagogy.

Introduction

Centers for Teaching and Learning (CTLs) are tasked with using limited resources to have the maximum impact. CTL directors often must choose between different modes of delivery such as workshops, reading groups,

learning communities, and individual consultations. Directors also must consider which faculty should be accepted to participate in programs that provide stipends and whether centers should dedicate resources to a single large event or many smaller events. To effectively influence faculty work in the classroom, it is essential that CTLs fully engage faculty in the programs they attend. In this article, we describe how a CTL at a highly selective university with high research activity analyzed the association between participation in different types of professional development and faculty attitudes toward teaching using the Appreciation of Pedagogy Scale (APS) (Hurney et al., 2020). Hurney et al. (2020) define appreciation as a focus on, “positive attributes, such as what one knows or feels instead of what one does not know or feel” (p. 31). The attitudes that make up the scale include: 1) awareness of pedagogy research; 2) beliefs that research can inform teaching practice; 3) integration of new strategies with current ideas about teaching; 4) positive emotions about learning about teaching; and 5) the frequency, value, and enjoyment of engagement in professional development. Together, the APS measures faculty members’ overall appreciation of pedagogy. We conclude by sharing what we have learned through use of the APS about the ways workshops, individual consultations, reading groups, and faculty learning communities engaged faculty on our campus.

Background

CTLs provide various professional development opportunities designed to address different learning outcomes. For example, at our CTL, workshops often focus on increasing or integrating knowledge with practice and provide rich opportunities to discuss teaching with peers. In contrast, consultations provide just-in-time individualized support, which might lead to increased changes in practice. Scholars have proposed various lists of common CTL programs and services (Beach et al. 2016; Chism et al. 2012; Hines 2011; Lee 2010). For example, Lee (2010) described workshops, individual consultations, classroom observations, orientations, grants, faculty fellows programs, teaching circles, and faculty learning communities. Beach et al. (2016) expanded this list to include full-day institutes or retreats, small-group instructional diagnosis sessions, and structured reading groups. Among these program types, Beach et al. found that single-session workshops and individual consultations were offered most frequently by CTLs, followed in frequency by seminars with multiple meetings and faculty learning communities. CTLs were less likely to use approaches such as multi-day institutes or

retreats and structured discussions focused on a reading or book. At our center, we engage faculty in each of these activities, but our most common activities include workshops, individual consultations, reading groups, and faculty learning communities.

Evidence supports the efficacy and impact of many extended forms of CTL programming. In one study, extended pedagogical training that lasted between four months and three years developed more student-centered views of teaching and teaching self-efficacy in participating faculty than briefer training (Postareff et al., 2008). Participation in intensive course design institutes has been demonstrated to improve instructors' beliefs in their self-efficacy (Palmer et al., 2016). Participation in faculty learning communities has been demonstrated to improve participants' self-efficacy, content knowledge, and beliefs that the institution was supportive of their teaching (Favre et al., 2021; Furco & Moely, 2012). A series of consultations were demonstrated to lead to more complete coverage of assessments, grading, and course policies in syllabi. Participation in a faculty development seminar prior to the consultation did not impact the results, with syllabus improvements more frequent among those who attended consultations than those who had not regardless of whether they attended the workshop (Hershock et al., 2022). Some studies also found that individual workshops lead to increased knowledge and use of active learning and inclusive teaching strategies (Dwyer & Smith, 2020; Hershock et al., 2022; Manduca et al., 2017).

In each of these studies, a single type of program was evaluated. Although they investigate a number of outcome measures, including changes in knowledge, teaching practices, and self-efficacy, the studies do not measure the impact of programs on faculty identity and beliefs about teaching (Booke & Willment, 2018; Karm, 2010; Trigwell & Prosser, 1996). According to Kirkpatrick (1998), evaluations of impact should measure resulting changes in both behavior and concepts. Hines (2017) and Hurney et al. (2020) encourage us to envision and assess CTL work as a curriculum in which our programs and services work in concert to achieve overarching faculty learning goals. Holistic investigations of this sort will provide more actionable findings than emerge from narrow evaluations of impact.

One effective route to gathering data that provides a holistic picture of impact is to embed reflective questions in faculty development activities (Karm, 2010; Loughran, 2002). Although we are currently doing this (Singer-Freeman & Verbeki, 2024), the coding of qualitative data is time consuming, and it can be difficult to effectively track changes over time using qualitative data. Hurney et al. (2020) developed the Appreciation of Pedagogy Scale

(APS) to provide useful information about faculty beliefs about teaching that can be easily administered and analyzed.

Our research represents an effort to measure the impact of program combinations on faculty learning outcomes (FLOs) using this scale. Specifically, we mapped APS sub-scales to key FLOs and measured differences across faculty who had participated in a variety of center programs. We believe this practice will add to the existing literature by providing information about the ways in which faculty beliefs about pedagogy differ for groups of faculty who engage in different types of professional development and ways in which the APS can be mapped to FLOs. Because this data is not longitudinal, we will not be able to evaluate whether participation in different types of professional development caused changes in faculty attitudes. However, our current measures will serve as baseline data that will allow us to evaluate changes for individual faculty in the future. In the current work, we explore two research questions:

- 1) Do faculty who engage in more than a single type of CTL program have increased appreciation for pedagogy?
- 2) Is participation in workshops, reading groups, instructional consultations, or faculty learning communities associated with greater areas of appreciation for pedagogy that map to key FLOs?

Methods

Institutional Setting

The study was conducted at a university that embraces a teacher-scholar ideal. The school enrolls approximately 5,000 undergraduate students and offers graduate degrees and professional programs in Business, Medicine, and Law. The CTL has a full-time Executive Director and four full-time staff. These include a Director of Educational Development, a Director of Research, an Associate Director of Curriculum Development and Assessment, and a Communications and Operations Specialist.

Procedure

All teaching faculty were invited by email to complete an online survey that included the APS. The APS has five sub-scales with five-point Likert-

style questions. All questions in the survey were optional. At the end of the survey faculty were asked to provide informed consent to participate in research. Faculty participation data was obtained from an internal tracking system which has been functioning for the past four years.

Materials and Mappings to FLOs

Our CTL has four broad strategic goals for faculty development: 1) increase pedagogical knowledge; 2) increase reflective growth; 3) increase motivation to adopt evidence-informed teaching practices; and 4) increase adoption of evidence-informed teaching practices. To measure progress towards these goals we developed nine FLOs by modifying those shared by Hurney et al. (2016). Five of our nine FLOs can be mapped to APS subscales.

Awareness

Awareness includes five questions that evaluate familiarity with evidence-based teaching practices and includes items such as, *"I am aware of evidence-based strategies used to teach students in my discipline."* The awareness subscale maps directly to FLO 1, *"Increase knowledge of evidence informed teaching."*

Integration

Integration includes two questions that evaluate faculty consideration of using new techniques and includes items such as, *"When I see a new teaching strategy, I think about if I would use it or not."* Although the integration subscale measures intention and not action, we believe the integration subscale maps to FLO 2, *"Integrate knowledge with practice"* and FLO 3, *"Increase reflective and iterative growth."*

Emotion

Emotion includes four questions that evaluate positive feelings about teaching and includes items such as, *"I am curious to hear new ideas about teaching."* We believe the emotions subscale maps indirectly to FLO 4, *"Increase motivation to adopt evidence-informed strategies"* because it includes items that

evaluate positive feelings about teaching. Although this is not a perfect mapping, having positive emotions has been demonstrated to increase behavioral change in other areas such as diet, exercise, prosocial behavior, and pro-environmental behavior (Shiota et al., 2021). Moreover, educational developers have found that positive emotions increase students' learning and their motivation to learn (Cavanagh 2016; Eyster 2018). Although faculty participants in CTL programs are not students, they are still fundamentally learners. Accordingly, we hypothesize that similar indirect effects might be present around the motivation to adopt new pedagogical practices. Along with the beliefs subscale (see below) we believe we have useful information relating to FLO 4.

Beliefs

Beliefs includes four questions that evaluate faculty views of teaching as a learnable skill and includes items such as, *"I believe that teaching is a learnable craft."* We believe the beliefs subscale also maps indirectly to FLO 4, *"Increase motivation to adopt evidence-informed strategies"* because beliefs that teaching is a learnable skill are central to a growth mindset, which has been shown to increase teachers' motivation to improve (Liu et al., 2023).

Behavior

Behavior is the final subscale and is evaluated differently than the other subscales. It includes nine behaviors that support pedagogical development such as reading about, discussing, observing, and reflecting on teaching. For each behavior, faculty evaluate the frequency with which they engage in the behavior, the extent to which they enjoy the behavior, and the extent to which they value the behavior. The 27 responses to these questions are averaged to create a single behavior score. Because many of the behaviors involve interactions with others around teaching, we believe the behavior subscale maps indirectly to FLO 6, *"Develop relationships that enhance teaching."* Increased behaviors will support the formation of relationships that enhance teaching, but the response to the behavior subscale will not directly measure faculty relationships around teaching. Table 1, provides a summary of the mappings between the five APS subscales and the corresponding FLOs.

Table 1
APS Subscales Mapped to Relevant CTL FLOs

Subscale	Faculty Learning Outcome
Awareness	1. Knowledge: Increase knowledge of evidence informed teaching
Integration	2. Integration: Integrate knowledge with practice 3. Reflection: Increase reflective growth
Emotions Beliefs	4. Motivation: Increase motivation to adopt evidence-informed strategies
Behavior	5. Relationships: Develop relationships that enhance teaching

Grouping Variables

We were interested in exploring the impact of our primary faculty-support activities (learning communities, consultations, workshops, and reading groups) on faculty attitudes towards pedagogy. Using our internal tracking of faculty activity over the past three years, we created groups of faculty members who had participated in each activity type. We did not weigh participation frequency. Accordingly, a faculty member who had attended a single meeting of a type of activity was grouped with faculty who had frequently participated in that type of activity. Faculty appear in multiple groups if they participated in more than one type of activity. Faculty groupings by activity types are presented in Table 2. We also created groupings based on the diversity of activities in which faculty engaged. We grouped faculty into three program diversity groups: none, which includes faculty who did not participate in any CTL programs; limited, which includes faculty who participated in one or two different program types; and rich, which includes faculty who participated in three or four different program types. As can be seen in Table 2, 41% of respondents had not engaged in any activ-

ities, and smaller groups had participated in between one and four types of activities.

Learning Communities

At our institution, learning communities meet multiple times over the course of a year or a semester and are organized around a topic, such as inclusive teaching, or to support a cohort, such as new faculty. Generally, faculty receive a small stipend for their participation in learning communities. In the summer of 2020, the majority of faculty participated in peer-led learning communities in which CTL staff trained faculty to lead disciplinary learning communities to support the rapid transition to remote instruction. For this reason, there is an unusually high proportion of faculty who have participated in learning communities that is not representative of participation during other points in time. Additionally, because the learning communities that occurred that summer were peer-led, participation in a learning community does not necessarily involve direct contact with CTL staff.

Consultations

At our institution, consultations are requested by faculty and generally include support around student learning, course design, syllabi, assessment, active learning, classroom climate, and inclusive pedagogy. Faculty can schedule as many consultations as they wish. All consultations involve direct contact between a single faculty member and a member of the CTL staff. All consultations are voluntary and unpaid.

Workshops

At our institution, workshops are offered by CTL staff or CTL partners and are single meeting events that generally last between one to three hours. A schedule of workshop topics and dates is announced each semester and faculty register to attend. Attendance at workshops is unpaid. Because some workshops are offered by non-CTL staff, participation in a workshop does not necessarily involve direct contact with CTL staff.

Reading Groups

At our institution, reading groups are offered by CTL staff and generally meet three times during a single semester. A schedule of books and dates is announced each semester and faculty register to attend. Faculty who register

for a reading group receive a free copy of the book. Attendance at reading groups is unpaid.

Research Design

The reported results are from repeated measures analysis of variance (ANOVA) and one-tailed independent samples *t*-tests. Statistical analyses were computed in SPSS. The survey was administered using Qualtrics. The reported patterns were similar to patterns seen in the full sample of faculty that included those who did not consent.

Participants

A total of 975 faculty were invited to complete the survey. At the end of the survey, faculty were asked to provide informed consent to participate in research. A total of 175 faculty (18%) completed the survey and consented to participate in the research. All questions in the survey were optional, resulting in a range of faculty who completed each item from 165-175. Faculty respondent demographics can be seen in Table 2. As can be seen in Table 2, our sample included good representation of key groups we serve including tenured, tenure-track, and non-tenure-track faculty; junior and senior faculty; and faculty from all academic areas of the university. We also had representative samples of faculty who had participated in learning communities, consultations, workshops, and reading groups, had strong representation from faculty who had not participated in any CTL program, and from faculty who participated in between one and four program types. Most faculty who participated in one program type also participated in other program types.

Results

Faculty responded to the APS measure using the full 1-5 Likert scale with subscale scores ranging from 1-5 for awareness, emotion, and belief, 1.5-5 for integration, and 1.9-4.8 for behavior. Overall, faculty reported high levels of appreciation for pedagogy with average scores falling between 4 and 5 for all subscales except behavior.

APS subscales are reported as a function of program diversity groups in Figure 1. A mixed between-within ANOVA was calculated to assess the impact of the program diversity group (none, limited, and rich) on APS subscales (awareness, integration, emotion, and belief). Because behavior uses a

Table 2
Faculty Demographics and Participation

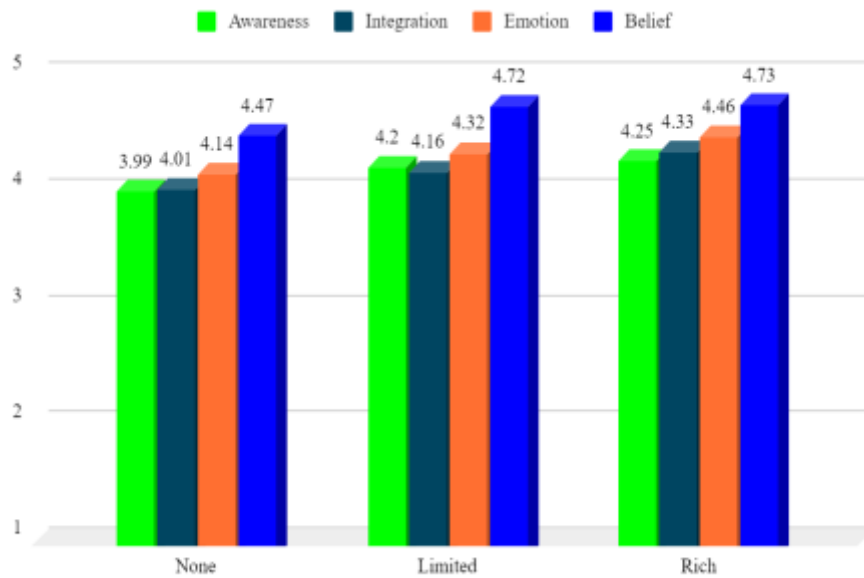
Demographic Group	Number	%
Tenured or Tenure Track	98	56%
More than 10 Years of Service	79	45%
Arts and Humanities	53	32%
Social Science	43	26%
Professional Schools	35	21%
Math and Science	35	21%
Participation		
Learning Community	93 (17 only in LCs)	53%
Consultations	58 (4 only in Consultations)	33%
Workshops	48 (2 only in Workshops)	27%
Reading Groups	40 (3 only in Reading Groups)	23%
Multiple	78	45%
Diversity of Participation		
None	68	41%
Single Program Type	26	15%
Two Program Types	32	19%
Three or Four Program Types	39	24%

Note. Under "Participation," the number who only participated in each program type is reported in parentheses.

different format for response choices from the other subscales, this subscale is excluded from this analysis. Because sphericity was violated ($\epsilon = 0.84$), Huyn-Feldt corrected results are reported. We failed to observe a significant interaction between program diversity group and subscale, Wilks' Lambda = .98, $F(5.27, 427.09) = .36$, $p = .88$, partial eta squared = .001. There was a substantial main effect for subscale, Wilks' Lambda = .44, $F(2.64, 427.09) = 40.81$, $p < .001$, partial eta squared = .20. We explored this main effect using the Bonferroni correction and found that beliefs (4.64) were more positive

than emotions (4.31), which were more positive than integration (4.17) or awareness (4.15). Integration did not differ significantly from awareness. There was also a moderate main effect for program diversity, $F(2, 162) = 5.06$, $p = .007$, partial eta squared = .06. We explored this main effect using the Bonferroni correction and found that faculty who participated in three or four different types of programs had more positive APS scores (4.41) than those with no participation (4.15). Those who had participated in one or two different types of program had intermediate APS scores (4.35), which did not differ significantly from either other group.

Figure 1
APS Subscale Scores Disaggregated by Program Diversity Group



The behavior subscale included three sets of questions that evaluated frequency, enjoyment, and value of activities related to pedagogical professional development. A mixed between-within ANOVA was calculated to assess the impact of the program diversity group (none, limited, and rich) on these behavior components (frequency, enjoyment, and value). Because sphericity was violated ($\epsilon = 0.94$), Huyn-Feldt corrected results are reported. We failed to observe a significant interaction between program diversity and behavior components, Wilks' Lambda = .99, $F(1.91, 328.26) = .96$, $p = .38$, partial eta squared = .001. We also failed to observe a significant main effect of

program diversity group, $F(1, 172) = .51, p = .48$, partial eta squared = .003. There was a substantial main effect for subscale, Wilks' Lambda = .37, $F(1.91, 328.26) = 187.36, p < .001$, partial eta squared = .52. We explored this main effect using the Bonferroni correction and found that ratings of value (3.67) were more positive than ratings of enjoyment (3.35), which were more positive than ratings of frequency (2.95).

Table 3
Differences in Awareness Subscale by Faculty Participation

Mean and Standard Deviation				
Program	Participation	No Participation	<i>t</i> -test	Cohen's <i>d</i>
Learning Community	4.23 (.59)	4.01 (.72)	$t(162) = 2.16, p = .02$.33
Consultation	4.18 (.70)	4.10 (.65)	$t(163) = .69, p = .25$	
Workshop	4.23 (.58)	4.09 (.69)	$t(163) = 1.16, p = .12$	
Reading Group	4.24 (.58)	4.10 (.69)	$t(163) = 1.16, p = .12$	
Multiple Programs	4.21 (.61)	4.06 (.70)	$t(163) = 1.52, p = .07$	

Note. Activity types for which there was a significant difference are listed in bold and include a measure of effect size.

To explore differences in subscales between faculty who participated in different types of programs, we calculated 1-tailed independent samples *t*-tests comparing faculty who participated in each type of program to faculty who did not participate in this type of program for each subscale. To explore differences in program diversity, we created a grouping variable that compared faculty who had only participated in a single type of professional development or had not participated in any professional development to faculty who had participated in between two and four different types of professional development. Given the differences between the three components

of the behavior subscale in the previous analyses, we initially explored them separately in these analyses but found no significantly different patterns. Accordingly, we report them as a single subscale in these analyses.

Average subscale scores for faculty who participated in different types of programs and resulting *t*-tests are reported in Tables 3-7. Table 3 reports differences in awareness scores. Awareness aligns with FLO 1 (increase knowledge of evidence-informed teaching). As can be seen in Table 3, although participation in any type of program was associated with higher awareness scores than was seen in faculty who had not participated in that program type, only participation in learning communities was associated with significantly higher awareness scores than was seen in non-participants. This difference had a medium effect size.

Table 4
Differences in Integration Subscale by Faculty Participation

Mean and Standard Deviation				
Program	Participation	No Participation	<i>t</i> -test	Cohen's <i>d</i>
Learning Community	4.24 (.53)	4.02 (.65)	<i>t</i>(163) = 2.42, <i>p</i> = .01	.38
Consultation	4.24 (.59)	4.09 (.60)	<i>t</i> (163) = 1.53, <i>p</i> = .07	
Workshop	4.28 (.52)	4.08 (.62)	<i>t</i>(163) = 1.93, <i>p</i> = .03	.34
Reading Group	4.18 (.59)	4.12 (.60)	<i>t</i> (163) = .56, <i>p</i> = .29	
Multiple Programs	4.21 (.53)	4.08 (.65)	<i>t</i> (163) = 1.38, <i>p</i> = .08	

Note. Activity types for which there was a significant difference are listed in bold and include a measure of effect size.

Table 4 reports differences in integration scores. Integration aligns with FLO 2 (Integrate knowledge with practice) and FLO 3 (Increase reflective and iterative growth). As can be seen in Table 4, although participation in any type of program was associated with higher integration scores than was seen in non-participants, only participation in learning communities and workshops was associated with significantly higher integration scores than was seen in non-participants. These differences had medium effect sizes.

Table 5
Differences in Emotion Subscale by Faculty Participation

Program	Mean and Standard Deviation		<i>t</i> -test	Cohen's <i>d</i>
	Participation	No Participation		
Learning Community	4.36 (.70)	4.19 (.72)	<i>t</i> (163) = 1.58, <i>p</i> = .06	
Consultation	4.41 (.67)	4.21 (.73)	<i>t</i>(163) = 1.72, <i>p</i> = .04	.28
Workshop	4.51 (.69)	4.19 (.71)	<i>t</i>(163) = 2.56, <i>p</i> = .01	.45
Reading Group	4.20 (.86)	4.30 (.67)	<i>t</i> (51) = -.64, <i>p</i> = .26	
Multiple Programs	4.33 (.74)	4.24 (.70)	<i>t</i> (163) = .84, <i>p</i> = .20	

Note. Activity types for which there was a significant difference are listed in bold and include a measure of effect size.

Table 5 reports differences in emotion scores. Emotion aligns with FLO 4 (Increase motivation to adopt evidence-informed strategies). As can be seen in Table 5, participation in consultations and workshops was associated with significantly higher emotion scores than was seen in non-participants. These differences had medium effect sizes. Participation in learning communities

was associated with a non-significant increase in emotion scores and participation in reading groups was associated with a non-significant decrease in scores.

Table 6
Differences in Belief Subscale by Faculty Participation

Program	Mean and Standard Deviation		<i>t</i> -test	Cohen's <i>d</i>
	Participation	No Participation		
Learning Community	4.71 (.40)	4.52 (.59)	<i>t</i>(163) = 2.42, <i>p</i> = .01	.38
Consultation	4.74 (.38)	4.56 (.55)	<i>t</i>(148) = 2.52, <i>p</i> = .01	.37
Workshop	4.78 (.37)	4.56 (.54)	<i>t</i>(111) = 3.06, <i>p</i> = .001	.46
Reading Group	4.63 (.46)	4.61 (.52)	<i>t</i> (163) = .19, <i>p</i> = .43	
Multiple Programs	4.71 (.39)	4.54 (.56)	<i>t</i>(163) = 2.23, <i>p</i> = .01	.35

Note. Activity types for which there was a significant difference are listed in bold and include a measure of effect size.

Table 6 reports differences in belief scores. Belief aligns with FLO 4 (Increase motivation to adopt evidence-informed strategies). As can be seen in Table 6, participation in learning communities, workshops, consultations, and any combination of two or more different program types was associated with significantly higher belief scores than was seen in non-participants. These differences had medium effect sizes.

Table 7 reports differences in behavior scores. Behavior aligns with FLO 5 (Develop relationships that enhance teaching). As can be seen in Table 7,

although participation in any type of program was associated with somewhat higher behavior scores than was seen in non-participants, only participation in workshops was associated with significantly higher behavior scores than was seen in non-participants. This difference had a medium effect size.

Table 7
Differences in Behavior Subscale by Faculty Participation

Mean and Standard Deviation				
Program	Participation	No Participation	<i>t</i> -test	Cohen's <i>d</i>
Learning Community	3.35 (.55)	3.28 (.55)	$t(175) = .87, p = .19$	ns
Consultation	3.35 (.61)	3.30 (.52)	$t(175) = .49, p = .31$	ns
Workshop	3.47 (.60)	3.26 (.53)	$t(175) = 2.27, p = .01$.39
Reading Group	3.32 (.58)	3.31 (.54)	$t(175) = .17, p = .43$	ns
Multiple Programs	3.34 (.57)	3.30 (.54)	$t(175) = .46, p = .33$	

Note. Activity types for which there was a significant difference are listed in bold and include a measure of effect size.

Discussion

We used institutional tracking of faculty professional development activities and the APS to investigate whether faculty who engage in more than a single type of CTL program have increased appreciation for pedagogy and whether participation in different types of professional development is associated with different responses to APS subscales. When comparing responses across subscales, we found that faculty scored lower on the awareness and integration subscale and had the highest scores on the beliefs subscale. We interpret the strongly positive responses to the belief questions as evidence that our efforts to foster a culture of evidence-informed teaching

seems to be paying off. Within the behavior subscale, which we analyzed separately, we found that faculty value behaviors that support teaching more than they enjoy them and that they enjoy them more than they participate in them. This pattern of responses is quite similar to those reported by Hurney et al. (2020) for an elite liberal arts college that had not participated in recent intensive pedagogical training. From this lens, the current results can be seen as a replication and extension of Hurney et al. (2020). We were very interested to see significant gaps between value, enjoyment, and participation and view these gaps as an invitation to investigate and address the structural barriers that prevent those who value and enjoy professional development from actually engaging in it.

We also found that faculty who participated in a greater range of program types had more overall appreciation for pedagogy than faculty who participated in less diverse offerings or did not participate in any CTL program. It is possible that encouraging faculty to participate in more diverse types of professional development increases appreciation for pedagogy. If so, it would be important to encourage faculty to engage in a range of program types. However, we cannot draw causal conclusions from the current study. It is likely that faculty with a greater appreciation for pedagogy seek out more types of professional development. We are viewing this early finding as a baseline measure. As we track changes in individual faculty engagement with our programs and attitudes towards teaching over time, we will be able to determine whether participation in diverse professional development can increase appreciation for pedagogy.

It may also be possible that different program types are particularly effective at one aspect of appreciation for pedagogy, which would emphasize the importance of thinking of our programs working in concert with each other. Because the subscales align closely with our strategic goals and important FLOs we were interested in investigating the extent to which faculty members' previous experiences with our program types were associated with different patterns of APS responses. This investigation has provided us with rich information about our impact on faculty. We summarize our analyses of the association between program types, subscales, and FLOs in Figure 2, indicating program types that frequently are designed to support each FLO attainment with checkmarks.

Awareness—Increase Knowledge of Evidence-Informed Teaching

As can be seen in Figure 2, all program types are designed to increase awareness. Accordingly, we were somewhat surprised to observe that only participation in learning communities was associated with a significant elevation in awareness when we compared participants to non-participants. Review of the differences between those who participated and did not participate in different sorts of programs reveals that those who did not participate in learning communities had lower average scores (4.01) than those who did not participate in other types of programs (4.09-4.10). Because of the peer-led learning communities that were offered during COVID, an unusually high proportion of faculty have participated in learning communities over the past four years. In fact, participation in these learning communities was expected for all full-time faculty who were not on leave. Because of this expectation, we believe that faculty who did not participate may have unusually low awareness because they joined the faculty recently which caused them to miss the learning communities and also has given them less time to learn about evidence-based teaching. Alternatively, those who have not participated in any learning community may actively avoid CTL programs, which would limit their exposure to research on evidence-based teaching. As we collect longitudinal data tracking changes in participation and changes in awareness, we will learn more about whether other program types can cause increased awareness.

Integration—Integrating Knowledge with Practice and Increasing Reflective Growth

As can be seen in Figure 2, learning communities, workshops, and consultations are frequently designed to increase FLOs 2 and 3. Although some reading groups are designed to support these FLOs, this level of support varies depending on the book being featured. We found that participation in either learning communities or workshops was associated with elevated integration scores, confirming the relation between these activities and the targeted FLOs. As expected, we failed to observe any association between participation in reading groups and integration scores. Somewhat unexpectedly, we found only a marginally significant association between participation in consultations and integration scores ($p = .07$). We believe this weaker association may be driven by the variability in the topics discussed during

Figure 2
Mapping of FLOs to Programs Associated with Elevated Scores

Subscales and FLOs	Program				
	Learning Community	Consultation	Workshop	Reading Group	Multiple
Awareness FLO 1 Knowledge	✓	✓	✓	✓	
Integration FLO 2 Integration FLO 3 Reflection	✓	✓	✓		
Emotion FLO 4 Motivation	✓		✓	✓	
Belief FLO 4 Motivation	✓		✓		
Behavior FLO 5 Relationships	✓	✓	✓	✓	

Note. Programs intended to support FLOs are marked with a ✓ and shaded cells indicate a significant association between participation in an activity and increased subscale scores.

consultations. Like reading groups, the topics covered in consultations vary considerably depending on the needs of the faculty member. We plan to begin tracking the alignment between consultations and these FLOs to learn more about how and when consultations can support integration.

Emotion and Belief—Increasing Motivation to Adopt Evidence-Informed Strategies

As can be seen in Figure 2, we frequently design learning communities, workshops, and reading groups to increase curiosity and positive feelings about teaching. We found that participation in either consultations or workshops was associated with elevated emotion scores, supporting the efficacy of these programs. Somewhat unexpectedly, we found only a marginally significant association between participation in learning communities and emotion scores ($p = .06$). As expected, we found no association between participation in reading groups and emotion scores. As was mentioned in the introduction, the mapping between positive emotions towards teaching and motivation to adopt strategies is indirect, which make a complete interpretation of these patterns difficult.

As can be seen in Figure 2, we frequently design learning communities and workshops to support beliefs that teaching is a learnable skill. Interestingly, in addition to having the highest overall ratings in response to this subscale, participation in learning communities, consultations, workshops, or multiple program types was each associated with more positive responses to this measure. We have interpreted these results as evidence that most forms of participation support this FLO and that more engagement likely results in stronger endorsement of this FLO.

Behavior—Developing Relationships That Enhance Teaching

As can be seen in Figure 2, we actively work to develop relationships that enhance teaching in all of our program types. However, whereas consultations only develop relationships between CTL staff and faculty, the other three program types also develop relationships between groups of faculty who are gathering to learn about teaching. Thus, we expect to see the strongest associations between these program types and improvements on this FLO. However, the behavior subscale does not directly measure relationships that enhance teaching. Instead, it measures value, enjoyment, and fre-

quency of behaviors. We were somewhat surprised to see that only workshops were associated with significant increases in behavior scores. However, upon reflection, we believe that this may have been due to the fact that a relatively small number of faculty attend workshops and a small group of faculty attend many workshops. From this perspective, workshop attendance may be associated with a high level of behavioral engagement. In future work, we hope to develop a more direct measure of the formation of relationships that enhance teaching.

Conclusions

Overall, we found that faculty who engage in specific types of programs have different attitudes than faculty who do not participate in these activities. Workshop and learning community participation were associated with the most areas of elevated appreciation for pedagogy. This finding was gratifying as these are key components of our programming, designed specifically to impact the type of concepts measured by the APS. Each component was associated with greater appreciation for subscales that align with important FLOs. We encourage others to consider measuring the impact of these activities on APS subscales. Although we cannot conclude that workshop or learning community attendance created the observed differences, we look forward to measuring changes over time to clarify the direction of influence.

We were interested, but not surprised, that consultations were only associated with elevated emotions and beliefs. Consultations generally occur when a faculty member has a specific need that shapes the ensuing conversation. Increases in awareness, integration, and behavior might be better supported by interactive and content-focused programs that include conversations with peers. We were somewhat surprised to see that participation in reading groups was not associated with differences in appreciation for pedagogy. We plan to investigate faculty responses to reading groups more closely to learn why faculty attend reading groups and how the experience impacts them. We are interested to learn whether following reading groups with a workshop focusing on applications might increase impact. The current results are a first step towards investigating ways programs attract different types of faculty and potentially offer different impacts. We encourage others to consider tracking faculty behavior across CTL programs to measure effects on broad learning goals.

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