Following up with faculty participants in a large professional development program

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Following up with faculty participants in a large professional development program

Introduction

Faculty participation in teaching professional development programs often fails to translate to sustained shifts in teaching practices [1], [2], [3]. Faculty development programs which focus on scattered individual workshops on specific teaching strategies do not actively address the institutional barriers faculty face in implementing new practices in their classes [4], [5], [6], [7]. We created the Teaching Excellence Network (TEN) at Rutgers University, a multicampus state university to centralize pedagogical development initiatives, reduce institutional barriers, and provide sustained support for faculty's course transformation efforts. We have previously highlighted the structure and design principles behind the TEN, and do not explore those in this paper [8]. This paper explores the experiences of two participant coauthors to examine how participation in the TEN have impacted the course transformation experiences of faculty at our institution. We examine these experiences through a theoretical lens of structural agency and motivation and discuss the practical implications for professional development programs. These co-author participants describe short-term and long-term benefits from participation in TEN, including establishing, and networking within, a community of faculty interested in supporting teaching and connecting with experts in pedagogy (general and specific), instructional design, and the scholarship of teaching and learning. We will address the two-part question: What facets of these two participants' experiences were important in sustaining and pursuing course transformations, and how can our findings inform the design of support for future participants?

Positionality of the writing team

This work took place at Rutgers University, a large public R1 institution in the northeast, on the New Brunswick campus (enrollment of ~35,000 undergraduate students). Our writing team consists of six TEN grant team members. Author CH is a postdoctoral associate in the School of Arts and Sciences. Their main role in the collaboration is research, including data collection, curation, and analysis, as well as dissemination of results. Authors SB and CP are staff members working in faculty/educational development and student support offices. They provide expertise and experience in program development and the application of education theory to practice. Author PB is a faculty member in the School of Engineering's Office of Undergraduate Education and an engineering education researcher. They provide expertise in theoretical frameworks, pedagogical methods, and the development of faculty support initiatives. Author CR is a faculty member in the Department of Physics and a physics education researcher. They bring expertise in large-enrollment course pedagogical methods and overcoming barriers associated with scale, as well as STEM and physics education research methods. Author ME is a faculty member in the Department of Chemistry and has a background in chemistry education research. They bring expertise in pedagogy, faculty development, curriculum development, and chemistry and STEM education research methods.

We also have two former TEN participants. Author APC is a Computer Science (CS) faculty interested in designing curriculum and programs that make computer science accessible,

engaging, and inclusive to all students. She has led the revision of the CS department's introductory course sequence to facilitate students' transition through the sequence, reduce classroom intimidation, and increase students' interest in computing. Author EW is a faculty member in the Department of Industrial & Systems Engineering. She is interested in the continuous improvement of engineering education. Over the course of many semesters, she has focused on creating an engaging and inclusive classroom environment that supports student networking.

Theory

Our theoretical framework of structural agency and motivation combines structuration theory and expectancy-value theory thereby allowing us to address both the impacts of institutional structures on faculty's sense of agency and motivation and provide an integrated view of institutional and individual factors which impact faculty's pedagogical change efforts.

Strong Structuration Theory describes a mutually constitutive cycle, where structures impact agents' decision making and are impacted by agents in turn [9]. This cycle, shown in Figure 1, comprises 4 components. *External structures* are conditions for action; they are the social hierarchies that shape our context, determine resource availability and allocation, and inform our understanding of our role. *Internal structures* are a basis for decision making; they are our understanding of our context, our role within it, and the roles of others. These structures precipitate moments of active *agency*, in which the agent draws upon their internal structures to make a decision in response to external structures. Exercising agency yields *outcomes*, which may include actions taken and changes to internal and external structures [9].

Agents' choices within this cycle may reinforce or change existing structures, and structures impact agents' sense of agency in the context of structural change. This perspective highlights faculty agency, emphasizing that even choosing not to act represents a decision shaped by contextual constraint. This emphasizes how and why faculty exercise their agency, and how contextual alteration might support them in using their agency to engage with course transformation. This is in line with Strubbe et al. [10] who emphasizes faculty as agents and moving towards an asset model of faculty. Structuration Theory shifts our focus, moving the deficit from faculty who do not engage in change, to the structure which does not support change. This framing centers our participants and their decisions, allowing us to examine how they navigate the contexts in which they are embedded.

Expectancy-Value Theory (EVT) is a theory of motivation which provides the lens to understand why faculty choose to exercise their agency [11], [12]. EVT is a widely established motivation theory [13], which has been used in the context of faculty development in multiple studies [14], [15], [16]. In EVT motivation comprises two branches (Figure 1). The *Expectancy* branch relates to an individual's expectation of success when engaging in an action. Strongly predictive of expectation is an individual's self-efficacy [17], a powerful motivational factor that relates to a person's concept and belief about their own competence when engaging in a particular activity or domain. The *Value* branch of EVT provides several constructs for understanding the value that implementing pedagogical practices could have to faculty. The four most relevant values are attainment, utility, interest, and cost. *Attainment* value derives from the

activity's connection to one's identity. *Utility* value derives from the activity's potential benefits. *Interest/Enjoyment* value derives from the pleasure and engagement one felt during the activity. Finally, *Cost* describes the anti-value an activity has due to losses incurred when engaging in the activity (e.g., time, resources, etc.) [11], [12].

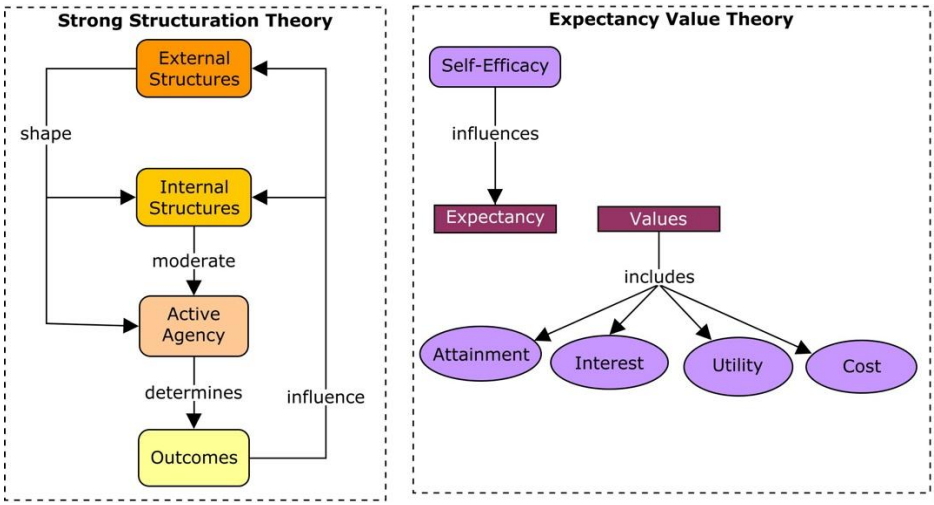

Figure 1. Our theoretical frameworks EVT and Strong Structuration including the constructs within each framework.

These theories together comprise our *Analytical Lens* and enable us to understand internal factors, external factors, and the motivational factors that influence faculty's pedagogical choices. Our work centers faculty and their experiences, exploring the assets at their disposal, and how they leverage them to achieve their goals. These theoretical frameworks were deliberately built into the structure and programming of the TEN, and we use them to explore the impacts of participation in the TEN on their transformation goals and efforts.

TEN/Institution context and goals

The TEN was first conceived prior to the COVID-19 pandemic, at a time when there were few coordinated professional development programs at Rutgers University. The TEN aimed to offer programs in evidence-based pedagogy, as well as create a central hub for other developing and existing resources to reduce barriers to faculty course transformation. The professional development programming designed within the TEN centered an asset-based approach by framing course transformation as an issue of structure, agency, and motivation. The design of the TEN faculty development programs was based on the premise that organizational and structural factors must be systematically addressed to enhance faculty agency and thereby bolster prospects of educational improvement at research universities.

The TEN programs were focused around two types of professional development: a course transformation summer institute (SI) and semester support groups (SSGs). More details of the TEN programs are provided in a previous article [8], but in brief:

- The SI was designed to provide faculty with (1) a broad understanding of learning theory, teaching strategies, and technological tools that could be useful to improving pedagogy in their courses and (2) individualized guidance on their own course transformation goals

and how the theory and tools they were learning could be used to achieve those goals. Faculty participating in the SI committed to approximately four hours per day, with 90 minutes of synchronous meeting time, for fifteen days over the summer. Faculty earned a stipend for their SI participation that aligned with the part-time salary rate for teaching a 3-credit course, received a letter from the Assistant Vice Provost for Undergraduate Education (that was sent to their department chair and their dean), and produced a teaching portfolio to document their course transformation effort.

- Semester Support Groups (SSGs) were designed to provide a small group of faculty an opportunity to learn about low-barrier methods of course transformation and gain opportunities for feedback, guidance, and accountability as they enact course transformation. SSGs provided a less-intensive format for faculty compared to the SI. For SI participants, SSGs provided a means for those faculty to receive continuing support during the semester. SSG facilitators earned a stipend that aligned with the part-time salary rate for teaching a 1-credit course. Example SSG topics: "Values Affirmations Intervention," "Group for Independent Feedback on Teaching," "PlayPosit: Assessment Reflection Targeted Intervention," and "Preparation, Accountability, and Support for SoTL and Education Research."

Providing both high and low time commitment options, with options for an intensive course and ongoing support, was intentional and aimed at reducing barriers to faculty participation, in addition to meeting different faculty needs. Faculty were welcome to participate in either or both of the programs.

Between Spring 2021 and Spring 2025, 38 faculty participated in an SI cohort; these faculty represent 21 STEM departments across five schools and 11 different position titles ranging from part-time lecturer and supervisor of laboratory operations through assistant and associate ranks of teaching and practice non-tenure track positions to all ranks of tenure/tenure-track positions. During this same seven semester period, 55 faculty participated in one or more of the 21 offered SSGs (27 faculty attended more than one SSG;19 faculty participated in both SI and one or more SSGs).

Faculty and course contexts

Two past TEN participants have contributed their experiences to this paper. They were highly engaged participants, met their goals for their course transformations, and expressed interest in reflecting on their experiences within the lens of our theoretical frameworks. Not all TEN participants met their course transformation goals or engaged as fully as APC and EW in TEN programs. The self-selection of these two participants does not invalidate the findings we can glean from applying this lens to understand their experiences. Their experiences are presented authentically without any attempt from the rest of the co-author team to influence the ways they described their experiences in more positive, more negative, or more neutral light. Ultimately, exploring these two participants' stories reveals experiences that are critical to achieving positive course transformation outcomes. These faculty members, and their context, are introduced below.

Co-author APC is a faculty member in Computer Science (CS). She coordinates and teaches introductory CS course sequence. She became interested in course transformations to

address issues that these courses and the CS major had with underrepresentation of women and general concerns about student success. Student success was an especially big problem in Data Structures, the second course of the sequence that was often seen as a "weed out" course within the major. APC's courses have enrollments between 500-1,000 students, with class time split between large lectures and smaller recitations.

APC enrolled in one of the SSGs offered through the TEN. Subsequently, she relied on the network of contacts she acquired from that participation to further support her course transformation efforts. APC made a number of significant changes to the Data Structures course, including revised curriculum and syllabus, incorporation of undergraduate learning assistants (LAs) [18], [19], [20], [21], use of affective interventions to address inclusion, tutoring support, and changes in the structure of assignments and policy. These changes had a profound impact on how the course was taught and how students were impacted by their enrollment.

Co-author EW is a faculty member in the Department of Industrial & Systems Engineering. She coordinates and teaches Engineering Economics. The structure and enrollment of the course underwent significant changes as she began her position, including becoming a required course for all engineering students. This made the previous structure of the course untenable. EW's course enrollment is over 500 students, split up into lectures of 150-250 students.

EW enrolled in both the SI and in a large number of SSGs through the TEN in support of her course transformations. EW changed the course to include the incorporation of active learning into large lectures, the incorporation of undergraduate LAs, reworking assignments, modified summative assessment, and added formative assessment methods. These changes had a profound impact on how classroom instruction was implemented, the student experience, and student outcomes.

Commentary on faculty members' experiences

In this section, we summarize salient themes in APC and EW's experiences through the lens of our theoretical frameworks. Both co-authors leveraged different aspects of TEN resources to help enact their pedagogical changes. While they both encountered barriers from external structures and the costs related to making changes, they both report a number of positive outcomes related to their own teaching experience and their observed impacts on their students' experiences. Ultimately, they both report continuing to benefit from their engagement with the TEN's resources and the resulting networks and community they became a part of.

Initial Motivations to Engage in Course Transformations

Our two instructors, APC and EW, were both assigned to large courses, with student retention difficulties and a paucity of instructor availability. Both sought to improve the accessibility, inclusivity, and engagement for students, and to generate a positive impact on student well-being and persistence. They provide excellent examples of how institutional structure (departments, course structure, TEN) interfaces with personal decision-making (decisions to transform courses or interact with colleagues). Both instructors express strong

personal motivation to transform their courses, which drives their initial investment. During their journeys both instructors encounter features of their institutional environment which support or hinder their attempts to transform their courses. In the process of navigating barriers, APC and EW bring changes - large and small - to their institutional environment, which support their continuing change efforts. The TEN program, as part of their institutional environment, impacted the external and internal structures available to them, supporting them in activating their agency and sustaining change.

APC: The novelty of the material in Data Structures, combined with its difficulty, can result in a significant number of students retaking the course, which led the course to be known as a "weed-out" course. The "weed-out" designation can signal course structures that are detrimental to student well-being, sense of belonging in the major, and success. Student performance in the introductory sequence can predict their experience in later courses, and students' opinions of these courses impact their sense of belonging in CS for semesters to come. Starting in Spring 2021, the Data Structures course underwent significant interventions to broaden participation and improve retention in the major. As a woman in CS, I could relate to the few women in the classroom, and I remember how ostracized I have felt by my own lack of self-confidence. Looking back, my personal motivation was to provide my young self with a supportive and safe learning environment.	EW: I returned to teaching after a long break and was eager to update myself with current trends in the classroom. I wanted to create a student-centered classroom environment. I was hoping to demonstrate through example that attending class was worthwhile (a lesson I learned the hard way as an undergraduate student). In addition to challenges brought about by the class's large size, within each section there is a wide mix of college experience (first year students all the way through students in their final semester) as well as a variety of majors (10 engineering majors, economics majors, etc.). So, I needed to design a course to support all types of students. I especially sought to help new college students develop good study habits. I have always been motivated to broaden my skills as an instructor so that I could do my job well.

Figure 2. Faculty commentary on their courses before transformation.

APC displays very strong *attainment value*, her sense of self and personal accomplishment ties in closely with her goals for her students. She sympathizes with students in a similar position to herself and aims to improve the environment for their sake and her own. Her experience is prompted by her participation in *external structures*, the Data Structures course and her broader department, which shapes her understanding of what students are experiencing and may need. EW notes that her course contains a wide variety of student situations and that teaching this course was her first return to teaching in a long time. She was committed to acquiring the skills she needed to teach well, be any means available to her. We can see that although the sense of *attainment* comes from a different place, EW is also strongly *attainment* motivated. In this case, motivated by embracing and thriving in her role as an instructor.

Both APC and EW identified several areas for improvement at the outset of their course transformation.

APC: Students procrastinated starting programming assignments. We weren't certain if they felt overwhelmed by the online autograder or the assignment size. To address this trend, in Fall	EW: Prior to my appointment, assessment of student learning primarily took the form of periodic homework assignments and multiple-choice exams. I wanted to incorporate more

2022, we added an early submission option for assignments. For extra credit, students submit a small portion of the assignment within a few days of the assignment release. Our goal was to encourage students to get an early start on the assignment while at the same time reducing the anxiety of submitting their assignments to the autograder. But the trend continued, so, we realized that the students lacked the programming ability to start the assignments, being unfamiliar with programming the basic data structures operations. We introduced a new category of programming assessments, called Labs, designed to provide students with additional lower-stake programming practice. The Labs were also designed to supplement existing major programming assignments by covering related topics that were not featured in the assignment. Our first iteration included five Lab assignments. Student feedback was astounding; students wanted more Labs. In the second iteration, we designed Labs to function as steppingstones for major assignments.	frequent, varied feedback to the students. I have changed from the 80-minute, sage-on-stage lecture format to one in which active participation by students is encouraged. I designed the course to have multiple, small touch points each week to facilitate long-term retention of the material. These took the form of in-class problem solving, between class reading assignments, midweek reviews of recently covered material, and homework assignments. One of my teaching goals has been to make a large lecture feel like a small recitation. There is no external recitation component to this course, so I built it into regular class meetings. Students routinely work on problems during class to reinforce past concepts and practice new concepts. Students are encouraged to seek help from each other, and I move through the lecture hall answering questions. It is a personal need for community that helps drive the building of a community within the classroom. Knowing from experience that groups often form within disciplines and college level, I saw this diverse group as an opportunity for students to create connections across disciplines and experience level. Students have made reflective comments about how they never would have met this person or made this friend without the conscious effort of community building in the classroom.

Figure 3. Faculty commentary on improvements they made to their courses.

APC had already identified overcoming procrastination and submission anxiety, as well as bridging basic knowledge, as initial changes to support student participation in the course. Here, APC was changing the *external structures* (in this case the course structure) to support students and improve course equity. We see the impact of this change on APC's *internal structures* in her statement "student feedback was astounding" as her ideas about what students wanted from the course began to shift. APCs actions were beginning to change both *external structures* and her own *internal structures*.

EW knew she wanted to introduce far more interactivity into her course than was traditionally included in a large-lecture course. The course redesign was a structural challenge because she was the only instructor, with a large number of students. She wanted to change the *external structure* so that the course would feel like a small lecture course and encourage community growth among the students. She notes that the students themselves felt the impact of the changes as they reflected on the connections they had made in the course which they would not otherwise have made. In this case, EW's course transformation has impacted the *external structure* of the institution, altering the student network.

Both APC and EW incorporated undergraduate LAs into their courses to improve the instructor to student ratio in the course. This has helped them both to overcome the limitations of having a very large course with few faculty available. APC and EW describe similar reasons for including LAs in their courses:

APC: Previously, graduate teaching assistants led the weekly 55-minute problem-solving sessions of 50-60 students. After the redesign, the undergraduate LAs lead smaller sessions of 15 students. Smaller sections allow richer and more personal interactions, as well as giving LAs opportunities to positively impact the community. We partnered with our institution's Learning Centers to create CS-specific bias and microaggression training for LAs to promote an inclusive environment.	EW: To facilitate this approach, I requested support from the university in the form of Learning Assistants (undergraduate students who have already taken the course and have received pedagogical training). The success of this approach was immediately apparent in student feedback. I now have a team of 12 LAs to support student learning in large sections. The new support person to student ratio of 1:50 is infinitely better than the old ratio of 1:250.

Figure 4. Faculty commentary on the organization of their course meetings.

Their explanations of the impacts of LAs are similar but include subtly different motivations. APC's strong sense of self and interest in supporting women and minorities manifests in the bias and microaggression training for her LAs. Meanwhile, EW's focus on instructor-student ratios and interactions highlights her interest in achieving a small lecture feel. We can also see the high *utility* value afforded by this *external structure* (the LA program). Their respective motivations are actively shaping both the *external structures* that they are embedded in and their perceptions of those structures (their *internal structures*).

Evolution of the Courses

As they moved into their course transformations both APC and EW encountered barriers and new ideas. They each describe challenges they faced in their course transformation, which they then overcame. In this process, they found the TEN helpful, as well as interactions with teaching-focused colleagues. Both APC and EW described *costs* in terms of time and resources that could have been a demotivating factor. Yet, both faculty stayed motivated and found ways to counter or overcome the costs. In terms of time, APC secured more resources from the department to support the course, while EW learned of a new tool to reduce time she was spending on grading to reinvest elsewhere.

APC: The course transformation experience equipped me with the skills to effectively solicit necessary support from my department. I introduced a staff coordination team that involves undergraduate teaching assistants (TAs) to support the course. They are responsible for aiding in answering a centralized course email, coordinating exams, and assignments. The team support has provided me with the time to continue pedagogical and classroom improvements without the physical and emotional toll of the initial	EW: The SSGs met roughly every other week for 90 minutes. I enjoyed the amiable, yet task focused format. The facilitators were aware of the many demands on participants' time and didn't put undue pressure on us but at the same time encouraged accountability. A constant barrier to continuous improvement is time. There is never enough of it. One huge takeaway from the community was learning about Gradescope in an SSG. No one in my department uses this tool, but members of the community facilitated by the TEN

redesign. In fact, the whole introductory sequence is being redesigned to streamline the courses and introduce an artificial intelligence component. At this point I started to have weekends again as I had a great team of undergraduate TAs that looked forward to working on course updates. The TAs designed all the small assignments which only required review from me.	have successfully used it to reduce the time needed to grade hundreds of exams while at the same time promoting consistently. Based on their suggestions (and support) I implemented Gradescope last semester and will not go back to grading individual paper exams.

Figure 5. Faculty commentary on available support structures.

We can see both APC and EW taking advantage of *external structures* to reduce burdens on themselves. APC leverages the resources from her department in the form of undergraduate teaching assistants, and restructures her course to reduce her administrative and teaching burdens. Meanwhile EW participates in a faculty support group, and learns from the community there about a grading tool which she uses to restructure her course and save time. APC and EW describe the significant value of these *external structures* in the form of *utility*, and *cost* reduction, which contributed significantly to sustaining their change efforts.

Both APC and EW reflected on how professional development programming supported them in their transformations. APC notes that it was important that this *external structure* connected to her *interest*. EW notices that the professional development programming was structured to be respectful of her time while providing significant accountability for her transformation efforts. This ultimately provided *utility* value and reduced *cost*. This demonstrates further the importance of supportive *external structures* for promoting sustained change efforts.

APC: The TEN program enticed my curiosity about how humans learn and brought to my attention that not everyone has the same support and access to education. The program transformed me into an advocate for computer science education that is accessible, engaging, and inclusive to all students.	EW: The SSGs met roughly every other week for 90 minutes. I enjoyed the amiable, yet task focused format. The facilitators were aware of the many demands on participants' time and didn't put undue pressure on us but at the same time encouraged accountability.

Figure 6. Faculty commentary on what they enjoyed about TEN activities (EW's response is repeated from the initial part of her response in Figure 5).

APC and EW also go on to say that these professional development programs helped expand their professional communities. This bolstered their ongoing transformation efforts as they were able to seek support from colleagues. These *external structures* also positively supported their *self-efficacy*, providing both emotional fortitude and a sense that they could implement new methods successfully.

APC: TEN also brought me in contact with colleagues that are pedagogically trained, which led to an infinite number of conversations that aided me with ideas on how to transform these courses but also sustained me during the redesign. The TEN program provided me with access to colleagues in STEM, many of whom face the	EW: The intensive nature of the summer program encouraged me to take "some-day" ideas, flesh them out through the lens of research-based practices and make them an active part of the course. The open, sharing nature of the institute let me borrow methodologies already proven to work in classes with similar challenges. I was able

same challenges. These connections continue to provide valuable emotional support and a means to leverage each other's experiences.	to implement tried and tested methods developed by the institute instructors.

Figure 7. Faculty commentary on the benefits of the network that they developed through TEN.

Reflection on Changes

Reflecting on their experiences, APC and EW note how they have changed professionally and personally and how they have molded their institutional environments as part of this process of change. Both co-authors described how the TEN programs (*external structures)* gave them new tools that permanently changed their perspectives and/or approaches on teaching.

APC: These interventions wouldn't [have] become reality without the TEN program. I was not pedagogically trained during my doctoral program. I was coordinating courses and implementing policies according to my own experiences in computer science programs. My opinion was that students needed to toughen up and power through, I was not empathetic about how students' struggles and realities impacted their studies. The TEN program enticed my curiosity about how humans learn and brought to my attention that not everyone has the same support and access to education.	EW: Participating in the TEN summer institute provided me with the language I needed to describe the improvements I wanted to make in my course and the confidence to do it. Learning about metacognition, self-efficacy, the importance of repetition, and varied delivery methods, filled out the "tool-box" I could use to make improvements to the course. TEN has provided me with the support I need(ed) to constantly improve the classroom experience for my students
	EW: A direct result of one SSG is that I now routinely use a simple affirmation survey prior to each midterm exam which the students seem eager to engage with. A second SSG focused on the use of social network analysis to help understand community within a segment of the university.

Figure 8. Faculty commentary on the influence that the TEN had on their course transformations.

APC's reflection demonstrates that participating in the TEN helped her change her perspective on what it means to be a teacher, to support learning, and to interact with students. These changes then enabled her to enact further changes in the classroom, and ultimately better align with her overarching goals for student outcomes. APC's changes relate to her *internal structure* of beliefs.

EW reflects on her changes in a subtly different way: as adding "tools" to her toolbox. These are still changes to *internal structure*, but rather than changing her beliefs, these alterations in structure are instead related to knowledge of methods for achieving the outcomes she wants. This, in turn, reveals new avenues and professional benefits.

Both authors also reflected on the costs and barriers they encountered, which shaped the way they viewed their overall experiences. While they both developed networks outside of their department, their reflections focused on different aspects related to the outcomes of their course transformation efforts.

APC: My relentless pursuit of improvement meant I couldn't rest until my vision for a better outcome was fully realized. While physical and emotional tolls were inevitable by deploying many interventions at the same time, all requiring real-time adjustments, I feel rewarded by the strong positive feedback I received, and I can now proudly call myself an educator. Specifically, I feel rewarded from the student feedback on their experiences taking the course, the genuine camaraderie I built with my colleagues in STEM, the recognition for my efforts from my department, but mostly I feel rewarded by knowing that I was part of improving the experience for thousands of students	EW: Honestly, I have not been successful in my efforts to share my teaching experiences with faculty within my department. On my recommendation, two faculty from my department have since participated in a TEN program. I'm only just realizing that neither ever spoke to me of their experience, nor did I make the effort to find out about their experience. As a teaching-focused faculty member, I feel like I have a different set of priorities regarding undergraduate education than my research-focused colleagues. The TEN community has provided me with a supportive network of student-focused colleagues that support my efforts and keeps me motivated.
	EW: This [SSG] led to an internal research grant to further investigate ways to measure (with an eye to improving) the social networks in an engineering classroom.

Figure 9. Faculty reflection on costs, barriers, and personal changes that TEN brought about.

APC described a high *cost* of implementing pedagogical changes. Ultimately, she felt this *cost* worthwhile due to the large benefits she perceived from enacting these changes. This included changes to both *external structures* (e.g., departmental recognition, a network of supportive colleagues, and improved interactions with students) and *internal structures* (e.g., the fulfillment of doing what she feels was an essential part of her job). In contrast, EW experienced different rewards. While she struggled to engage colleagues in her department and get recognition from her department, the new avenues created by TEN provided EW with the benefit of a network of colleagues outside of her department and rewards like institutional grants from the university to make further improvements in the classroom, which relate to *external structures*.

Conclusions and implications

Motivated faculty need external structures to support sustained efforts in teaching. Sometimes supportive structures might not be present in departments or there might be conflicting values between departments and instructors. Supplementary structures such as the TEN can help to provide the resources and structures needed to maintain efforts for course transformations. This kind of extra-departmental, supplementary structure supported APC and EW by supporting their ability to build new networks, to enhance their pedagogical knowledge, and to advocate for financial supports.

Our faculty accounts demonstrate that faculty members who have an initial motivation to transform courses and teaching practices are met with institutional structures that can either thwart or bolster their efforts. Challenges of large class sizes, disparities in student populations, small numbers of course assistants, limited financial resources, and heavy burdens of research and other departmental time obligations can pose significant challenges to course transformation efforts. As faculty evaluate their individual situations, they may determine the cost too high and

the challenges too insurmountable to continue with a course transformation project, even if they highly value the project's potential outcomes.

APC and EW demonstrate that if a faculty member who is adequately motivated is able to access supportive external structures, they might find the resources needed to sustain their motivation, as well as gain practical knowledge and tools to reach their objectives. They might also impact the external structures of their department and institution by reallocating resources and demonstrating successful efforts that might be contradictory to normative expectations within the department or institution. When these external structures have utilitarian value, reduce costs in time and effort, and/or support the faculty member's sense of personal and professional attainment, they serve to sustain motivation for innovative teaching projects.

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