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Designing a Regional Teacher Professional Development Enterprise

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Teacher professional learning is foundational to high quality P-12 education. While many researchers have identified the importance and criteria of high-quality professional learning, little research explains how this professional learning can be implemented in a regional system. This ten-month case study offers one planning approach to engage important stakeholders, including principals, other education leaders, professional development providers and especially teachers, in a process to design a regional professional learning collaborative. This approach employed features of high-quality professional development throughout the planning activities. Drawing on principles from design thinking, findings identify the importance of the empathize, define, ideate, and prototype phases in designing innovative systems for professional learning. Emphasis is placed on the importance of shared authority with teachers, optimism inherent to design thinking, and relationship and community building throughout these phases. Implications for the development of educator professional learning systems are discussed and a coda sharing the current efforts of the collaborative is presented.

Keywords: professional development (PD), regional teaching, shared authority, design thinking, high-quality professional development, educational leaders, teachers

INTRODUCTION

Regardless of where and how teachers are initially prepared, there is always more to learn. All educational jurisdictions—local, regional or state agencies or federal education authorities—change educational policies that require teachers to acquire new knowledge and learn new practices. Moreover, rapid developments in technology, communication, and culture impact how education is enacted to serve evolving societies. Because teachers are knowledge workers, to stay current with the state-of-the-art, they continue to learn as the education sector changes. Whether the need for professional learning is driven by organizational considerations or by the motivation of individual teachers to address their personal learning, this need is foundational to high quality education.

Research and development in teacher professional learning aim to create a knowledge base about what works for whom and where. However, even papers that address systemic issues (Borko, 2004) focus on program design and evaluation and stop short of providing guidance on how to operationalize professional learning throughout a regional education system. Other innovations (Fishman et al., 2013) help bridge the research-to-practice gap, yet even they are silent about how teacher professional learning systems might be designed. The Learning Policy Institute identifies high-quality teacher professional learning that: "(1) is content focused; (2) incorporates active learning; (3) supports collaboration; (4) uses models and modeling of effective practice; (5) provides coaching and expert support; (6) offers opportunities for feedback and reflection; and (7) is of sustained duration" (Darling-Hammond et al., 2017, pg. 4). The Learning Policy Institute recommends that such efforts include adequate resources and related policy matters but does not suggest how a regional teacher professional development system might be planned and organized.

In many jurisdictions, education agencies are vastly different in size and resources, thus creating inequities in the availability of and access to quality professional learning. In the work we report here, that is the case. A regional system could be in a position to make professional learning more widely available to all educators in the region and enable more equitable and effective access to those resources. We describe a planning approach to engage important stakeholders, including teachers, in a process to design a regional professional learning system. Data from this design process constitute a case study that can be useful to others who wish to design systemic efforts. Our question is: How do you design a regional professional learning collaborative?

Framework

Many theoretical and conceptual frameworks guide research and development in teacher professional learning, ranging from a focus on personal factors such as role identity (Kaplan and Garner, 2017) to theories of adaptive expertise (Von Esch and Kavanagh, 2018). Some, such as Ravhuhali et al. (2015), eschew theory and focus primarily on honoring teachers' voices in the consideration of the design of teacher professional development.

Our approach to system design is partially aligned with Ravhuhali et al. (2015) because we wish to honor teachers' professional autonomy and provide an avenue for their voice, or authority. Drawing on Weber (1947), we define *authority* to mean occasions when individuals have the right, or power to shape their professional learning (Kinser-Traut and Turner, 2020). We are also aligned with Darling-Hammond et al. (2017), who argue for teacher professional learning at the system level that identifies needs and selects high quality methods that are likely to succeed.

Following recent scholarship in improvement science (Lewis, 2015), we depart from Darling-Hammond et al. (2017) regarding the concept of fidelity, which is based on the idea that the program to be implemented is faithful to how the innovation was enacted in its development context. In contrast, improvement science suggests that local adaptation is not only expected, but desirable. This is because people and contexts change over time, regions and nations, rendering silent the ability of implementers to control innovation in the rough and tumble of real schools. Improvement science turns what Darling-Hammond et al. view as a problem—inability to control every aspect of the innovation—into an essential component. It builds innovations that are principle-based so that implementers can enact them in a manner that is congruent with the principles, rather than focusing on fidelity to behaviors. We respect teachers' knowledge and understanding of how principle-based innovations can be adapted locally. Moreover, we believe implementation that is congruent with principle is more aligned with our commitment to accord teachers' voices more influence in system design. Our focus on teacher voice promotes sharing authority across stakeholders among which teachers are the largest group. Our commitment to sharing authority empowers teachers to engage in their professional learning, thus disrupting the traditional power dynamics surrounding professional development (Smith and Rowley, 2005; Sandholtz and Scribner, 2006).

Following our commitment to teachers' voices, we are committed to a collaborative approach to the design of teacher learning. Many jurisdictions have organizations that are designed and administered by school authorities, such as New York State's Boards of Cooperative Educational Services (BOCES, Ward, 2007). Often, as in the case of BOCES, these organizations enable smaller jurisdictions to gather together to access resources to which each might not have access otherwise. Yet, such organizations are based on a bureaucratic, government funded and administered effort. They are not collaborative in the sense that groups, such as teachers, who typically do not have ascribed power to influence their learning, are excluded from exercising authority. We base our approach to collaboratives in much the same way as defined by Díaz-Gibson et al. (2017), who include formal organizations (e.g., schools, government agencies) and informal groups (e.g., teachers, neighborhoods, families) in their approach to collaboratives.

Our assessment of the literature is that, while it offers insights into components of effective collaboratives, it gives *little advice* about how to develop these systems. We were seeking advice at a granular level about how we might create our design. What process might we follow to ensure that a wide range of voices and stakeholders have input? How might we surface promising ideas and needs of the educational community? How do we balance the need for broad support and input with the need of education leaders to engage professional learning that might be unique to their school or district? How do you design a system to serve a diverse region with several school districts, independent schools, and charters?

Design Thinking

In *The Sciences of the Artificial*, Simon (1996) argues for a branch of scientific investigation that studies the creations of human artifice. Engineering, architecture and medicine are sciences of the artificial. That is to say, humans create ideas and designs, usually based on a foundation from the natural sciences, which in turn have impacts that can be studied empirically. Education is a design enterprise that is informed by sciences of the artificial. Education programs and systems are not the result of natural forces; they are the result of human design.

Simon's (1996) work was seminal in helping professionals undertake design in a thoughtful, research informed manner. Design is not random. It is the result of considerable innovative thinking to create a solution to a problem. Good design is based on the designer's knowledge and a consideration of the opportunities and constraints that place boundaries on effective design solutions. The term *design thinking,* influenced heavily by Simon, portrays the unique qualities that are required by people engaged in the design of artifacts. Brown and Wyatt (2010, p. 32) describe some of the unique attributes of design thinking:

Design thinking incorporates constituent or consumer insights in depth and rapid prototyping, all aimed at getting beyond the assumptions that block effective solutions. Design thinking—*inherently optimistic, constructive, and experiential*—addresses the needs of the people who will consume a product or service and the infrastructure that enables it (Emphasis added).

We use the design thinking model from the Hasso Plattner Institute for Design at Stanford University, known as the d-school (2021, May 5), which is widely used and available through Creative Commons. The d-school model has five phases: empathize, define, ideate, prototype, and test. Users are

encouraged to iterate among phases as they design. *Empathize* is the data gathering phase, with a focus on understanding the values and needs of users. This phase, central to human-centered design, requires designers to observe, engage, and immerse themselves in the users' world. The *define* phase transform data from the empathize phase into a problem statement for design activities. *Ideate* moves from problem definition in the define phase to possible design solutions. This phase is best implemented with as few constraints on design as possible to generate many solutions. Thinking wide is preferred to focusing on a limited set of solutions. The *prototype* phase moves from ideas to actual designs. It is preferable to do rapid prototyping, that is, to try many solutions in order to "fail fast" early instead of investing resources in solutions that might fail when implemented at scale. The *test* phase applies solutions in limited settings to generate data to test the validity of the problem statement, solution strategies, and prototypes. The phases inform one another, and designers iterate among them to create satisfactory designs.

METHODS

Educational Context

Our work took place in Tucson, Arizona. The urban and rural region has great socio-economic disparities and poverty is a major issue. A majority-minority borderlands region, Tucson is 70 miles from Mexico and is highly diverse. There are about 122,000 students in the region's K-12 schools and about 17,700 students in preschool and childcare centers. Most K-12 schooling is public, although there are a small number of private and faith-based schools. Like the rest of Arizona, teacher turnover is high and many teachers are beginners, requiring professional learning to gain the skills and understandings to help students succeed (Hoffman, 2020).

Groups and Participants

We engaged six different participant groups (see **Table 1**). A *steering committee,* advised by a larger *planning design team*, provided leadership. All members of the steering committee were members of the planning design team. *Design charrette*[1] participants included most members of the steering and design committees, along with more participants from stakeholder groups, particularly teachers. In addition to these three active participating groups, we held a *focus group* with K-12 teachers. We also consulted *P-12 education leaders* (e.g., school superintendents, early childhood center directors) and we sent *surveys* to six different stakeholder groups. **Figure 1** shows the timeline of activities over the ten-month planning period.

Case Study Methods

We used case study methods (Stake, 2013) to identify key components of the planning process and design charrette. We sought to understand the importance of each phase within the design process (i.e., empathize, define, ideate, prototype, test) as they applied to the design effort we engaged. This case of planning represents a study of the development of a regional professional collaborative, with a specific focus on design thinking.

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[1]Design charrette (Condon, 2012) is the approach to the workshop we used as a key component of our planning.

TABLE 1 | Participant groups.

Group	N	Members
Steering Committee	7	University faculty and administrators, K-12 leader, PD provider
Planning Design Team (once/month)	32	K-12 teachers, early childhood teachers, PD providers, P-12 leaders, community college administrators
Education Leaders	10	Superintendents, charter leader, PD leader
Teacher Focus Group	38	P-12 teachers
Surveys		
P-12 Teachers	1,396	Public district and charter teachers, independent schoolteachers, early childhood teachers
Principals	78	Public district and charter schools, independent schools
Early Childhood Directors	25	Public and private sector center directors
District Professional Learning Provider	23	School district providers of professional learning
PD Providers	27	Public and private sector providers of professional learning
PD Providers at State University	42	Professional learning providers at the public university.
2-Day Design Charrette	54	University faculty and administrators, community college leaders, community organizations, public district and charter school leaders (principals, PD directors, superintendents) and teachers (early childhood, middle school high school, resource teachers and instructional coaches), consultants

Data Collection

We used several data sources: fieldnotes of interviews with school leaders and the preschool (P) –12th grade teacher focus group; surveys from P-12th grade teachers, school principals, early education center directors, and three groups of PD providers (district, independent, university-based); and questionnaire responses from design charette participants.

Data collection tools were customized to each group in **Table 1**. Semi-structured interviews with school superintendents opened by describing the effort and asking open-ended questions (e.g., What key take-aways do you have about the initiative? What hopes and needs do you have related to professional development? What concerns do you have about the initiative?). The teacher focus group included questions about their experiences with professional learning, such as: What is the earliest professional learning experience you remember and what was memorable about it? What topics are you interested in learning more about and how might this support your teaching? Think of a professional learning experience that sounded good to you but turned out not. How would you have fixed it? If you could attend/participate in any professional learning, what would it be? Why?

We developed different surveys for each group because the data we needed from each group addressed issues unique to their roles. Data collected through conversations with school leaders, the teacher focus group, and surveys shown in **Table 1** were collated and analyzed to provide a summary of regional professional learning needs and resources.

Data Analysis

Survey data were analyzed with descriptive statistics and cross tabulations across questions to reveal relationships among responses. We depicted these data graphically as we used them to provide feedback to the groups throughout planning.

We used qualitative data coding to analyze fieldnotes, responses to interview and focus group questions and written responses to open-ended questions in the design charrette feedback forms. For the design charrette data, we created a coding system based on empathize, define, ideate and some prototyping because these were the phases most appropriate to this initial design work. Both authors, along with a third coder, read data transcripts and worked jointly to code the data. The various data sets allowed us to triangulate the professional development needs and resources in the region across various stakeholders and data sources (Marshall and Rossman, 2010).

FINDINGS

We present findings from our planning that transpired over ten months, divided into two main components—data collection and design (see **Figure 1** for a timeline). We organized around the four phases of design thinking relevant to this process: empathize, define, ideate, and prototype. Following this, we describe participants' reactions to engaging in the process.

Our Planning Approach, Building a Collaborative

Here we describe how these two components, data collection and design, relate to design thinking and detail important components of design thinking in developing a professional learning collaborative.

Empathize Phase

Early in planning, the steering committee formed the planning design team comprised of district officials, local teachers, and

FIGURE 1 | Planning and design timeline.
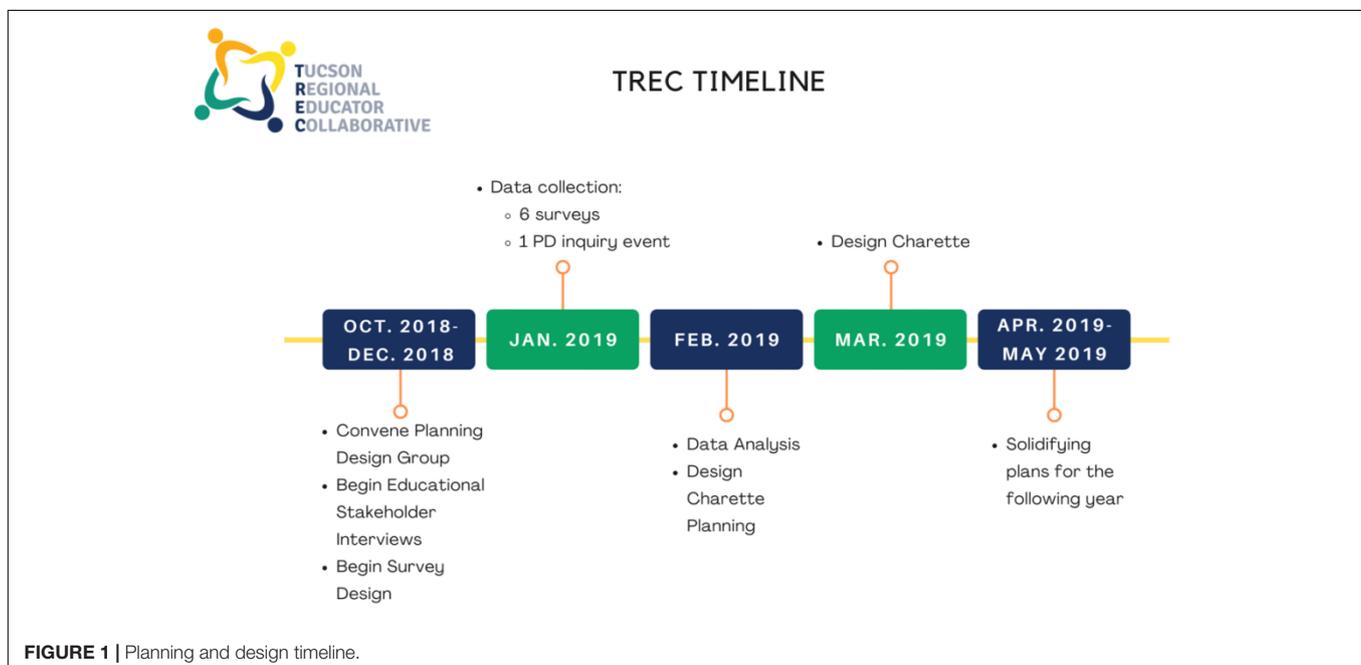
community organizations that serve teachers. The first steering committee and planning design team task was to begin the empathize phase, specifically coming to understand the values and needs of users. To immerse themselves in the teachers' world (Lewis, 2015) and to understand the region's professional learning opportunities, the planning design team brainstormed general questions and stakeholder groups (e.g., PD providers) that should be interviewed and/or surveyed.

Collecting Data and Building Relationships With School Leaders

The project director individually interviewed nine P-12 education leaders (six school district superintendents, one non-profit leader, and two charter school leaders) to discuss the project, determine interest, and establish ways to distribute surveys. These interviews provided opportunities to build relationships with each leader and to assess the proposed value and understanding of designing a collaborative.

School leaders endorsed the creation of a collaborative that would make high-quality teacher professional learning accessible. An agency could offer greater accessibility by offsetting the financial costs and supporting communication. They thought the university could bridge differences between district and charter schools and support relationships among districts. The initiative could foster collaboration by providing information, involving and promoting voices of local educators, sharing resources, and increasing affordability. Several superintendents commented that, at a time of teacher labor market shortages, a unique and supportive professional learning community might draw teachers to the region.

Some superintendents expressed concern that the initiative would fail, referring to a prior failure. However, as the conversations continued, all leaders recognized common regional professional learning needs, such as culturally responsive teaching, bullying, mental health and suicide prevention, special education, curricular content, and supporting the trajectory of learning-to-teach. Many wanted the initiative to enable teachers to feel agency in selecting professional learning that met their needs and to build connections with others in the region. Several leaders discussed using online professional learning that their teachers were requesting. A common hope was that the initiative would make professional learning accessible (e.g., hybrid, online, weekend, summer) and through collaboration with the university, some expressed interest in collecting data to understand how professional learning affects the classroom. They stressed that the collaborative should not attempt to recreate or overlap with professional learning resources already available. Not surprisingly, most were unsure how this effort would be achieved, thus underscoring our concern that there is little sound advice in the literature regarding how to create a system-level effort.

Collecting Data and Building Relationships With Teachers

The group of P-12 leaders was a good start as they are aware of the challenges teachers and districts face. However, these interviews required triangulation with information from teachers, because they would be the end users. To complement the school leaders' data, we planned a teacher focus group to

engage ourselves in the users' world (Hasso Plattner Institute of Design at Stanford, 2021, May 5) and understand their experiences with professional learning. The professional learning events they recalled in response to a writing prompt emphasized choice, relationship building and collaboration with colleagues, implementable strategies, active participation, and a focus on classroom challenges. These well-remembered events (Carter and Gonzalez, 1993) included frustrations, such as professional development "where no one pays attention;" technology based professional development without user interaction; stand-alone workshops not connected to classroom work, including grade and content specific concerns; and events taking place during the school day. These attributes of well-remembered events are contrary to high quality PD (Darling-Hammond et al., 2017), highlighting these teachers' understanding of how to support their learning. For example, teachers understood that professional development without user interaction conflicts with the attribute that high-quality PD requires active learning.

Teachers also engaged in small group conversation, responding to questions described in the data collection section. These questions led to energetic discussions, revealing that teachers want to talk about professional learning and have excellent ideas about it, again often consistent with the literature. They spent a considerable time in professional development and were looking for a change in how it is supported in the region. The key implication was that teachers want to interact with and have a chance to share what they know about their own professional learning.

The interviews with P-12 leaders and focus-group teachers set the foundation for the development of six surveys, which served to further define the regional landscape of professional learning needs and resources.

Define Phase

The define phase built on the empathize phase that established our understanding of the values and needs of users, specifically the P-12 education leaders in the region. Over three months, we used the values and needs that emerged from the empathize phase to define our problem statement and context for the design activities. Specifically, we realized the importance of engaging in a professional learning needs and resources assessment.

Professional Learning Needs and Resources Assessment

Initial empathize activities identified six stakeholder groups to assess: teachers, principals, early childhood directors, district PD providers, independent PD providers and PD providers at the University of Arizona. The planning design group created six related but unique surveys. We used connections developed during the empathize phase to ensure wide distribution of the surveys. Superintendents suggested how to distribute the teacher survey, principal survey, and district PD provider survey for their districts. A local non-profit teacher support organization distributed the surveys to their list of 10,000 teachers. The professional development providers' survey went to multiple list serves focused on these providers.

Using a two-week data collection window, we collected anonymous responses from 1,396 teachers, 78 principals, 25 early childhood directors, and 23 district professional development

providers. We collected non-anonymous responses from 27 professional learning and 42 staff and faculty at the University of Arizona who offer professional development. The responses were compiled into six data reports and one executive summary. The full reports can be found in **Supplementary Materials**.

Converting Data Into a Problem Statement

A substantial majority of teachers (88.5%) felt very well-prepared for teaching their current grade or content and a large percentage (78.9%) responded that their goal for professional learning is to support their professional growth. These responses suggest an interest in additional professional learning beyond feeling well-prepared for teaching. Despite a strong interest in new professional learning, 27% reported not finding professional development they were looking for in the region. Four categories described the lack professional learning opportunities: content specific teaching (49%), special education or exceptional education (20%), advanced credentials such as master's programs (17%), and socio-emotional learning (14%). Yet, despite teachers' interest in further professional learning, insufficient funding and time were key challenges for districts, early childhood directors, and principals in providing meaningful PD.

Identifying Similarities and Differences

Key areas of professional learning identified as a need by both districts and teachers concerned: (1) a focus on instruction including blended learning models and project-based learning; (2) social emotional learning (e.g., trauma-informed learning); (3) subject specific content (e.g., STEM), and (4) on-demand learning opportunities that enable flexibility in attending (e.g., asynchronous on-line).

Teachers and PD providers, including university faculty, differed on the top three qualities essential for professional development facilitators. The key difference was the teachers' desire that providers have had classroom experiences—this was the second most important quality for teachers—whereas it was the fifth most important for PD providers and fourth most important for university faculty. A challenge remains, however, to convince PD providers that their contributions might require collaboration with experienced classrooms teachers for their efforts to succeed.

Although the survey responses clarified a number of issues, the responses also raised questions. For example, teachers reported not being able to find specific content PD, while PD providers reported offering these topics (i.e., STEM). We need to further explore this mismatch of need compared to resources and determine why, if the resources exist, the need remains. This suggests another challenge identified by both PD providers and teachers, that it is time-consuming and difficult both for teachers to identify relevant PD opportunities, and for PD providers to connect with schools and teachers.

These similarities, differences and challenges provided the foundation for understanding the problem statement: the new collaborative needs to leverage existing professional learning resources in the region to support educators and address gaps. How this might be done is the focus of the ideate phase.

Ideate Phase

Once we had begun to achieve clarity from the data we collected in define phase, we needed a mechanism to help us move forward. How does a group generate ideas for innovation that are both new and exciting, and based on research and practice that can succeed if implemented with care? One source is the accumulated wisdom that all fields create and communicate through publications in books, journals, and conference proceedings. To develop a regional teacher professional development enterprise a group needs to be familiar with important literature. However, there are millions of publications in teacher professional learning and becoming familiar with all of that is a herculean task.

Assuming that different experts possess unique yet overlapping knowledge, one way to augment the literature review requirement and to surface design solutions beyond what is possible locally, is to ask experts to process it for you. This does not minimize your own obligation to create knowledge for local use, but it increases points-of-view. Engineering design (Salter and Gann, 2003) suggests that face-to-face engagement is productive for the design process. Thus, using experts to gain a broader view will likely be more effective if they engage the group that ultimately will be responsible for the final design. In essence, this is what a design charrette does. Drawn from architecture and urban planning, "a design charrette is a time-limited, multiparty design event organized to generate a collaboratively produced plan for a sustainable community" (Condon, 2012, p. 1).

At the February planning design meeting, we tasked the stakeholders to interpret the data reports that summarized the surveys and to identify components our design consultants should address in their design proposals (e.g., How does the design address both teacher needs and goals as well as district goals? How does the design attend to equitable access to high quality professional learning?).

Design Charrette

Simultaneously with summarizing data from the ideate phase, we planned and prepared the design charrette. We identified three nationally distinguished professionals in the field of educator professional learning, who were tasked with creating a professional learning design for our region: Cynthia Callard (University of Rochester), David Stroupe (Michigan State University), and Kari Thierer (South Puget Sound Community College). We sent data summaries and a list of components to the designers, who prepared their design ideas based on best practices for educator professional learning. For their design presentations and documentation, we borrowed and adapted from "ideation workshops" (Dyer and Gregerson, 2021, May 5). Each designer created four products: (1) a press release that would "announce" the design to the broader public; (2) the design itself, limited to three pages; (3) two pages of FAQs and 4) a PowerPoint presentation that was presented at the charette.

To ensure we had a diverse group of participants at the design charrette, we invited education stakeholders from across the region (see **Table 1**). We sampled the region's schools and P-20 stakeholders (including various roles, e.g., teachers for all P-12 levels, principals, PD directors) and participants representing the region's ethnic, racial, and socioeconomic diversity. Participants'

task was: *Listen carefully, think about the designs presented and the principles behind them, and identify promising design principles and activities for our region.*

The goal of the design charrette was to engage participants in selecting, augmenting, and adapting the consultants' ideas to provide a foundation for our PD enterprise. This required that all participants be engaged in listening carefully and critically, and to create their understanding of the ideas and how they might apply to our region. Participants needed to transform the ideas (e.g., implementing networked improvement communities-NICs; leadership cadres; virtual and online resources) into solutions to our unique regional needs and constraints. This goal required participants to actively learn the ideas presented throughout the design charrette. We could not accomplish our goal if the participants were merely listening and taking notes. We applied the principles of high-quality professional learning (e.g., active learning, collaboration, feedback and reflection; Darling-Hammond et al., 2017) to our enactment of the design charrette.

Figure 2 shows the schema for the design charrette. A key process included Aronson's (1978) jigsaw classroom with three distinct components. Because the groups needed to develop their understanding and application of the design presentations, our approach enabled them to construct understanding actively through discussions and the creation of artifacts.

In the jigsaw analysis component, participants were assigned to one of six small groups (1st component in **Figure 2**). We created two groups for each of the three consultants to keep these initial groups small so that participants could actively discuss. Each group was assigned the task of paying particular attention to the design presentation of their assigned consultant, while also carefully attending to and understanding the other two presentations for later comparison. They were

asked to analyze their consultant's ideas carefully and create as much understanding as they could. In the jigsaw consolidation component, we assembled the two groups for each design presentation into one larger group (2nd component in **Figure 2**). They distilled the aspects of the design that could be effective in the Tucson region and entered their ideas onto a PowerPoint template. This provided the basis for new ideas and possibilities for the design of the collaborative, while beginning to consider what would work best in our region.

The ideate activities in the design charrette created a high degree of engagement, surfacing many ideas for how the effort might move forward and the components that might be included in prototypes. Not surprisingly at this stage of ideation, participants were not in agreement about these possible elements. Steps were needed to convert the ideas from this phase into actionable prototypes, which was the focus of the next component of the design charrette.

Prototype Phase

To move from the ideate to the prototype phase, we engaged in the jigsaw synthesis component. We created synthesis groups, such that each new group had representatives from the three analysis groups (3rd component in **Figure 2**). These new groups, based on their expertise and perspectives, each produced a synthesis of the designs (a prototype) and in turn created a possible design for the region on poster paper. While these were unique designs, there were also striking similarities across the synthesis groups. These composite groups explained their designs to the whole group and then using a gallery walk format, participants voted on essential features of a design by voting on key components. The voting formed the basis for the forward movement topics that followed by identifying the key areas prototypes should include.

We concluded the design charrette with a synthesis of the understandings represented in the posters and the gallery walk, recognizing the synergy that was beginning to develop across ideas and interests. The steering committee tallied votes from the gallery walk and identified leading design features to include in prototypes of our professional development enterprise. We were careful to preserve the participants' understanding of the initial features that would be required in prototypes, knowing full well that these initial attempts might not survive the evaluation of prototypes as they become more coherent. This is an essential aspect of the "failing fast" notion of prototyping in design thinking. Our intent was to invite participants to work on developing more complete versions of these prototypes, some of which might include quite different directions for ultimate development. At this phase it was important not to reject alternate approaches to prototypes, each of which might exemplify the principles that emerged from the ideate phase.

Next, participants self-selected into groups based on their interest in working on features that the gallery walk suggested would be needed in subsequent prototypes and eventual testing: *hub* (management); *networking* (teacher learning communities, social support, networked improvement communities and action research); *just-in-time resources* (e.g., website, a directory service for matching people to people,

FIGURE 2 | Design charrette jigsaw analysis component.
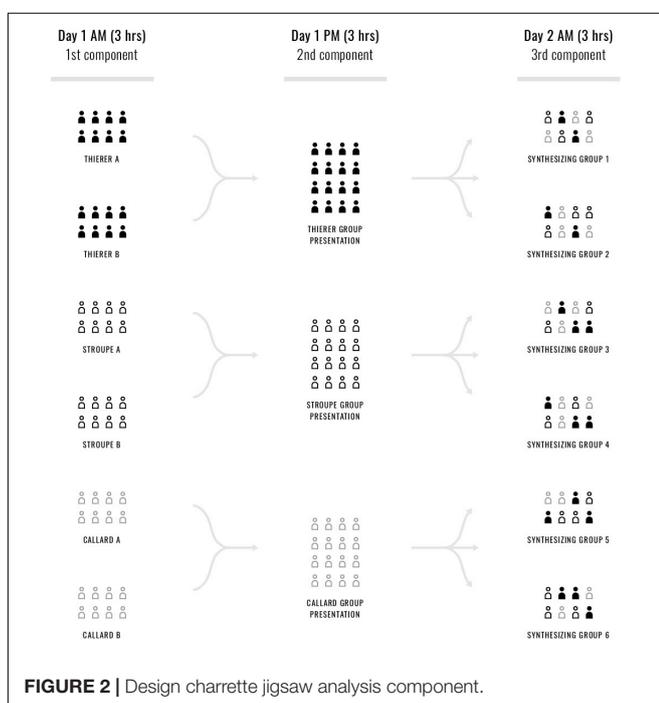
clearinghouse); *communications* (expanding reach and long-term communication strategies); *immediate communication and engagement over the next 6 months* (inward and outward communication); *funding* (activities needing funding, sources of funds, grant opportunities); and *educator leadership* (teacher fellows, peer support). The terms used to define these features derived from the posters. In order to honor teacher voice, we were careful to respect the language the participants used rather than to convert their words into more technical jargon.

Participants' Reactions to the Design Charrette

At the end of each of the two days, participants responded to an open-ended questionnaire by answering: "What was the most important thing that was accomplished during this retreat?" and "What important understanding did you learn in these two days?". We coded responses using the phases of design thinking. Examples of comments are shown in **Table 2**. Three themes emerged that reflected key attributes that characterize successful design thinking application in education: (1) the recognition that sustained community engagement is necessary for success; (2) the participation of a diverse and engaged group in the design process can be inherently optimistic; and (3) ultimate accomplishment requires increased teacher professionalism and impact on students.

There is a substantial literature on the importance of community in teacher learning (Prenger et al., 2019). The design charrette participants reflected that importance as they wrote about the potential of the collaborative to *foster community* among teachers in the region. This could be accomplished by engaging a diverse group of teachers representing all professional categories (e.g., early childhood, elementary, secondary, special education, subject specialists), localities, school type (e.g., public district, charter, independent), and representatives of affiliated organizations such as the university, community college and professional development agencies.

One of the presumed features of a design charrette that Brown and Wyatt (2010) identified is that they are *inherently optimistic*. Participants in our design charrette agreed with this sentiment. We labeled this sentiment as "forward movement" to characterize the optimistic and future orientation of these comments. Participants recognized that professional learning is necessary to achieve important personal and system goals and that it will be challenging to sustain the effort necessary to achieve these. Although several participants expressed the optimism that would be needed to maintain motivation to engage in the process, they also acknowledged the challenges of achieving common understanding and agreement on how to move forward.

Participating in a design process like the one described here would be of little value if it did not lead to desirable outcomes for teacher professionalism and impact on students (Darling-Hammond et al., 2017). One participant captured this sentiment and the skepticism of the process:

An important understanding for me was that this could actually becoming something very viable. In reading the background information, I admittedly came in very cautious, and

concerned about lack of action behind words. However, what I was able to witness the past two days was the complete opposite of that (Participant 18).

Many other participants recognized and voiced support for the importance of this primary justification for teacher professional learning opportunities. Even though there is emphasis in the ideate phase on generating possible solutions that are as innovative as possible, the participants recognized that whatever design solutions were ultimately enacted, they needed to be aligned with state and federal policies that rely on student learning outcomes as important indices of school quality.

DISCUSSION

Our purpose was to demonstrate in detail how a region could create an organization to support teacher professional learning by using a design thinking framework. The professional development literature provides guidance about the importance of successful teacher learning programs, but it provides far less help on the question of how to create a regional system to support such efforts. Drawing on Simon's (1996) approach to sciences of the artificial and advances in design thinking promoted by the Stanford d-School, we embarked on a ten-month planning exercise that drew upon the expertise of local stakeholders, including teachers, and national consultants to design and begin a regional professional development collaborative. This case study contributes to the field of educator professional learning by providing a detailed example of how to create such a system.

Our approach of engaging regional stakeholders employed the phases of design thinking to surface essential features of a system. Interviews with education leaders and a focus group with teachers revealed potential challenges we would have to confront, such as skepticism that this effort would not likely succeed because previous attempts had not. Yet, despite this initial reluctance, stakeholders were willing to suspend judgment about the concept of a regional collaborative in order to begin the process of design, specifically investigating needs and resources as well as considering the components the collaborative would include. We were encouraged to find that our teacher collaborators were knowledgeable about the components of effective teacher professional learning and supportive of aligning the collaborative's professional learning opportunities with these quality requirements (Darling-Hammond et al., 2017).

The design charrette (Condon, 2012) served as an effective and engaging approach to move stakeholders through the rigorous intellectual work of sifting through many ideas for the collaborative. In many ways, the design charrette enabled us to apply the Darling-Hammond et al. (2017) features of effective professional learning. The event was *content focused* and grounded in best practices related to professional development. It engaged *active learning* through the use of the jigsaw method. It was fundamentally *collaborative* throughout, including attention to teacher voice. It *modeled effective practice* through its active learning, collaborative design, optimism in educators, and shared authority across the stakeholders. It provided *expert support* and *feedback with reflection* through the gallery walk,

TABLE 2 | Examples of design thinking phases and themes from design charrette participants.

Design thinking phase & coded theme	Question 1: Most important thing accomplished?	Question 2: Most important understanding?
Empathize, general	a variety of voices were **acknowledged** at every step of the process (5[a]) Multiple perspectives [and] voices were acknowledged (37)	Teachers are willing and wanting professional learning communities (1). Other districts are experiencing similar concerns with professional learning (6)
Empathize, Foster Community	**Bringing** many voices together (8) **bringing together** so many stakeholders and perspectives was so valuable (1) **Seeing** and connecting with fellow educators and agencies from the community (36)	power of **collective minds and collaboration** (3) There is more **in common** in terms of professional learning needs **across stakeholder groups** than is unique (27).
Empathize, Inherently Optimistic	Safe space to share ideas (14) It is evident that there is **synergy** and engagement (24)	People want this! (7) **How many people care** passionately about teaching and growing in that profession (29)
Empathize, Professionalism & Impact	[C]ommitment to a regional **professional learning c**ollaborative was huge! It is something that I didn't really realize how much we needed until we started this work (26)	[M]ore in common in terms of **professional learning needs** across stakeholder groups than is unique (27)
Define, general	Developing a shared goal (13) It provided a common language (12)	How the system must look at all components simultaneously (10) How complicated it is to create a PD structure that meets the needs of many groups and will accomplish the goals of the developers. (29)
Define, Foster Community	building a lot of **common understanding** (8)	Teachers are willing and wanting to be part of the process to help increase teacher learning (2)
Define, Inherently Optimistic	I think that the design team has enough information to delve into and **create a really critical "ecosystem"** for educational professionals (18)	There is a need for professional learning in SoAZ and it is difficult to have a grasp of exactly what the need is, but working collectively and collaboratively, we can try to **address the most pressing concerns** (9)
Define, Professionalism & Impact	A more focused idea for a **future pd plan** (4) Common understanding of how PD needs in our region can be met (11)	Teachers want to be part of the process and presentation to help **increase teacher learning** (3)
Ideate, General Ideate, Foster Community	... and **synthesis of ideas** related to professional learning (28) **Bringing educators together** to brainstorm & develop this (34)	I think it's ibtetesting [interesting] how many commonalities were in our designs (23) figuring out how **to get everyone on board with an idea and pulling in the same direction** (27)
Ideate, Inherently Optimistic	educators in Southern Arizona ...help us **unite and grow** in our professions (16)	An important understanding for me was that this **could actually, become something very viable (**18)
Ideate, Professionalism & Impact	**ideas either exist in some form in the region to have been tried** and were not sustainable. (30)	[P]eople want to grow professionally, and support each other in the **ultimate goal-student success** (19)
Prototype, Foster Community	**building** a community of people who want change (2)	I like the concept of the **NIC** (networked improvement community) and was unaware of this term (28)
Prototype, Inherently Optimistic	**Actionable ideas** and a plan to **move forward** (33)	Each of the 3 designers had **great insights** and presented new concepts (31)
Prototype, Professionalism & Impact	Creating a **network** (6)	

[a]This number represents the anonymous respondent to the reflection question from the design charrette.
Bolded words highlight the action(s)/characteristic(s) of the specific design thinking phase.

subsequent discussion, and participant surveys following the two-day charrette. By itself, it was not *sustained*, but as we describe below, it provided a foundation to be sustained in the following year.

This paper provides a roadmap, based on established practices in the field of design thinking and high-quality professional learning, for the type of activities that educators can apply to create systemic professional learning through a collaborative. We

were not able to provide evidence of efficacy or effectiveness. However, case study methods provide a powerful methodology to create models of the strategies and activities that can ultimately lead to professional learning systems, or collaboratives, to serve local and regional needs.

Coda

We set out to examine how we might create a collaborative organization to support teacher learning. Basing our conception of a collaborative on Díaz-Gibson et al. (2017), this case study demonstrates that a viable design for such an organization can result from a principled approach to collaboration. All groups that participated in the various design phases were able to contribute ideas and energy to the effort. One continuing issue, as always, is how to sustain funding. As TREC is not a government agency, it must sustain its work through raising funds by grants and participant contributions, such as commitment from school districts to pay for services. TREC shares with virtually all educational reforms the fundamental need to raise money to sustain it.

The work we describe here led to the formation of the Tucson Regional Education Collaborative—TREC, which has focused since the planning phase on building capacity. TREC has been deliberate, piloting each effort before implementing it more fully. This approach has allowed us to fail fast and resolve tensions. For example, in the first year the planning design group of about 25 stakeholders served as the steering committee. It quickly became apparent that this group was too big for nimble decision making, so TREC formed a smaller advisory board to support decision making. The advisory board, four key working groups, and semi-annual stakeholder meetings with the three key stakeholder groups—teachers, districts, and PD providers—are the main decision-making bodies.

TREC has built a website that serves as a one-stop shop for educators to identify professional learning opportunities. Many of the initial components of the website design were usable, but to be consistent with the fail-fast principle of design thinking, TREC uses processes of continuous improvement to eliminate poor designs. For example, teachers wanted to ensure the website included a rating system for professional learning activities, but some PD providers were not willing to add their events if the ratings were included. TREC is working to help PD providers see the value of a rating system, so that a prototype rating system might be reintroduced.

TREC's focus is supporting teachers and improving systems, but effective collaboration requires that all partners continue to see value in the enterprise; TREC cannot alienate partners. However, tensions are likely to emerge as TREC balances teachers' expectations with PD providers' programs. Recall that we found that teachers highlighted the importance of PD providers having classroom teaching experience, but PD providers did not view this as important. This issue is but one of several that have emerged as teachers have exercised authority in ways that are unaccustomed by other stakeholders. TREC's efforts to increase teacher shared authority is leading to positive impacts in our Teacher Leader Cohorts, with teacher leaders implementing PD for their colleagues.

Finally, conditions matter. TREC was implemented during the COVID-19 pandemic, impacting TREC's growth in unknowable ways. Perhaps it helped the website gain traction, perhaps it hindered teacher engagement, there is no way to know. There continues to be great excitement about TREC in the region and TREC is growing. Visit www.TRECarizona.org for updates on progress.

AUTHOR'S NOTE

JK-T is the director of the Tucson Regional Educator Collaborative [TREC] (2019) a program of the College of Education at the University of Arizona. Her research focuses on shared authority and the positive impact it can have on all levels of education including teacher professional development. She taught math and science for 10 years mostly at the high school level, has a Ph.D. in mathematics education, and was a Visiting Assistant Professor at NYU.

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DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

RM contributed to the conception of the study. JK-T and RM contributed to the design of the study, analyzed the data, wrote, revised, and reviewed sections of the manuscript. JK-T led the analysis of the data. Both authors contributed to the article and approved the submitted version.

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