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## **Value Creation in Social Learning Spaces: Scale Development**

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**Abstract:** Wide agreement exists about the value and power of learning in social contexts, and social influences on learning have been studied from multiple perspectives. However, before this study, no known measure of the value of learning that happens in social spaces had been developed. This study operationalizes the cycles of the Value Creation Framework proposed by Wenger-Trayner and Wenger-Trayner (2020) and introduces a scale to measure value created through participation in social learning spaces. Data were collected from 18 distinct ECHO® education and health learning communities in New Mexico, Oklahoma, India, and Nigeria. These ECHO® communities align with the conceptualization of social learning spaces. Findings resulted in a parsimonious survey that represents the distinct cycles of value creation. The results of the CFA support the validation of this scale and suggest that the instrument accurately represents the value cycles in Wenger-Trayner and Wenger-Trayner's (2020) framework. This protocol has utility across educational institutions, organizations, and agencies.

**Keywords:** Social Learning, Value Creation, Professional Learning Communities, Communities of Practice, ECHO

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## **Value Creation in Social Learning Spaces: Scale Development**

Changing demographics, a shift toward globalization, and increased competition have illuminated the need for continual professional growth for adult workers across all industry sectors (Chuang, 2021). In education, these changes, along with enhanced understandings of the necessity and value of high quality professional development for teaching that leads to increased student achievement, have caused an emphasis on continual professional growth for educators as they strive to meet student needs (Borko, 2004; Smith, 2020; Desimone, 2009; Darling-Hammond, Wei & Andree, 2010; Yoon, Duncan, Lee, Scarloss & Shapely, 2007). New forms of professional learning in education have gained prominence as a result and include revised mentoring techniques (Lashway, 2003), peer sharing and support (Browne-Ferrigno & Muth, 2004;), online principal professional development (Ross, 2011), professional learning communities (Stoll, et al., 2006), and communities of practice (Wenger, 2011). These opportunities for professional learning for educators reflect a dramatic shift from passive and intermittent forms of learning to active and consistent professional development that is embedded in educational contexts and supported by peers (Stewart, 2014). Professional learning communities (PLCs) have become the “norm” for enhanced professional growth, and evidence suggests that PLCs thrive “when all participants are invested in the work they are doing” (Stewart, 2014, p. 28).

These changes in the way professional development is offered are aligned with historical philosophical understandings that learning is a social activity (Dewey, 1963; Lindeman, 1926) and the belief that learners share responsibility for their learning by becoming active and engaged participants (Vacca & Vacca, 2002; Wilkinson et al., 2010). Social learning opportunities are especially important for adult learners who are motivated for learning when they recognize immediate utility for learning, focus on issues that concern them, experience autonomy in their learning, and learn in a respectful and collaborative climate (Knowles, 1973). Further, scholars have long emphasized the strong influence of social context on learning and interventions that address both social and cognitive dimensions of human development. For example, Vygotsky (1978), Piaget (1959), and Bandura (1977) emphasized social interaction as a key mechanism in the development process. Bandura (1977) emphasized the interaction of environmental and cognitive factors to influence development and behavior modeling to support cognitive learning. Vygotsky (1978) posited that social interaction precedes development, and that consciousness and cognition are the product of socialization and social behavior. These examples along with other broad theoretical understandings have provided a foundation for the rise of innovative social learning through platforms such as communities of practice.

Most recently, communities of practice and social learning have advanced to online, virtual learning environments as rapid technological advancements have revolutionized opportunities for social interaction in virtual spaces. Learning Management Systems, virtual classrooms, massive open online courses (MOOCs), and platforms such as Zoom or Teams technology have expanded opportunities for social learning in unprecedented ways (Raspopovic et al., 2017). Further, virtual learning spaces have proven essential as the globe has adapted to the complexities of a “new normal” for learning in a post-pandemic world. What the pandemic taught us is that these virtual spaces provide flexibility and connectedness through social interaction that may enhance learning.

## **Social Learning Through Project ECHO®**

In 2003, Dr. Sanjeev Arora, physician and professor at the University of New Mexico, introduced a model of online professional learning after a patient, a 43-year-old widow and mother of two, died of a treatable illness before she could receive medical care (UNM Health Sciences, 2023). Dr. Arora realized that if health care professionals in her rural community would have had the requisite knowledge to treat her disease, she would have survived the illness (UNM Health Sciences, 2023). He also noted that, at that time, out of the 28,000 patients who had been diagnosed with hepatitis C in New Mexico, only 1,500 had received treatment (UNM Health Sciences, 2023). In response, Dr. Arora established an online professional learning platform, Project ECHO® (Extension for Community Healthcare Outcomes), as a virtual “community of practice” where doctors could learn from experts and from each other. The ECHO® platform provided an infrastructure for knowledge sharing and collaborative learning that has expanded to rural and underserved communities around the globe (UNM Health Sciences, 2023). While the ECHO® platform originated in the medical field, it has been adapted to meet the learning needs of professionals in primary, secondary, and higher education. Notably, in 2017, the UNM headquarters established an official division for ECHO® Education to support educational applications of the ECHO® platform.

### **ECHO® Protocol**

The ECHO® protocol was initially founded on the notion of clinical rounds, a process where medical professionals review patient cases, access best practice procedures, and collaboratively determine best treatment strategies. Building on this notion, the ECHO® model uses a virtual hub-and-spoke knowledge sharing approach through Zoom technology. In these virtual settings, teams of experts (i.e., “hub teams”) lead virtual telementoring sessions for either health care or education professionals in their local contexts (i.e., “spoke sites”), thereby amplifying the capacity of these individuals to deliver optimum services to their local communities.

Typically, ECHO® sessions last one to two hours and are offered weekly, biweekly, or monthly. Much like a clinical round, each session incorporates a three-part format: a case or problem of practice, a didactic or learning presentation concerning state-of-the-art practices, and discussion/recommendations. Cases and problems of practice focus on real-life issues that are context-based and relevant to day-to-day practice. The didactic is a fifteen-minute, theory-to-practice presentation typically delivered by a hub-team member or guest presenter. Both the case and didactic promote interactive hub/spoke interaction leading to recommendations for best practices and strategies. In both health and education, application of ECHO principles and processes help cultivate a dynamic, professional learning community in which “all teach; all learn.”

In 2017, the ECHO® platform spread to Oklahoma State University’s Center of Health Sciences (OSU-CHS). OSU-CHS was also designated as a “Superhub,” which is an ECHO® partner authorized to provide training and technical assistance to those who wish to start ECHO® programs. Soon after, a group of OSU Educational Leadership faculty partnered with the OSU-CHS to incorporate the ECHO® Education platform to provide professional learning for Oklahoma educators in rural areas (Harris et al., 2020). During the COVID pandemic, every county in Oklahoma was served through OSU ECHO® Health and ECHO® Education. At this time, the participation rate in some ECHO® sessions soared from the average twenty participants

per session to the maximum 500 participant limitation on Zoom (Harris et al., 2020). Currently, OSU-CHS offers over 25 education and health related ECHO® programs to meet the learning needs of educators and health care professionals across the state.

Before this study, qualitative evidence existed regarding participants' perceptions of their learning experiences in ECHO® including the formation of professional networks and application of learning to practice (Harris et al., 2020). However, while ECHO® participants articulated the benefits of learning in these social learning spaces, the actual effectiveness of the learning experience was difficult to quantify and understand across diverse ECHO® social learning spaces. Specifically, ECHO session participants include a very diverse participant population who meet together regularly across 23 different ECHO lines to address challenges in healthcare, mental health, or education. Each of these lines follows the same protocol; however, topics and cases differ considerably.

### **Purpose of the Study**

One way the effectiveness of learning in social learning spaces like ECHO® can be understood is by understanding the *value* that participants create through their learning experiences and the extent to which they apply new learning to their own practice (Wenger-Trayner & Wenger-Trayner, 2020). The concept of value creation in learning communities is not new. For example, Elkjaer (2003) explains that value creation happens within a social context as a result of the exercise of human agency within learning communities. He further distinguishes “learning as knowledge acquisition” and “learning as participation” and explains, “learning is a meeting between learners and environment within the community of practice at hand” (Elkjaer, 2003, p. 481) Additional studies in the late 20th and early 21st centuries identify teams as adding value through knowledge creation that leads to knowledge dissemination and enhanced performance (Anderson & West, 1996, 1998; Lawson et al., 2009; Pitsis et al., 2003; Tataw, 2023). These studies suggest that value is created as learning occurs within groups. More recently, Tataw (2023) concludes, “teams as learning communities are important structures in the creation and sustainability of value in both organizational and instructional settings” (p. 2).

In Wenger-Trayner and Wenger-Trayner's (2020) work, the term, “value,” is not used to signify a person's or group's principles or standards of behavior. Rather, value implies worth, usefulness, or benefits of the activities and experiences generated by participants in the professional learning process that can potentially lead to better practices and systemic change. The Value Creation Framework provides a lens for explaining the value – for example, the knowledge, resources, networks, and practices – that is constructed *within* social learning settings and how participants apply this value *beyond* the space in their respective contexts. In any given social learning context, participant experiences and what they take away from the space may differ. The value creation cycles offer a systematic way of categorizing the different types of value participants may construct within the learning space and how they leverage this value to shape their own practice and in some cases, transform the broader environments to which they belong.

Previous studies have used the Value Creation Framework to explain this progression of learning (Amersfoort et al., 2019; Bertram et al., 2014; Cowan & Menchaca, 2014). For example, van Amersfoort et al. (2019) used the framework to explain how value was created in teacher learning networks. Bertram et al. (2014) used the cycles to assess the value that graduate students and professors constructed in a community of practice and how the value contributed to enhanced academic outcomes. In a study of a community of practice in a master in Educational

Technology program, Cowan and Menchaca (2014) utilized the value cycles in their evaluation of the program.

These studies demonstrate that an understanding of the value that is created within and among participants has strong implications for those who organize and lead social learning spaces as it can inform the design, implementation, and continuous monitoring of the spaces. However, all previous research on value creation has approached the measurement of value through a qualitative lens. While providing a strong foundation upon which value creation can be understood and studied, this approach presents some limitations in how value creation can be assessed on a larger scale across a larger number of participants and contexts. A quantitative measure would offer a means by which a wider range of participant perceptions could be captured, thus providing a broader representation of value creation and learning outcomes which could inform program design, evaluation, and decision-making. Therefore, we build upon the theoretical work of Wenger-Trayner and Wenger-Trayner (2020) by operationalizing participant perceptions of value created through participation in Project ECHO®. No instrument existed before this study to measure participant perceptions of value created in a social learning space.

The purposes of this study, therefore, were: 1) to develop an instrument that captures participant perceptions of value created in social learning spaces using Wenger-Trayner & Wenger-Trayner's (2020) value cycle framework and 2) to test the validity of the Value Creation Scale. Specifically, this study utilized exploratory and confirmatory factor analyses to test participant perceptions and explore how they load on Wenger-Trayner and Wenger-Trayner's (2020) seven theorized factors of Value Creation.

## Literature Review

### Communities of Practice and Social Learning Spaces

In the latter decades of this past century, Lave and Wenger (1991) furthered the scholarship of social learning by focusing on its collective and contextual aspects and coined the now popular concept “communities of practice” (CoPs) to explain how social learning occurs and the structures needed for its enhancement. Wenger (1998) defined CoPs as “groups of people who share a *concern or a passion* for something they do and learn how to do it better as they interact regularly” (p. 1). An emphasis on *concern* and *passion for learning* in the conceptualization of CoPs is important to note because it expands the understanding of social learning by providing a foundation for motivation toward individual and collective participation in the learning process. The Community of Practice (CoP) model has been applied in a wide variety of organizational contexts (Kerno, 2008) including business, government, education, professional organizations, project development, and civic life (Wenger-Trayner & Wenger-Trayner, 2015). In fact, Wenger-Trayner and Wenger-Trayner (2015) suggest that “hardly any organization of a reasonable size [exists] that does not have some form of communities of practice initiative” (p. 4).

However, most recently, Wenger-Trayner and Wenger-Trayner (2020) extended their work on social learning by distinguishing between Communities of Practice (CoPs) and Social Learning Spaces (SLSs), which are inherently more organic, egalitarian, and spontaneous. This distinction expands the understanding of collective learning to a broader spectrum of social learning experiences that are not limited to, but can include, CoPs (McKnight et al., 2023; Wenger-Trayner & Wenger-Trayner, 2020). SLSs are distinguished from CoPs because, theoretically, SLSs emphasize the effort that people employ as they strive to make a difference in

something that they care about (McKnight et al., 2023). Additionally, and of importance to this study, Wenger-Trayner & Wenger-Trayner's (2020) conceptualization of SLSs operationalizes social learning in terms of the value that is created by participants as they pursue their passion to make a difference. This conceptual understanding of created value in social learning advances theories of social learning by explaining participant perceptions of the outcomes of social learning as motivation for engagement. Further, this understanding is important because, whether social learning occurs in a CoP, social network, or other circumstance of social interaction, participant perceptions of outcomes, or value, created through social learning may provide important insights regarding social contexts and processes that support learning.

### **Value Creation in Social Learning Spaces**

In their work, *Learning to Make a Difference: Value Creation in Social Learning Spaces*, Wenger-Trayner and Wenger-Trayner (2020) argue that value creation is essential in SLSs because value gives meaning to the learning process and drives motivation for engagement. Specifically, participants engage in the process because they find value in their efforts as they seek to make a difference in what they care about. Wenger-Trayner and Wenger-Trayner's (2020) conceptualization of value creation in SLSs is an iterative process that moves through cycles of individual and collective benefits across activities that occur within the SLS. Their original model included five value creation cycles: immediate, potential, applied, realized, and transformative. Value that is created within the first four cycles may eventually, but not always, lead to transformative value, which encompasses the broader, collective impacts that learning can have on people, systems, and contexts.

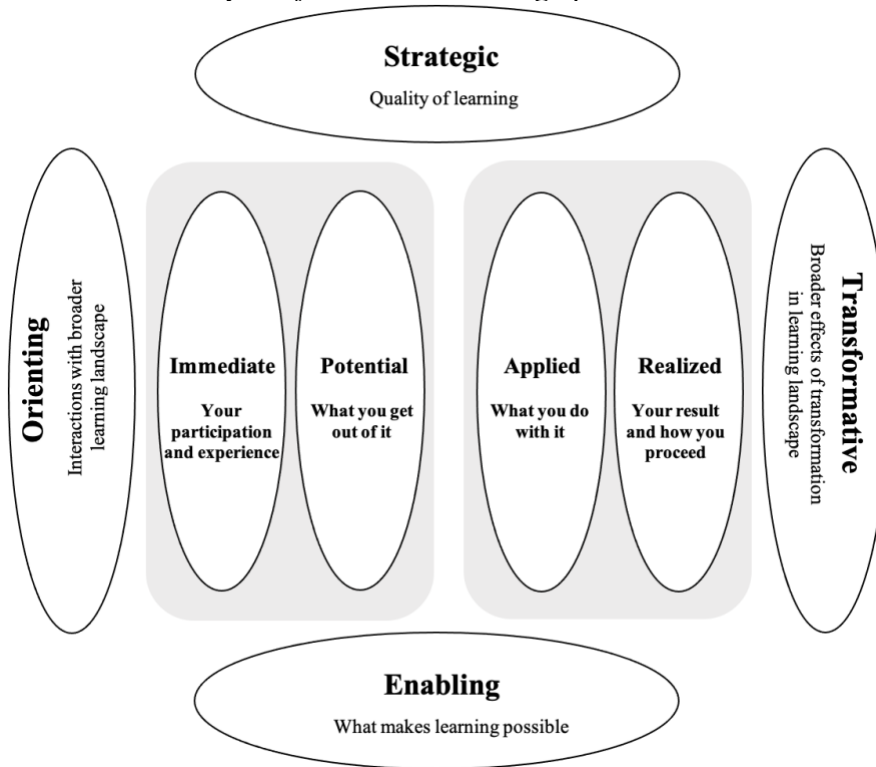
These initial cycles provided a solid framework for understanding how participants construct value from their experiences in SLSs. However, learning within these spaces does not occur in a vacuum but rather is influenced by rich contextual factors, such as the diverse backgrounds of participants, the goals of organizations to which participants belong, and the organizing structures that create an efficient learning space. Therefore, Wenger-Trayner and Wenger-Trayner (2020) expanded the value creation cycles to include three additional cycles – orienting, enabling, and strategic – which represent contextual factors that play a role in supporting learning that occurs within the SLS. These value cycles are illustrated in Figure 1.

Wenger-Trayner and Wenger-Trayner's (2020) Value Creation Framework has been used in multiple social learning contexts to explain the value that participants create in a learning experience and the applications of that value in their respective contexts. For example, in a study of graduate students and professors belonging to a community of practice in a graduate program, Bertram et al. (2014) found that the value created by participants was applied in ways that enhanced academic outcomes. Similarly, Cowan and Menchaca (2014) studied a community of practice embedded in a graduate program and found that the value created in the space influenced the sustained duration of the CoP for almost 13 years. Vrieling-Teunter et al. (2019) found in their study of teacher-learning groups in a teacher training college that the value creation cycles and social network analysis explained how knowledge was created and shared among participants. Mavri (2021) used the cycles to explain value creation in a community of practice involving university students and representatives from industry companies. The Value Creation Framework was also used by van Amersfoort et al. (2019) to explain how teachers generated value as they collaborated with colleagues in teacher learning networks. The study found that these collaborative learning experiences led teachers to reframe their views on learning and the value that their peers bring to their own learning processes (van Amersfoort et

al., 2019). Clarke et al. (2020) applied the Value Creation Framework to evaluate a professional learning network across geographic boundaries in Ireland. Whisler et al. (2017) documented their use of the framework in evaluating and re-designing a tutoring program.

This body of literature has established an empirical foundation for studying value creation in a variety of social learning contexts. There is a need, however, for a quantitative tool that could capture a larger number of participant perceptions in a systematic, categorized manner. An understanding of the distinct value cycles is necessary to develop such an instrument.

**Figure 1**  
*Value Creation Cycles for Social Learning Spaces*



*Note:* Value creation cycles are adapted from Wenger-Trayner and Wenger-Trayner (2020)

### **Value Cycles Within the SLS**

Wenger-Trayner and Wenger-Trayner theorize that four cycles of value creation occur within the SLS. These cycles include immediate, potential, applied, and realized value.

#### ***Immediate Value***

Immediate value occurs when participants find inherent value in the activities and interactions themselves (Wenger-Trayner & Wenger-Trayner, 2020). Motivated by caring to make a difference, participants in a Social Learning Space may find fulfillment in being part of a connected community of learners who share a collective commitment to engage complex topics

and mutual uncertainties. Examples of immediate value are enjoyment in interacting with other participants, enthusiasm about the topics being addressed, feelings of belonging and support from the group, and feeling like one is part of a team. In sum, “the value lies in the experience of being in this space or this moment together, regardless of whether or not it leads to something else” (Wenger-Trayner & Wenger-Trayner, 2020, p. 80).

### ***Potential Value***

Potential value refers to the process of taking from the SLS “something that has the potential to make a difference” (Wenger-Trayner & Wenger-Trayner, 2020, p. 84). This type of value reaches beyond just the enjoyment of the activities and experiences themselves to capture knowledge, skills, dispositions, and resources that may possibly be realized later. Potential value can emerge in both tangible and intangible ways. Tangible ways include obtaining resources that could be used in future situations, new practices or approaches, answers to questions, and new skills. Intangible ways include personal connections and networks that may later lead to further collaboration and renewed confidence in one’s ability (van Amersfoort et al., 2019; Wenger-Trayner & Wenger-Trayner, 2020).

### ***Applied Value***

Applied value captures the changes in practice participants make in their respective contexts as a result of what they gained in the SLS. Examples of applied value include trying a new idea, adapting an idea or resource, and initiating a new collaborative effort that resulted from connections made in the SLS. Applied value often emerges in a natural progression as participants negotiate how potential value fits within their environment (Wenger-Trayner & Wenger-Trayner, 2020). For example, participants may take away from the SLS a resource that they see as having potential value; later, that resource becomes relevant in a situation they encounter in their context. As they actively “reshape the idea to fit the new context” (Wenger-Trayner & Wenger-Trayner, 2020, p. 90), the knowledge becomes applied. Wenger-Trayner and Wenger-Trayner (2020) assert that applied value is not an isolated process that occurs *after* learning takes place, rather, “putting things into practice is a learning event in its own right” and is an integral part of the learning itself (p. 90). Knowledge gained through practice then becomes a catalyst for further collective learning as participants bring their experiences back into the SLS.

### ***Realized Value***

Realized value reaches beyond the application of knowledge capital and considers the extent to which the outcomes make a meaningful difference to stakeholders (Wenger et al., 2011). Changes in practice can influence larger goals and performance both positively and negatively. There are also cases in which learning has no effect on outcomes. As Wenger-Trayner & Wenger-Trayner (2020) argue, the application of new ideas, resources, and practices does not necessarily lead to improved outcomes. However, whether the effects are positive, negative, or non-existent, the act of reflecting upon realized value is a learning process in itself. In this way, participants not only reflect upon the difference that learning makes, but they actively learn from how and why changes had a particular effect. Realized value is often bound by context. Any given context may have goals and common aspirations that are shared by individuals, the group, broader stakeholders, the organization as a whole, and even more broadly, society. These shared goals and expectations become a filter through which changes in practice

are evaluated as learners determine to what extent learning made a meaningful difference in relation to what matters in their environments (Wenger-Trayner & Wenger-Trayner, 2020).

### ***Transformative Value***

Transformative value goes beyond an individual participant's desire to make a difference and extends to transformation in the larger context that can include boundaries, mindsets, identities, institutions, or power relations. Transformative value has both internal and external components. Internally, transformation can occur because of "radical or disruptive change" that influences the Social Learning Space. For example, new developments in medicine may influence the interactions or mindsets of individuals seeking to solve a medical dilemma, an area in which they care to make a difference. External transformative value refers to benefit that is created within the SLS that causes a transformation outside of the SLS. These changes may influence participants' experience in their own personal trajectory or how they interact with the world. In the example above, if participants in a SLS advance new understandings of how to address a medical dilemma, that learning may influence the practice or mindsets of others outside of the SLS.

### **Supporting or Facilitating Value Cycles**

Wenger-Trayner and Wenger-Trayner (2020) further theorize that four value cycles, outside of activities or processes that occur with SLSs, influence learning that occurs within the social learning space. These cycles are explained below.

### ***Orienting Value***

Orienting value includes the contexts and histories of participants that are relevant and enriching to their learning in the SLS. This value includes the unique, individual contexts represented by participants from the broader landscape within which the learning space is situated (Wenger-Trayner & Wenger-Trayner, 2020). Participants bring into the social learning space diverse, complex "experience and identities that reflect their participation elsewhere" (Wenger-Trayner & Wenger-Trayner, 2020, p. 115). These intricate contextual factors may include cultural differences, historical considerations, social and political contexts, and influences from other organizations or spaces. Wenger-Trayner and Wenger-Trayner (2020) sometimes combine their discussion of both orienting and transformative value because both reflect conditions in the broader social context. However, orienting value has utility for explaining the foundation or conditions upon which learning develops within the SLS, whereas, transformative value reflects the influence that learning within the SLS has on the broader, external landscape.

### ***Enabling and Strategic Value***

Enabling and strategic values are complementary value cycles that raise the effectiveness of learning in the SLS, and both are influenced by internal and external factors (Wenger-Trayner & Wenger-Trayner, 2020). Enabling value addresses the question, "What makes [learning in this space] possible?" (p. 98). Enabling value ensures continuity in participation and shared processes and rituals that can become an integral part of how the SLS functions. Examples of enabling value include the facilitation of SLSs, including creating conditions for caring about what

matters to participants. Enabling value can also include setting up meeting times and agendas or documenting important achievements. External enabling value may include inviting a professional facilitator to run meetings or to examine budgetary or technical resources that facilitate the effectiveness of the SLS.

Strategic value addresses the quality of engagement between and across stakeholders both within and outside of the SLS. Strategic value adds “clarity that animates the learning of a social space” by reflecting the extent and quality of conversations and relationships that facilitate the usefulness of the SLS (Wenger-Trayner & Wenger- Trayner, 2020, p. 106). Strategic value rarely takes the form of shared vision, project aims, or a set of goals. Instead, strategic value is reflected in ongoing conversations in which participants revisit, reinterpret or even reshape their vision as participants, circumstances, and feedback change. Examples of internal strategic value include awareness of differences among participants and their respective needs and expectations. External strategic value recognizes the influence of external stakeholders on the SLS. Examples include relationships with managers, funders, or potential partners. Concerning strategic value, on-going conversations among all relevant stakeholders are essential for effective functioning of the SLS.

## Methods

In this study, 1,765 participants from 18 distinct ECHO® education and health learning communities in New Mexico, Oklahoma, India, and Nigeria served as the population. Each ECHO® community represented multiple and diverse organizations, fields of expertise/training, and professional roles. Communities served in the ECHO® platform for this study included Covid-19, Addiction Medicine, Hepatitis C, High-Risk OB, HIV, Infant Mental Health, Heal the Harvester (mental health resources for farmers and ranchers), Help for the Healer (resiliency in healthcare providers and administrators), Obesity, Pediatric Behavior and Emotional Health, Psychiatry, Veteran Care, Rural Superintendents, Special Education, First-Year Principals, School Counselors, Family Community Partnerships, and Rural Educators. The commonality across ECHO® communities is that each one follows the prescribed three-part ECHO® protocol that includes a short 10-15 minute didactic presentation, case presentation, and collaborative problem solving. This protocol supports the professional development needs of these diverse areas of expertise and training and has utility across institutions, organizations, and agencies as participants address topics that they are interested in and are relevant for them.

Each of these separate and independent ECHO® communities utilized the three-part protocol to meet their professional development needs across their respective area of expertise. Further, we chose the ECHO® platform for this study because each of these learning communities aligns with Wenger-Trayner and Wenger-Trayner’s (2020) conception of a social learning space, which they define as an event arising out of a confluence of three factors of participation: caring to make a difference, engaging uncertainty, and willingness to focus on the learning process. Because participation in ECHO® is entirely voluntary and focuses on self-identified areas for growth within a defined area of expertise, individuals who attend ECHO® meet these three factors for qualification as a SLS as identified by Wenger-Trayner and Wenger-Trayner (2020).

Most individuals pursue medicine and education as careers because they want to make a difference by helping people and positively impacting society (Podolsky et al, 2019; Sinclair, 2020). This desire to make a difference is the key driver of social learning capability and a key feature of Project ECHO® (Project ECHO, n.d.). The platform exists to improve society through

improved health and education. ECHO® equips educators and health providers with the pertinent knowledge to improve practice by leveraging technology to facilitate professional learning. Experts and participants collaborate to solve problems and incorporate best practices and create a networked system that supports sustainable, equitable opportunities for growth and innovation.

ECHO® learning spaces also provide opportunities for participants to address uncertainties (Harris et al., 2020). The case or problem of practice presented in every session engages participants in the knowledge construction necessary to contextually apply new knowledge. Most participants who attend ECHO sessions come voluntarily to engage in the learning process (Harris et al., 2020). Application of ECHO principles and processes help cultivate a dynamic, professional learning network in which “all teach; all learn.” Paying attention to the social learning process affects how participants apply knowledge and go about their lives.

### **Developing the Value Creation Scale**

An instrument that captures participant perceptions of value creation in social learning spaces can advance understandings of communities of practice and social learning. To this end, the following validation procedures were followed toward the creation of an instrument to measure Value Creation in Project ECHO®.

Researchers often use two primary techniques in scale development – deductive, sometimes called *logical partitioning*, and inductive, also known as *grouping* (Hinkin, 1998; Hunt, 1991). We chose to combine both deductive and inductive approaches to define the domain of interest and identify the items to best assess it. These complementary processes are explained in the sections below.

### **Phase One: Specifying Operational Definitions of Value Cycles**

The first phase of scale construction consisted of explicitly defining seven cycles of Wenger-Trayner and Wenger-Trayner’s (2020) Value Creation model: immediate, potential, applied, realized, enabling, strategic, and transformative. It is important to note that orienting value was not included in the scale development. Wenger-Trayner and Wenger-Trayner (2020) note that value creation can happen both internally and externally of the social learning space. However, orienting value creation occurs more externally than the other cycles and includes human capital resources that individuals bring with them into the SLS and/or find outside of the SLS. Wenger-Trayner and Wenger-Trayner (2020) confirm this understanding by stating, “orienting value represents an effort to reach beyond the learning space and its stakeholders and take the broader landscape into account” (p. 114). While the contextual intricacies associated with orienting value are certainly vital and relevant to the learning process, they represent nuanced factors that, we believe, can be more meaningfully explored and robustly captured through qualitative rather than quantitative methods.

Although Wenger-Trayner and Wenger-Trayner (2020) often combine orienting and transformative values and explain transformative value as an outcome of the other cycles, we included the transformative value cycle because of our interest in “recognizing broader or deeper transformations that social learning can give rise to” (p. 113). We recognize that participant perceptions regarding the extent that social learning activities have transformed their context and community is only a self-report and does not detail explicit transformative effects. For example, on the Likert scale of the current instrument, participants self-report the extent to which

“mindsets have been transformed that influence the larger community.” The specific mindsets can be further explored and delineated through qualitative methods such as observations, interviews, and existing data sets. Thus, a more holistic portrait can be created through the combination of quantitative and qualitative methods.

## **Phase 2: Identifying Indicators**

The next phase consisted of identifying succinct criteria, which we refer to as indicators, that could be associated with each cycle. In addition to Wenger-Trayner and Wenger-Trayner (2020), additional sources aided significantly in this process, such as Bertram et al. (2014), Vrieling-Teunter et al. (2019), Cowan and Menchaca (2014), Littlejohn et al. (2019), van Amersfoort (2019), and Wenger et al. (2011). The development of the indicators was an iterative process whereby the research team repeatedly delved into the literature for wording and clarification, met collectively to discuss suitable identifying information for the indicators, and made consequent refinements until unanimity was reached among team members on the clarity of indicator connotation. Consequently, four concise indicators were identified to describe key features of each of the seven cycles.

## **Phase 3: Item Construction**

Throughout the survey development process, important considerations included what to measure, our target population, and how we can best design and word the items to elicit responses suitable for quantitative assessment. For example, a six-point Likert Scale was used to capture the sentiment of respondents by encouraging them to carefully consider each item and make a choice that leans either positively or negatively. After the initial pool of questionnaire items were written, qualified experts reviewed the items to make sure they accurately represented the cycles and their respective indicators. In all, 52 original items were written to reflect the seven cycles of value creation: Immediate Value, Potential Value, Applied Value, Realized Value, Enabling Value, Strategic Value, and Transformative Value.

### **Value Creation Validation Procedures**

Central to the mission of this exploratory study was development of a scale to measure Value Creation. Hinkin (1998) instructs that the development of a well-articulated theoretical foundation is key to successful item generation, for it is a strong theoretical foundation that indicates the content domain for any new measure. As such, in the formation of the Value Creation measure, items reflecting the various cycles of value creation were grounded in the theoretical groundwork laid by Wenger-Trayner and Wenger-Trayner (2020).

### **Establishing Construct Validity**

Before the Value Creation Scale as a measure operationalizing the seven cycles of value creation can be empirically tested, a validation study needed to be conducted to evaluate the validity of the Value Creation Measure. The current view of validity theory is constructed on the seminal work of Samuel Messick (1989, 1995), which emphasizes that all validity is assumed under construct validity. Construct validity is the ability of a measure to yield truthful judgments about the object it purports to measure (Messick, 1989, 1995; Miller, 2008). Messick outlines six facets of construct validity: content, substantive, structural, generalizability, external

(convergent), and consequential. These facets adhere to the same logic, “that validity exists to the degree that the measure represents the underlying theoretical construct and informs credible judgements about the phenomenon of interest” (p. 683, Adams & Miskell, 2016; Messick, 1995; Cronbach, 1971). In the developmental process of the Value Creation measure, construct validity was initially assessed by employing exploratory factor analysis to examine the content validity and substantive validity of the measure. Additionally, construct validity was further assessed utilizing confirmatory factor analysis (CFA) to evaluate the data model fit of the factor structure.

### ***Content Validity***

Content validity refers to the degree to which the items of the data collection instrument are a representative sample of the domain or universe of what is being explicitly measured (Hopkins et al., 1990). In accordance with Berk (1990), this is a systematic process involving expert judgment to determine, “(a) the appropriateness of the content for the intended respondents, (b) the accuracy of the content and domain structure, and (c) the representativeness of the content coverage in relation to the domain” (p. 660). To establish content validity, the original bank of items was submitted to a team of experts, which included educational researchers well versed in social learning. These experts vetted the questions, offering trimming suggestions, language substitutions, and item rephrasing. To equally represent the seven cycles, the original Value Creation measure consisted of 52 items with roughly 7 items per cycle or domain.

The Value Creation Measure is conceived of and measured as an individual/participant belief. To best capture participant perceptions, question stems were composed to help situate each item within a consistent context. The following question stems were used: “*In this Social Learning Space... As a result of participation in this Social Learning Space... As a result of changes in practice from participating in this Social Learning Space.* Individual items for each of the seven Value Creation domains can be seen in Table 3. Additionally, the scale utilizes a Likert response, ranging from Strongly Disagree (coded as 1), Disagree (coded as 2), Somewhat Disagree (coded as 3), Somewhat Agree (coded as 4), Agree (coded as 5), to Strongly Agree (coded as 6).

### ***Substantive Validity***

Substantive validity addresses the need to move beyond content validity as demonstrated solely by professional judgment. Messick (1995) instructs that this is done by acquiring empirical evidence that emphasizes the “theoretical rationales for the observed consistencies in test responses...along with empirical evidence that the theoretical processes are actually engaged by respondents in the assessment tasks” (p. 745). Essentially, the substantive aspect of construct validity provides empirical evidence to the content aspect by validating response consistencies which reflect domain processes (Loevinger, 1957).

As such, exploratory factor analysis (EFA) is well suited for substantive validity toward the early stages of instrument development and can be used as an effective method in providing empirical evidence of construct validity. EFA seeks to examine the factor structure and the internal reliability of a measure by exploring the underlying pattern of the data set, illuminating how the different items relate to each other and adhere to a similar logic. Through the process of EFA, researchers can locate items that empirically do not belong to the intended construct and as a result be removed from the survey (Leandre et al., 2012).

## Confirmatory Factor Analysis

To further examine construct validity, confirmatory factor analysis (CFA) was utilized to test the measurement structure of the Value Creation construct. In the psychological assessment literature, CFA is a widely supported statistical method for providing evidence of construct validation (Thompson & Daniel, 1996). Using CFA, an estimation technique is used to calculate parameters and fit indices, which then requires a match between the requirements of the technique and the data being analyzed. Maximum Likelihood is the most widely used estimator, which in turn requires continuous and multivariate normally distributed data to obtain accurate parameter estimates, standard errors of parameter estimates, and model fit indices (Bollen, 1989; Rakov & Marcoulides, 2000).

## Data Collection Cycles

For this validation study, two separate data collection cycles were completed, the first being in the fall of 2021. During this collection cycle, the 52-item Value Creation scale, utilizing Wenger-Trayner and Wenger-Trayner's (2020) theoretical conceptualization of the value creation cycles in SLSSs, was administered to the identified population. Responses were then factor analyzed using an exploratory factor analysis (EFA) conducted in SPSS Version 24. The EFA employed principal axis factoring and an oblique rotation (Promax) due to the correlated nature of the factors (Tabachnick & Fidell, 2010). The target number of responses was 250 participants, or roughly five responses per item (Crocker & Algina, 2006). The survey was distributed through Qualtrics to all participants in medical and education related ECHO lines in New Mexico and Oklahoma who had attended at least three ECHO sessions. It is important to note that two of the educational ECHO lines based in Oklahoma included an international population with individuals attending virtual ECHO sessions from India and Nigeria. A total of 1,765 ECHO participants received an invitation to participate in the testing of the Value Creation instrument. Of the 1,765 potential participants, 370 surveys were completed, reflecting a 21% response rate. Consistent with current survey research, response rates are trending lower due to attributing factors such as concerns over data privacy and increased electronic survey methods, leading to survey fatigue (Dillman, Smyth, & Christian, 2014). While a high response rate is always preferable, we did receive more than the initial targeted number of responses (i.e., 250 participants) as mentioned earlier in this paragraph. Ten surveys were only partially complete; therefore, those responses were removed from the database. A detailed description of participants in the initial data collection cycle can be seen in Table 1.

**Table 1**

*ECHO® participant information (EFA)*

Years in Current Field	%
0-5	11.8%
6-10	18.4%
11-15	16.5%
16-20	12.9%
20+	40.4%
ECHO® Participation Length	
1 Year or Less	18.8%
2-5 Years	81.2%

ECHO® Participation Frequency	
> Twice Monthly	18.8%
Twice Monthly	62.5%
Once Monthly	6.2%
2-3 Times Quarterly	12.5%
Student Participant	5.9%
Non-Student Participant	94.1%
Hub Team Member	6.3%
Non-Hub Team Member	93.7%

Note: N=272 for descriptive information.

For the confirmatory factor analysis (CFA), a separate data collection cycle was employed. An additional data collection cycle, resulting in two independent samples, was necessary when utilizing CFA to avoid any contamination of the results of the EFA. Data for the CFA analysis were collected in the spring of 2022. Informed by the EFA, a 26-item parsimonious Value Creation scale was administered in this second round of data collection. Responses were analyzed using the *lavaan* package in R 4.1.2. A more robust sample size was needed for the CFA, with a target number of responses being at least 10 responses per item, or roughly 250 responses. Similar to the prior data collection cycle, the value creation survey was distributed through Qualtrics. The 26-item Value Creation survey was again sent to all participants in medical and education related ECHO lines in New Mexico, Oklahoma, India, and Nigeria who had attended at least three ECHO sessions. After removing individuals who had responded in the first data collection cycle and to ensure an independent sample, a total of 1,395 ECHO participants received an invitation to participate in testing of the trimmed Value Creation instrument. Of the 1,395 potential participants, 359 surveys were returned. However, 133 surveys were only partially completed and therefore removed from the dataset (resulting in 226 completed responses). A detailed description of participants in the second data collection cycle can be seen in Table 2.

**Table 2**  
*ECHO® participant information (CFA)*

Years in Current Field	%
0-5	14.1%
6-10	18.3%
11-15	14.8%
16-20	10.2%
20+	42.6%
ECHO® Participation Length	
1 Year or Less	30.8%
2-5 Years	50.0%
6+ Years	19.2%
ECHO® Participation Frequency	
> Twice Monthly	30.8%
Twice Monthly	46.2%
Once Monthly	7.7%
2-3 Times Quarterly	7.7%

2-3 Times Yearly	7.6%
Student Participant	8.4%
Non-Student Participant	91.6%
Hub Team Member	9.9%
Non-Hub Team Member	90.1%

Note: N=263 for descriptive information.

## Results

The Value Creation Scale was initially validated using exploratory factor analysis, which informed the trimming process of several original items within each of the theorized Value Creation factors. Due to low factor loadings ( $< .70$ ) and some cross loading items, we ultimately eliminated half of the original 52 items (Tabachnick & Fidel, 2010). In factor analysis, simple structures are desirable (i.e. strong factor loading  $> .70$ ) that load on only one factor, with cross loading factors traditionally removed. As noted, a large item pool was initially generated with the understanding that some of the original items would not load as strongly as others. As a rule, we followed Tabachnick and Fidel (2010) when determining which items to trim while simultaneously taking into account our theoretical factor structure. This trimming process resulted in keeping the majority of items that loaded strongly ( $\sim .70$  or higher) on the hypothesized factors, yet still maintaining the simple structure goals of factor analysis. This resulted in a parsimonious 26-item operational measure with strong factor loadings along the seven theorized Value Creation factors. These factors include: 1) immediate value, 2) potential value, 3) applied value, 4) realized value, 5) enabling value, 6) strategic value, and 7) transformative value. All items were reported on a six-point Likert type response set. Factor 1, immediate value, resulted in four items with factor loadings from .704 to .905. Factor 2, Potential Value, resulted in four items with factor loadings from .715 to .900. Factor 3, Applied Value, resulted in two items with factor loadings from .705 to .905. Factor 4, Realized Value, resulted in four items with factor loadings from .652 to .881. Factor 5, Enabling Value, resulted in three items with factor loadings from .596 to .982. Factor 6, Strategic Value, resulted in four items with factor loadings from .626 to .933. Factor 7, Transformative Value, resulted in five items with factor loadings from .777 to .920. The complete results are summarized in Table 3.

**Table 3**

*Exploratory Factor Analysis Results: 26-Item Value Creation Measure Pattern Matrix<sup>a</sup>*

	Factor						
	1	2	3	4	5	6	7
<b>Immediate Value (4 items)</b>							
1. I feel comfortable engaging in discussions.			.819				
2. I feel comfortable sharing challenges I face.			.905				
3. I feel that others listen to my viewpoint.			.735				
4. I feel connected to the group.			.704				
<b>Potential Value (4 items)</b>							
5. I can gain knowledge that may advance my future success.		.725					

6. I can access important resources that can potentially help me in the future.	.900
7. I have gained new ways of looking at situations.	.815
8. I have acquired new skills that I may potentially apply in my context.	.715
<b>Applied Value (2 items)</b>	
9. I have changed at least one way I do things.	.705
10. I have applied suggestions from the group.	.905
<b>Realized Value (4 items)</b>	
11. Stakeholders are better served.	.712
12. Collective decision-making has been improved.	.652
13. Stakeholders have been empowered.	.881
14. Collective stewardship of resources has been improved.	.704
<b>Enabling Value (3 items)</b>	
15. We have adequate funds for necessary activities.	.810
16. We have adequate technology for our activities.	.982
17. A strong external team helps in facilitating and coordinating.	.596
<b>Strategic Value (4 items)</b>	
18. Participants focus learning discussions on the needs of all in the social learning space.	.792
19. Contextual applications are considered when discussing learning outcomes and suggestions.	.933
20. Participants consider those outside the group during learning discussions.	.804
21. Participants share enough information to translate learning into different contexts.	.626
<b>Transformative Value (5 items)</b>	
22. Mindsets have been transformed that influence the larger community.	.777
23. Changes have occurred that positively shift power dynamics in the organization.	.794
24. New definitions and measures of success have emerged.	.786
25. New policies and practices have been developed that influence the broader community.	.912

26. New norms and narratives have emerged that influence the culture in the broader community. .920

*Note.* Extraction Method: Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization.

Additionally, to further test the validity and internal consistencies of the seven theorized factors, means, standard deviations, correlations, and Cronbach’s alphas for the factors are presented below in Table 4. The factor correlations among the theorized factors were strong for social science research (as seen in Table 4), which signaled the use of an oblique rotation, Promax (Tabachnick & Fidell, 2010). Further, the factor reliabilities were high, given that the internal consistencies (i.e. all items measuring the same construct, Cronbach’s alpha) for all of the theorized factors were above the .8 threshold (Crocker & Alagna, 2006).

**Table 4**  
*Means, Standard Deviations (SD), Correlations, & Cronbach’s Alpha (n=370)*

Factor	Mean	SD	IV	PV	AV	RV	EV	SV	TV
IV	4.91	0.84	(.861)						
PV	5.29	0.81	.483	(.922)					
AV	4.93	0.95	.532	.665	(.885)				
RV	4.95	0.82	.617	.600	.676	(.910)			
EV	4.51	0.99	.486	.451	.496	.625	(.810)		
SV	4.93	0.77	.671	.616	.662	.724	.628	(.910)	
TV	4.53	0.87	.527	.561	.685	.720	.626	.717	(.924)

*Note:* IV = Immediate Value, PV = Potential Value, AV = Applied Value, RV = Realized Value, SV = Strategic Value, TV = Transformative Value, Cronbach’s alpha on the diagonal, all correlations among factors significant,  $p < .001$ .

Results of the CFA further confirmed the validity of the Value Creation measure, with the measurement model fitting the data well. Assessment of model fit was adequate considering Hu and Bentler’s (1999) recommendations and included the following commonly reported fit indices: model’s scaled  $\chi^2$  value, the comparative fit index (CFI), the standardized root mean residual (SRMR) and the root mean square error of approximation (RMSEA). Furthermore, parameter estimates were examined to test the strength of the hypothesized structural relationships among the variance and co-variance of the sample data. Results of the CFA were:  $\chi^2 (278) = 627.414$ ,  $p < .001$ ; CFI = 0.930; SRMR = 0.056; RMSEA = 0.075, 90% CI (0.067, 0.082). The Rho coefficient, which is an estimate of the reliability of a latent construct, (Raykov, 1997) and parameter estimates for the observed indicators were also calculated and are referenced in Table 5. While Chronbach’s alpha is widely used as an estimate of internal consistency, this statistic is not as appropriate for measuring reliability for latent factors. Thus, the reported Rho coefficients for the value creation latent contracts are provided. Further, the unstandardized and standardized factor loadings are overall strongly related to the latent factors, indicating that the items are significantly linked to the latent factor.

**Table 5***CFA Factor Reliabilities & Parameter Estimates (Unstandardized and Standardized)*

Parameter estimate	Rho Coefficient	Unstandardized	Standardized	<i>p</i>
IV → Q1	0.612	1.000	0.796	
IV → Q2		0.882	0.702	<0.001
IV → Q3		0.872	0.694	<0.001
IV → Q4		1.125	0.896	<0.001
PV → Q5	0.730	1.000	0.716	
PV → Q6		1.053	0.753	<0.001
PV → Q7		1.130	0.808	<0.001
PV → Q8		1.131	0.809	<0.001
AV → Q9	0.740	1.000	0.885	
AV → Q10		1.012	0.896	<0.001
RV → Q11	0.710	1.000	0.760	
RV → Q12		1.103	0.838	<0.001
RV → Q13		0.980	0.744	<0.001
RV → Q14		1.033	0.785	<0.001
EV → Q15	0.592	1.000	0.908	
EV → Q16		1.021	0.927	<0.001
EV → Q17		0.903	0.820	<0.001
SV → Q18	0.711	1.000	0.716	
SV → Q19		0.980	0.701	<0.001
SV → Q20		1.098	0.786	<0.001
SV → Q21		1.034	0.740	<0.001
TV → Q22	0.697	1.000	0.786	
TV → Q23		1.087	0.855	<0.001
TV → Q24		1.056	0.830	<0.001
TV → Q25		1.059	0.832	<0.001
TV → Q26		1.102	0.866	<0.001

## Discussion

The purposes of this study were to develop an instrument that captures participant perceptions of value using Wenger-Trayner and Wenger-Trayner's (2020) value cycle framework and to test the validity of the Value Creation Scale. The EFA resulted in a parsimonious survey that represents the distinct cycles of value creation. The results of the CFA support the validation of this scale. This combined evidence suggests that the instrument accurately represents the value cycles in Wenger-Trayner and Wenger-Trayner's (2020) framework.

The findings of this study align with previous research using the Value Creation Framework as they corroborate in a quantitative sense what has been studied qualitatively for many years (Bertram et al., 2014; Cowan & Menchaca, 2014; van Amersfoort et al., 2019). The theorized value creation cycles that have been used widely in studies to understand the effectiveness of learning in social spaces are indeed aligned with participant responses in the developed measure in this study. These findings advance this previous work by not only strengthening the empirical grounding for studying value creation in social learning settings, but

they also offer a complementary measurement tool that may be used to understand value creation more broadly as it allows for capturing a larger number of participant perceptions across a variety of social learning spaces. While we utilized the social learning space of Project ECHO as the context for this study, this validated instrument has utility for measuring value creation across diverse social learning settings.

Important to any social construct is the ability to reliably and validly measure its utility in practice. This study proposes an initial instrument by which to measure the “value created” in social learning. The understanding of participant perception of value is important because, while learning in social contexts has been theorized from multiple perspectives, no known measure of value creation from social learning has been developed. Further, value creation is not only concerned with knowledge acquisition, but it is heavily dependent on the implementation and contextual application of ideas, skills, and knowledge acquired in the social learning process. Consequently, comprehending participant perceptions on their application of learned skills within the various value creation cycles can be useful in understanding the extent to which they transfer acquired knowledge to actual practice.

This instrument may also provide insight into participant motivation for continued engagement in SLSs as they pursue learning as means to make a difference. Further, individual and organizational improvement and change are dependent upon individuals who actively seek to engage in social learning as a means to better themselves and the world around them, and it is increasingly common for organizations to build capacity through social learning opportunities. As social learning has shifted to include both in-person and virtual social learning, it is essential to be able to capture the effectiveness of organic and strategic learning experiences. These understandings are especially salient in the field of education, where opportunities for professional growth may emerge organically in social contexts as individuals pursue answers to increasingly complex challenges facing education.

Development of the Value Creation scale is important because, for decades, the importance of the setting in which education takes place and the powerful cultural and social norms that influence learning have been emphasized in social psychology, cognitive psychology, and anthropology. In the 1950s, for example, cognitive science emerged as an approach to understand learning from a multidisciplinary perspective and to explain the complexity of human learning within learning environments (Norman, 1980, 1993; Newell & Simon, 1972). Subsequently, further efforts were made to understand the importance of the social and cultural contexts for the advancement of learning (e.g., Cole, 1995; Lave, 1988; Lave & Wenger, 1991; Rogoff, 1990; Rogoff et al., 1993), and these conceptual frameworks of learning helped to explain the acquisition of knowledge, skills, and attitudes within social contexts (Aliakbari et al., 2015). Theorists such as Bandura (1985), Bourdieu (1980), Engestrom (2015), Vygotsky (1978), and Wenger (1999) have theorized, from different perspectives, that a key mechanism in the process of learning and development is social interaction.

### **Implications**

Effective professional learning is a social activity in which adults choose to be active, collaborative participants in the learning process (Vacca & Vacca, 2002; Wilkinson et al., 2010). Research suggests that this type of professional learning is enhanced through supportive leadership and dedicated organizational resources (Littlejohn et al., 2019). Moreover, this type of professional learning can be continually enriched through effective evaluation and feedback that ensure systematic improvement across organizations and communities.

Consequently, this study has a myriad of implications for research, theory, and practice. Toward research and practice, this study provides a heuristic by which to capture the varying perceptions of value individuals experience through participation in social learning experiences. As scholars and practitioners alike seek to better understand the effects of social learning, whether that be strategic intervention or organic professional learning, it is essential to be able to capture the varying degrees of value participants experience.

This tool for evaluating professional learning can be used to demonstrate successful outcomes to stakeholders, garner additional support for activities, identify specific ways to improve implementation, and make strategic decisions about what activities to continue or change. From immediate value, to realized value, to enabling value, to transformative value, insights from each of these types of created value provide utility to better understand the effectiveness and process of social learning. Additionally, this work builds upon the seminal work of Wenger-Trayner and Wenger-Trayner (2020) as it seeks to build upon the theoretical understanding of SLSs.

### **Future Research**

This initial conceptualization, measurement development, and confirmatory factor analysis provides a foundation upon which future work may build. The population for this study was chosen because the salient features of Project ECHO®'s learning contexts are closely aligned with Wenger-Trayner and Wenger-Trayner's (2020) criteria for social learning spaces. To advance knowledge on social learning spaces, this scale should be tested in other populations that are characterized as social learning spaces. Data yielded from this instrument may inform leaders and policy makers of the extent to which participants create value as well as assimilate, apply, and share new learning in their respective contexts. Further inquiry might also include a structural equation model, which could provide insight into how the five initial value cycles – immediate, potential, applied, realized, and transformative – might operate differently than the cycles that function as supports for the learning process – orienting, strategic, and enabling value. It is possible that the five central cycles could have a more proximal relationship with outcome variables while the other cycles, being somewhat tangential to what occurs *within* the SLS, may have a more indirect relationship with outcomes. A structural equation model could begin to uncover these relationships.

Furthermore, the instrument can be used in conjunction with qualitative research, which asks different questions and incorporates different methodologies. Using a combination of qualitative and quantitative methods can improve evaluation and research by providing more holistic portraits of professional learning contexts and ensuring that the limitations of one type of data are balanced by the strengths of the other.

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