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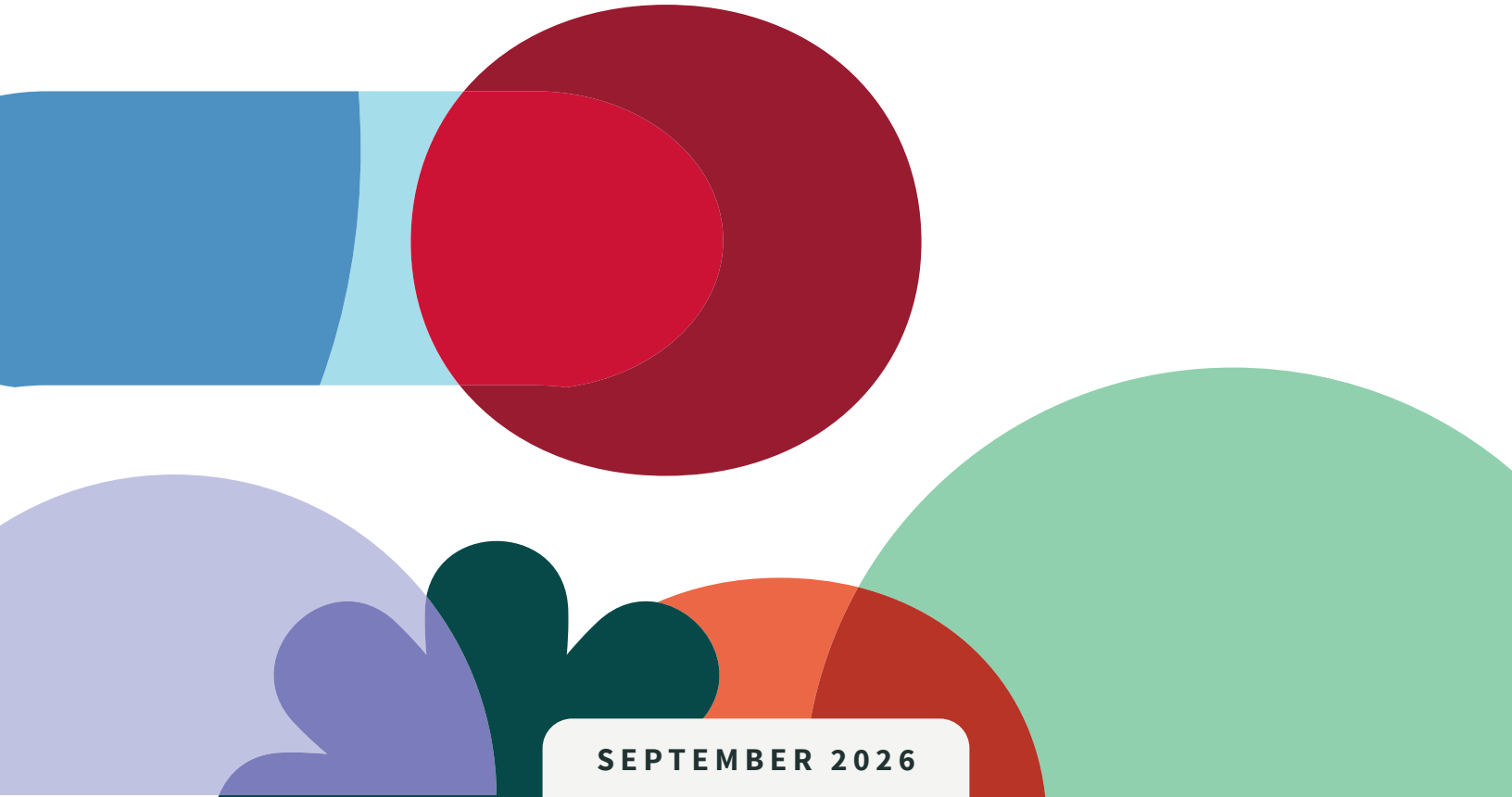
Learning Evaluation Brief

Enabling Ecosystem Capacity Through Infrastructure

FINDINGS FROM THE LEARNER-CENTERED ECOSYSTEM LAB

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Introduction

Across the United States, communities are increasingly exploring learner-centered approaches that extend learning beyond the conventional boundaries of school. These efforts often take the form of learner-centered ecosystems—networks of schools, community-based organizations, businesses, higher education institutions, cultural organizations, and public agencies working together to create more personalized, relevant, and connected learning experiences for young people (Education Reimagined & History Co:Lab, 2023; Díaz-Gibson et al., 2021; National Research Council, 2015; OECD, 2017; Remake Learning, 2021).

Across these efforts, a common challenge is not simply creating learning opportunities, but connecting learners to opportunities that are distributed across multiple organizations, settings, and sectors. This reflects a broader shift toward learning that occurs across home, school, community, civic, and digital environments rather than within any single institution (Ito et al., 2013). Research on community-connected learning, community schools, collective impact initiatives, and place-based education similarly highlights the importance of coordination, relationships, and enabling systems in supporting educational participation (Kania & Kramer, 2011). Scholars have argued that learning and educational opportunity is shaped not only by instructional experiences but also by the broader systems and environments in which young people develop (Bronfenbrenner, 1979; Bryk et al., 2015). Transportation networks, data systems, communication structures, community partnerships, and support services all influence whether opportunities remain isolated offerings or become accessible pathways for learners (Klinenberg, 2018; Star & Ruhleder, 1996).

The concept of infrastructure provides a useful lens for understanding the conditions that support learning across settings (Star & Ruhleder, 1996). Infrastructure can be understood as a multidimensional construct encompassing physical, social, and digital systems.

- Physical infrastructure includes the built environments and logistical systems that support participation, such as transportation networks, facilities, and learning spaces.
- Digital infrastructure includes the technologies and information systems that facilitate communication, coordination, and access (Klinenberg, 2018).
- Social infrastructure encompasses the relationships, networks, governance structures, and support systems that enable coordinated efforts.

The multidimensional framing of infrastructure adopted in this brief is also consistent with emerging field frameworks that emphasize the interdependence of physical, social, and digital infrastructure in supporting learner-centered ecosystems, including work by organizations such as **Siegel Family Endowment.** In ecosystems, these dimensions directly inform the conditions for how learners and organizations interact across settings.

Existing research has highlighted the importance of coordination, collaboration, and enabling conditions in supporting educational improvement (Coburn et al., 2013; Fullan & Quinn, 2016). However, infrastructure itself has not been investigated for its influence in creating those pivotal conditions. Rather than being examined as a distinct component of ecosystem development, it is often embedded within broader discussions of ecosystem functions, coordination, and organizational conditions (Russell et al., 2017). This represents an important gap because learner-centered ecosystems rely on infrastructure as a critical enabler for connecting learning experiences distributed across organizations, locations, and sectors. As ecosystems grow and these learning opportunities become even more distributed, the systems that connect learners to them become increasingly important to understand.

This brief examines the role of infrastructure across communities participating in Education Reimagined's Ecosystem Lab Cohort 1. Rather than treating infrastructure as a background condition, this brief examines how social, physical, and digital infrastructure shape access, participation, and growth within learner-centered ecosystems.

Approach

This study draws on data collected from the 2024–2025 cohort of Education Reimagined's Learner-Centered Ecosystem Lab, a multi-site initiative supporting communities in building learner-centered ecosystems. Data were collected through the 2024 Learner-Centered Ecosystem Lab Survey, administered between January and March 2025. Ten of twelve participating sites (83%) completed the survey, which included structured and open-ended items addressing ecosystem components, functions, contextual conditions, infrastructure barriers, partnership structures, equity practices, and early indicators of impact. Respondents were encouraged to collaborate across team members to provide comprehensive, site-level input. Participating sites represent diverse geographic and organizational contexts (e.g., intermediaries, school districts, out-of-school time providers, etc.) across the United States and are engaged in ecosystem-building efforts at varying entry points and stages of development.

This brief focuses specifically on infrastructure and examines how ecosystem communities experience and respond to social, physical, and digital infrastructure conditions. Thus, it draws primarily on survey items related to infrastructure challenges and ecosystem capacity. Respondents were asked to characterize the kinds of infrastructure challenges they faced, the impact of those challenges, and what opportunities for reach and access would be unlocked if the challenges were addressed.

Quantitative data were analyzed using descriptive statistics (i.e., counts, frequencies, and percentages) to identify patterns across participating communities. Open-ended survey responses were analyzed thematically and used to contextualize and interpret quantitative findings related to infrastructure, access, participation, and ecosystem growth. Preliminary findings were reviewed with Lab facilitators and community representatives as part of a collaborative sense-making process.

Given the exploratory nature of the study and the small sample size, findings should be interpreted as descriptive patterns rather than evidence of causal or generalizable relationships. At the same time, they offer insight into how infrastructure functions within communities actively engaged in ecosystem-building efforts and may inform others seeking to strengthen the conditions that support learner-centered ecosystem development.

Findings

Infrastructure Converts Opportunity Into Participation

A central finding of the analysis was that infrastructure shapes more than access to learning opportunities—it shapes participation. Because learning is distributed across institutions and locations, infrastructure influences how opportunities become available, who is able to participate, and how participation is distributed across learner populations. Rather than serving as a background condition, infrastructure is part of the mechanism through which opportunities become meaningful and accessible.

All of the communities studied reported a wide range of learning opportunities available through schools, community organizations, businesses, higher education institutions, and other local partners. Yet, they also consistently identified barriers that limited participation, regardless of whether the opportunities were technically present. These barriers spanned physical, digital, and social infrastructure and included funding, transportation, scheduling, coordination, technology access, and support systems that influenced learners' ability to access and navigate opportunities across settings.

Collectively, these barriers reflect challenges in the infrastructure that shapes whether and how learners participate in ecosystem opportunities. In some cases, infrastructure supports access to opportunities that already exist. In others, it creates new pathways, connections, and participation models that expand what opportunities are available in the first place.

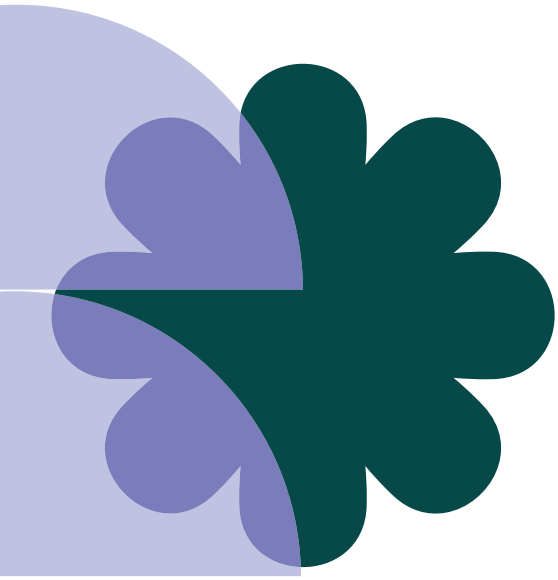
Liberty Public Schools illustrates this distinction. The district is creating learning hubs aligned with state career pathways that bring together business partnerships, hands-on learning experiences, and new structures for learner participation. Rather than relying solely on individual internship placements, the hubs are intended to create additional ways for learners to engage in career-connected learning. This approach responds to structural barriers Liberty has identified, including school schedules that can limit learners' ability to participate in opportunities of interest. Together, these efforts illustrate how infrastructure can expand access to existing opportunities while also creating new pathways for participation within an ecosystem.

The Liberty example also highlights that participation barriers are not solely questions of resource availability; they are often shaped by how learning opportunities are organized and connected across the ecosystem. Across the communities studied, barriers emerged across physical, social, and digital infrastructure, reflecting the multiple systems that influence how learners access and participate in opportunities.

This dynamic is evident in Liberty's own reflection: *"Some students have schedules that don't allow access to opportunities they are interested in."* This observation highlights that participation barriers are not limited to geography or transportation. The ways in which learning time is organized across schools, programs, and community settings—an example of social infrastructure—can also influence whether learners are able to engage in ecosystem opportunities.

In line with Liberty Public Schools' experience, other communities described a range of infrastructure-oriented strategies intended to support participation, including transportation supports, flexible scheduling, virtual learning options, mobile programming, partnerships with social service agencies, and wraparound services. These approaches often focused on strengthening the systems that connect learners to opportunities.

Communities approached these challenges in different ways. In Ojai, California, Rock Tree Sky leaders described how flexible learning structures and community coordination enable learners to spend more time participating in ecosystem opportunities. At PAST Foundation, in Ohio, leaders described transportation support, no-cost credential programs, paid internships, and partnerships with social service agencies as strategies for expanding participation and reducing barriers to access. In both cases, infrastructure served not only as a mechanism for connecting learners to opportunities, but also as a means of creating new pathways into learning experiences.



Infrastructure Distributes Participation

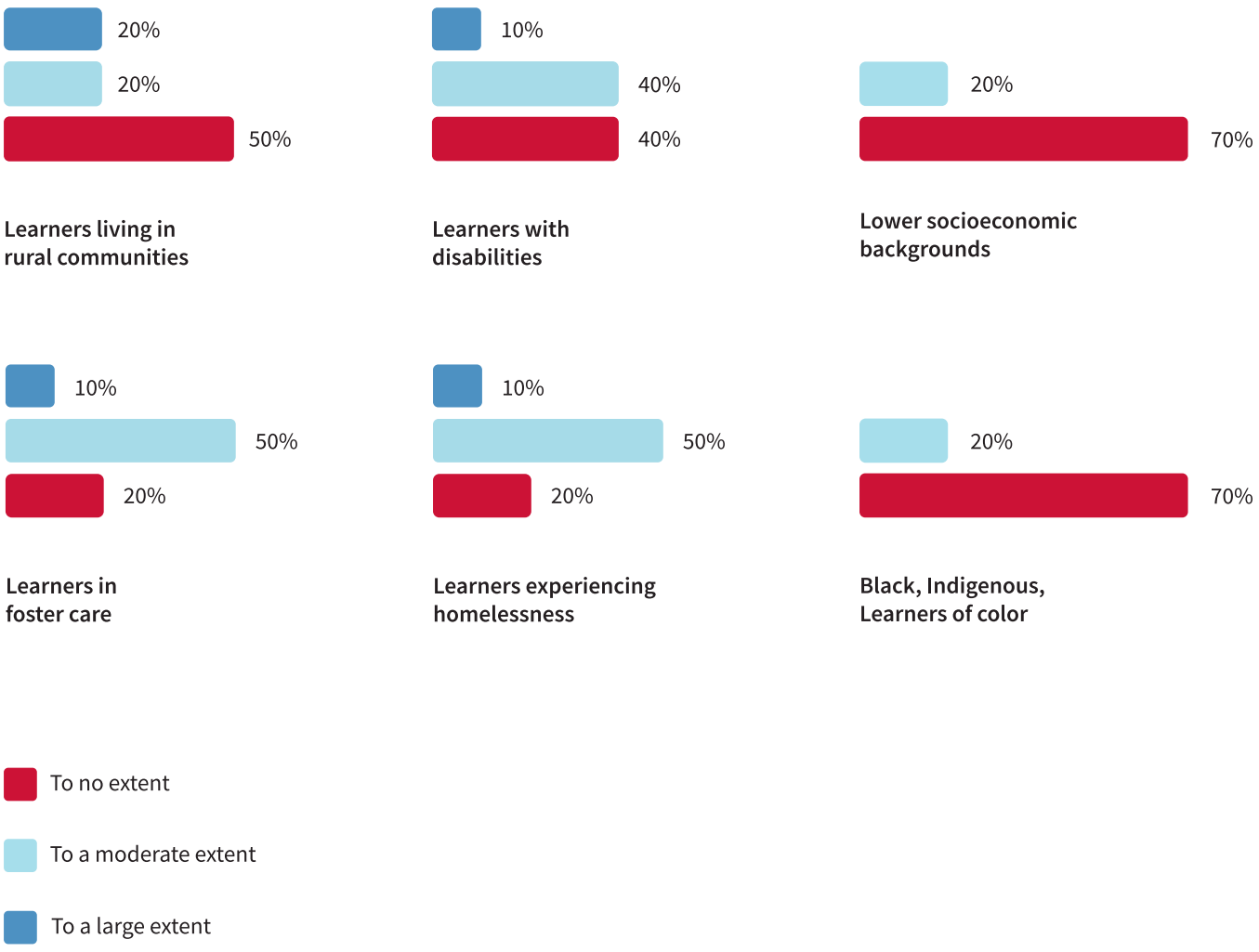
Participation barriers, however, are not experienced uniformly. The same transportation, scheduling, technology, and coordination challenges can affect learners differently depending on their circumstances and the resources available to them. As a result, infrastructure is not only a question of whether learning opportunities exist, but who is able to participate in them.

The relationship between infrastructure and participation was particularly evident in communities' efforts to expand access. Seventy percent of participating sites reported promoting equitable access for BIPOC and lower-income learners to a moderate or large extent, while only half reported similar levels of access for learners experiencing homelessness or foster care. Sites described a range of strategies for supporting equitable access, including multilingual communication, trust-building and culturally responsive practices, transportation subsidies, wraparound supports, family liaisons, cultural brokers, and restorative practices.

These examples illustrate that efforts to expand equitable participation extended across multiple dimensions of infrastructure rather than relying on a single type of support.

Figure 1

Percentage of Sites Promoting Equitable Access for Each Learner Group



The findings further suggest that infrastructure may play an important role in addressing longstanding inequities in access to educational opportunities. The learner groups identified by sites as most likely to benefit from infrastructure improvements were often those facing the greatest barriers to participation, including BIPOC learners, lower-income learners, learners with disabilities, and youth experiencing homelessness or foster care.

PAST Foundation's approach illustrates this relationship. Rather than creating separate opportunities for learners affected by longstanding inequities in access, the ecosystem focused on reducing barriers to participation through transportation assistance, paid internships, no-cost credential programs, and partnerships with social service agencies.

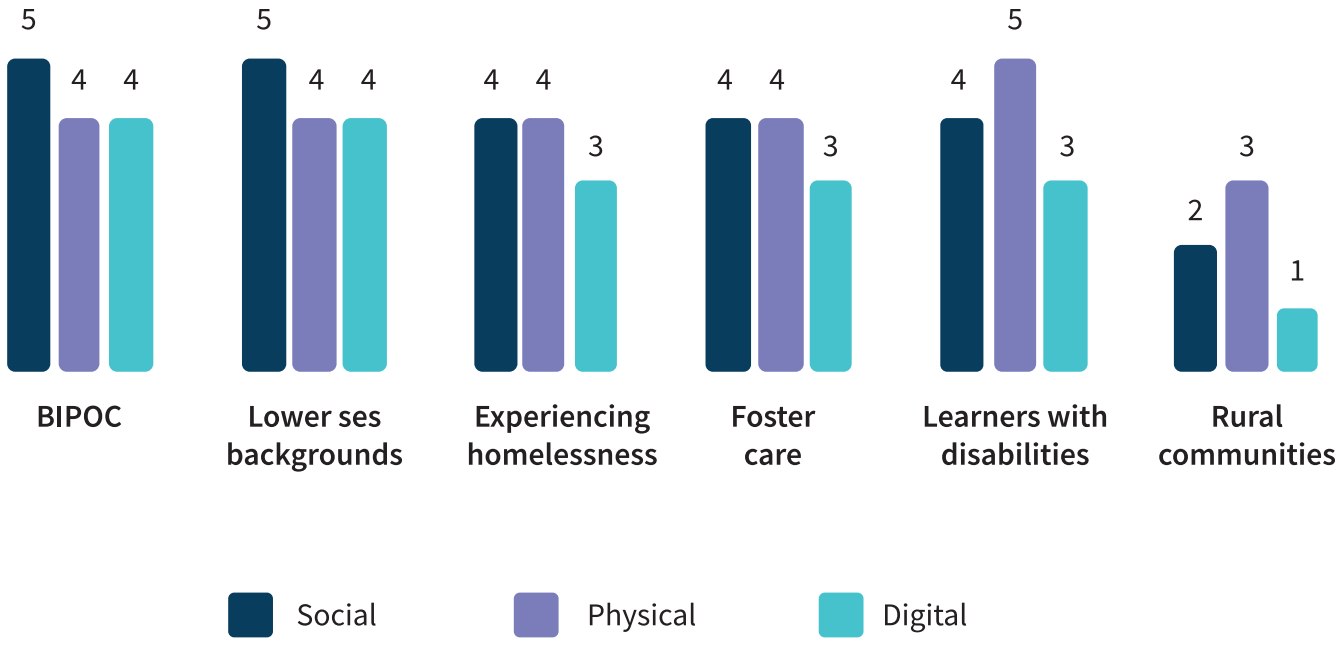
Fab Newport similarly demonstrates how infrastructure can be designed with equity in mind. Leaders described developing partnership agreements centered on equity, creating new systems of accountability, and establishing community learning hubs intended to make ecosystem opportunities more visible and accessible.

These efforts illustrate how infrastructure can be intentionally designed so that expanding participation and advancing equity reinforce one another, rather than operating as competing priorities.

Notably, the largest projected gains from infrastructure improvements were reported for BIPOC and lower-income learners, followed by learners with disabilities and youth experiencing homelessness or foster care.

Figure 2

Number of Sites Identifying Additional Populations That Could Be Served, by Population Group.



Taken together, these findings suggest that infrastructure shapes more than access alone. It influences how opportunities become available, who is able to participate, and how participation is distributed across learner populations. In learner-centered ecosystems, infrastructure is not simply a supporting condition, it is part of the mechanism through which opportunities become meaningful and accessible.

Infrastructure Shapes Ecosystem Capacity

Just as infrastructure shapes who is able to participate, the findings suggest it also shapes an ecosystem's capacity to grow and expand learning opportunities over time. Across participating communities, leaders consistently described infrastructure as a determinant of how many learners ecosystems could effectively and sustainably serve.

When asked to estimate how many additional learners could be reached if key infrastructure barriers were addressed, sites most commonly projected gains of 101 to 500 learners, while several anticipated substantially larger increases. Collectively, these estimates suggest that addressing key infrastructure barriers could enable participating ecosystems to serve more than 10,000 additional learners.

Figure 3

Potential Increase in Learners Served by Addressing Infrastructure Barriers, by Barrier Type.

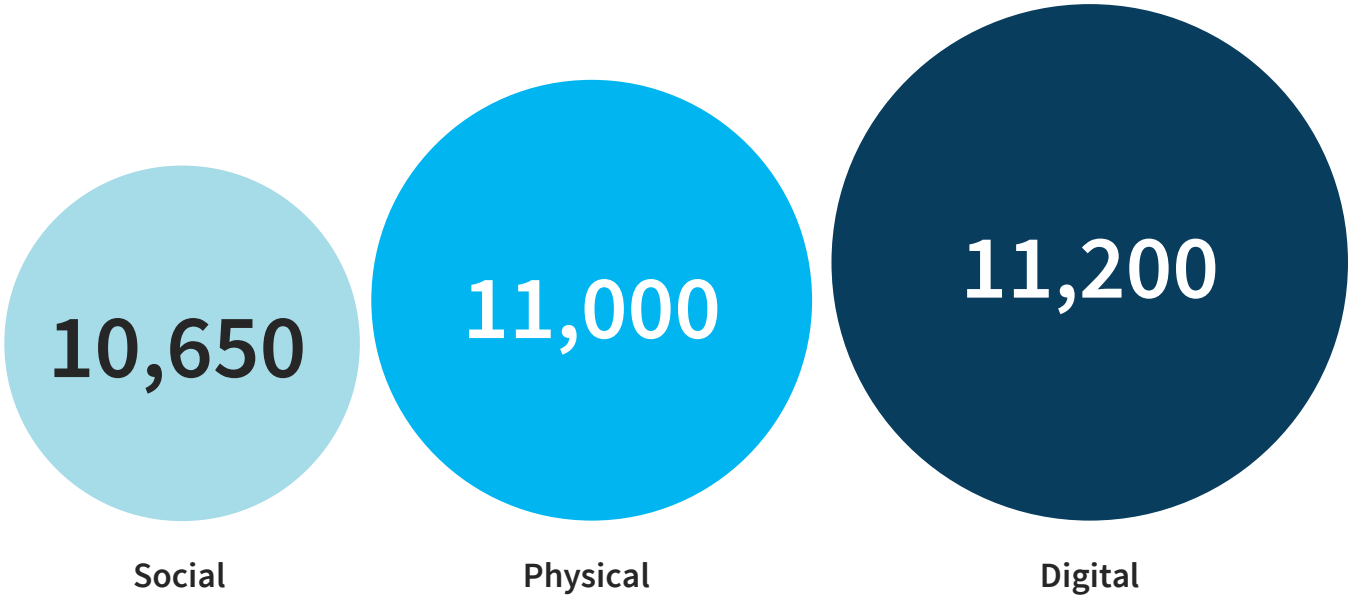
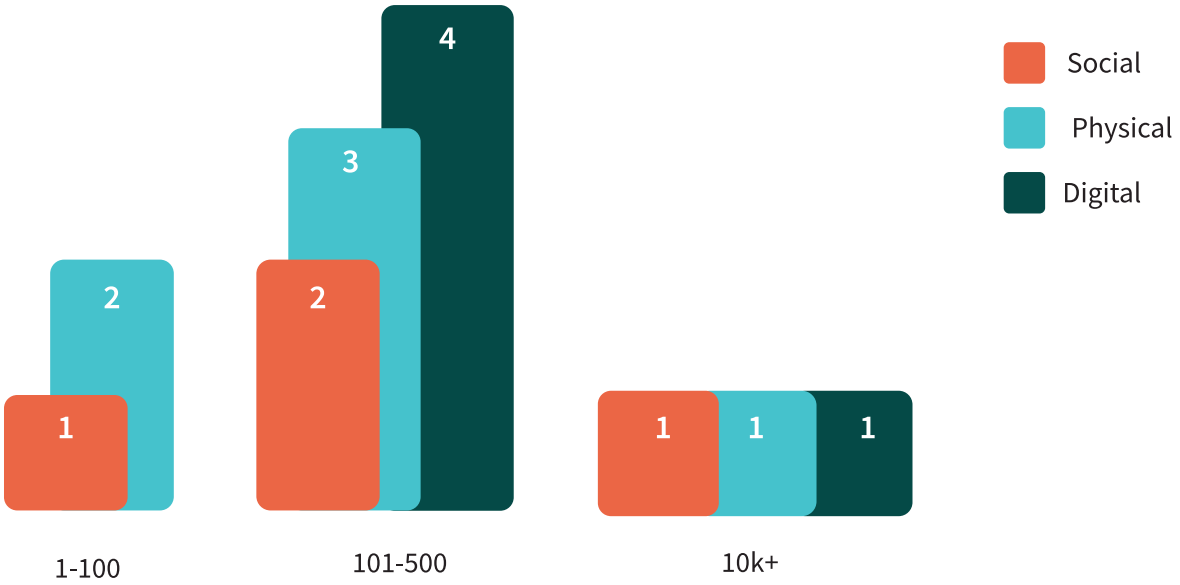


Figure 4

Number of Sites Reporting Potential Increases in Learners Served, by Range.



Note. Although, these projections should be interpreted cautiously as they represent practitioner estimates rather than measured outcomes. Nevertheless, they offer important insight into how ecosystem leaders perceive the relationship between infrastructure and growth.

The projected learner gains also suggest that ecosystem capacity is shaped by more than any single type of infrastructure. Across participating communities, leaders described physical, digital, and social infrastructure as contributing to ecosystem growth in distinct but interconnected ways. Physical infrastructure provides the resources, spaces, and mobility necessary for participation. Digital infrastructure supports communication, information sharing, learner recognition, and navigation across settings. Social infrastructure enables the relationships, governance, and coordination needed to connect organizations across the ecosystem. Together, these findings suggest that ecosystem capacity depends not on any single form of infrastructure, but on physical, digital, and social systems working together to connect learners, opportunities, and organizations across settings.

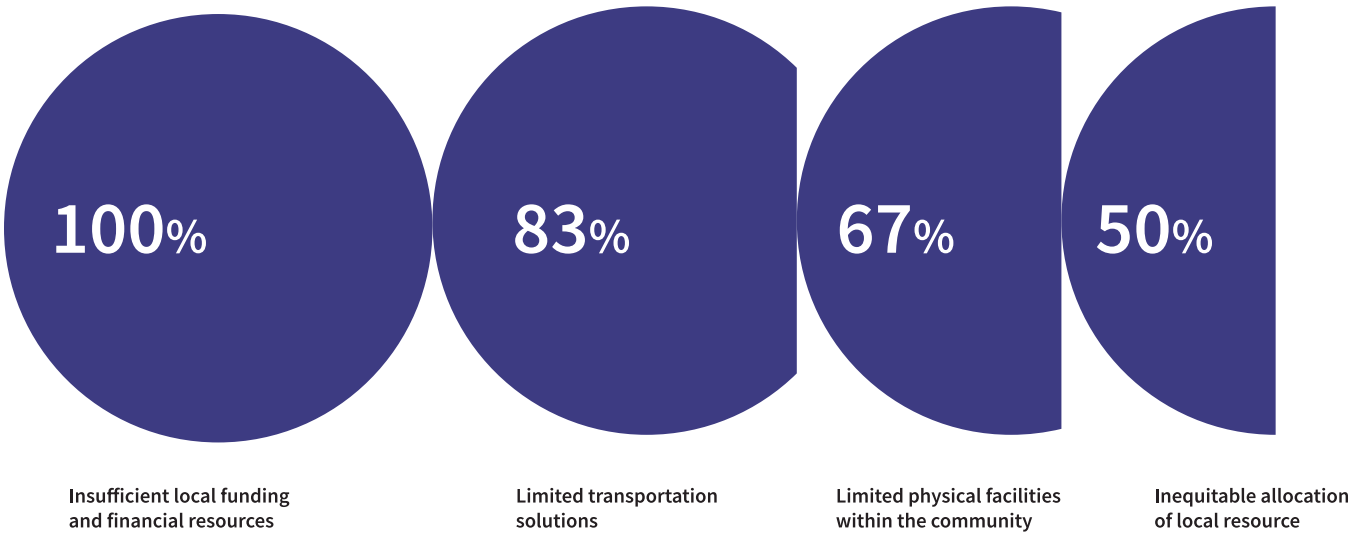
Physical Infrastructure Expands Reach

Physical infrastructure barriers were identified most frequently, with 60 percent of sites reporting them as a priority challenge. These barriers centered on funding, transportation, and facilities. All sites reporting physical infrastructure barriers also identified insufficient local funding and financial resources as a challenge, while 83% identified limited transportation solutions and 67% identified limited physical facilities within the community.

These findings suggest that expanding ecosystem reach depends not only on the availability of learning opportunities, but also on the physical infrastructure that enables learners to access them. Unlike school-centered models in which learning primarily occurs in a single location, learner-centered ecosystems depend on learners moving across organizations and settings, increasing the importance of transportation, facilities, and other forms of physical infrastructure.

Figure 5

Percentage of Physical Infrastructure Challenges



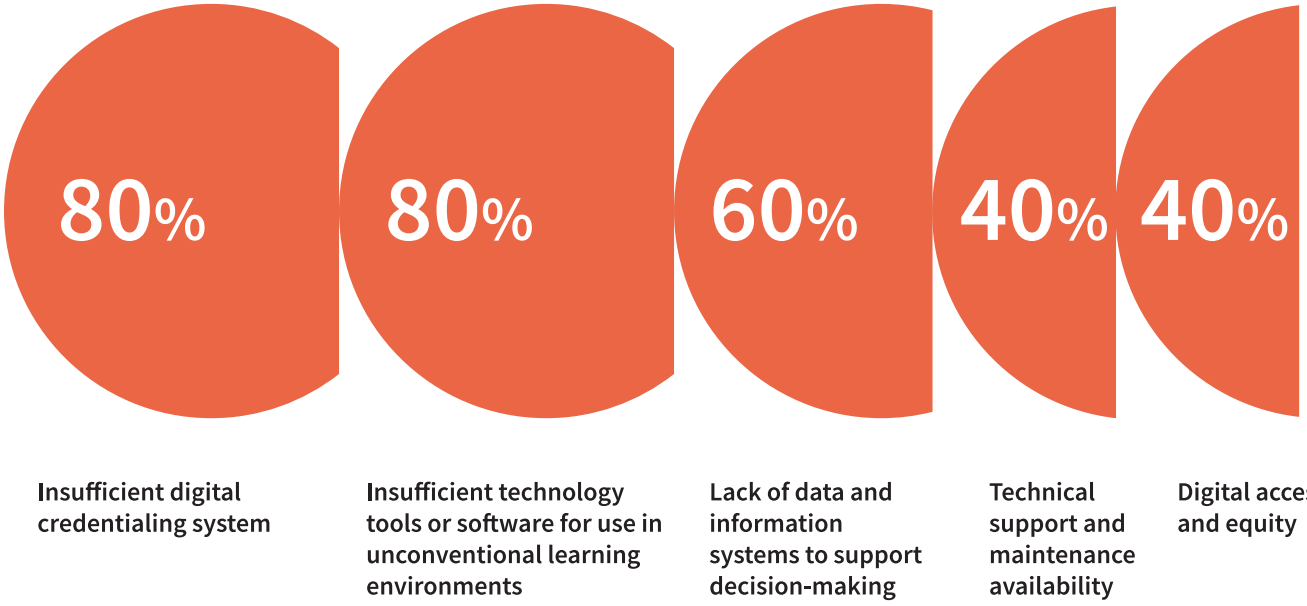
These findings suggest that mobility itself becomes educational infrastructure. The ability to move learners across community settings can shape how many young people are able to access learning opportunities across an ecosystem. Some communities are investing directly in this challenge. In Ojai, Rock Tree Sky reported one of their higher education partners is using a portion of a state early-college grant to support transportation, intended to address the logistical demands of learning across settings. In geographically dispersed communities, these challenges can be particularly pronounced. As Big Thought observed: *"Dallas is geographically spread out… infrastructure has to be approached to meet this reality."*

Digital Infrastructure Connects Learning Across Settings

Digital infrastructure challenges were most commonly related to insufficient digital credentialing systems (80%), inadequate technology tools for use in unconventional learning environments (80%), and limited data and information systems to support decision-making (60%).

Figure 6

Percentage of Digital Infrastructure Challenges



These findings suggest that many existing digital systems are better suited to documenting learning within individual institutions than across distributed learning environments. As ecosystems emerge, this becomes more than an operational limitation—it becomes a barrier to recognizing, coordinating, and connecting learning across settings.

In response, several participating communities are actively developing new forms of digital infrastructure. Big Thought is strengthening its digital badging and learning pathways system through updated technology platforms, partner training, and learner journey maps designed to help young people identify interests, document experiences, and navigate opportunities across the ecosystem. These efforts illustrate how digital infrastructure can support participation, learner navigation, and learning recognition across distributed learning environments.

Similarly, SparkNC, operating across North Carolina, partnered with learners to prototype a student-facing application designed to connect young people with learning opportunities, jobs, educators, and peers across its network. Together, these examples reveal broader needs related to coordination and information sharing, underscoring the role digital infrastructure plays in making learning across settings more visible, navigable, and connected.

Building Infrastructure for Learning Across Settings

A case study conducted with FabNewport, drawing on educator interviews and survey data, provides additional insight into how infrastructure challenges emerge in learner-centered ecosystems. Educators consistently emphasized that understanding learning requires visibility into experiences occurring across multiple programs, organizations, and settings.

92% of educators reported that it was very or extremely important to incorporate learners' experiences outside of their own course when identifying learning. At the same time, 61% reported having observed learning that they would have liked to share but that was not being documented in a way that allowed them to do so. These findings point to a common ecosystem challenge: learning occurs across settings, but the systems for documenting, sharing, and using information about that learning are often fragmented.

Educators described relying heavily on relationships with both learners and colleagues to build a more complete picture of learner growth. One educator explained: *"It would be cool if there was one place I could look that had everything...from program to program."*

Another reflected on the challenges of working across disconnected systems: *"We don't have consistent data collected over time... we have a ton of data. But I don't think we know really what to do with it... it's harder to use when it's collected in many different ways."*

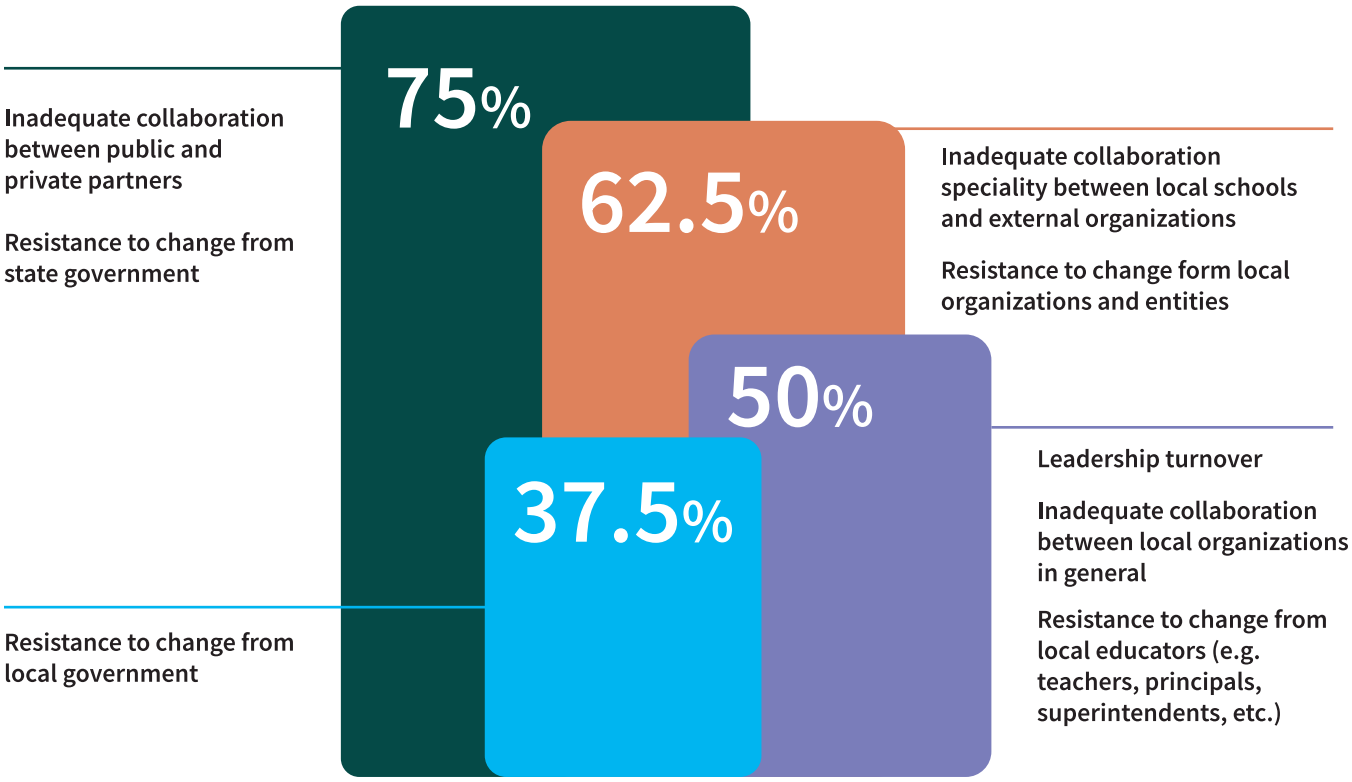
The case study illustrates how social and digital infrastructure intersect within learner-centered ecosystems. Relationships help educators share knowledge about learners across settings, while shared documentation practices, learner records, credentialing systems, and data tools provide the infrastructure needed to make that knowledge visible, usable, and actionable across organizational boundaries.

Social Infrastructure Enables Coordination

Within social infrastructure, the most frequently reported challenges involved inadequate collaboration between public and private partners (75%), resistance to change from state government (75%), inadequate collaboration between schools and external organizations (62.5%), insufficient professional development and training for educators (62.5%), and resistance to change from local organizations and entities (62.5%).

Figure 7

Percentage of Social Infrastructure Challenges

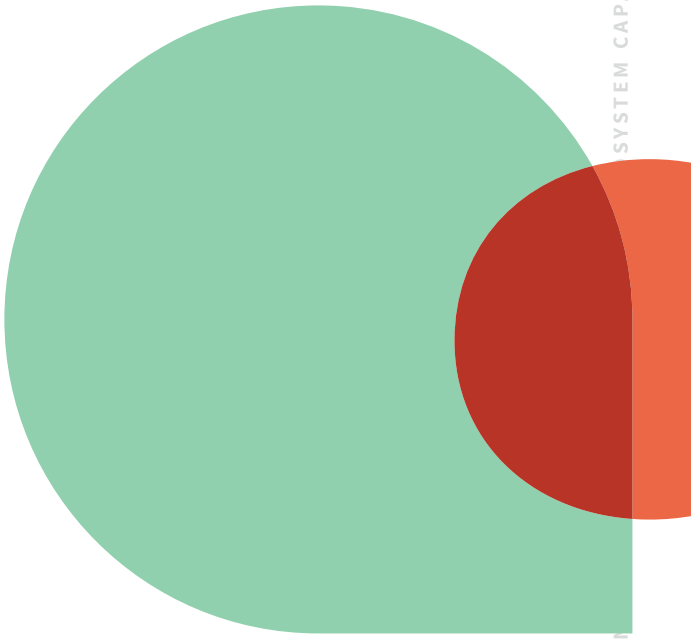


These findings suggest that ecosystem growth depends not only on relationships or partnerships, but also on the structures that enable organizations to work together across institutional boundaries. Communities frequently described the need for dedicated staff, governance structures, communication systems, and partnership management—not simply to support administration, but to enable ongoing coordination, adaptation, and ecosystem growth.

In Ojai

leaders noted that ecosystem development currently relies on dedicated staff time to coordinate partners, facilitate communication, and support ecosystem development, *"RTS currently funds the human work hours of building the ecosystem."* Similarly, SparkNC described the challenges of coordinating learning opportunities across districts operating under different policies and systems, *"Implementing a program across diverse districts... is a challenge because each district sets their own policies and practices."* These examples suggest that as learning opportunities become distributed across settings, coordination itself becomes a critical form of infrastructure.

Taken together, these findings suggest that ecosystem capacity is created not only within organizations but between them. The infrastructure communities identified as most essential—transportation systems, learner navigation, credentialing, shared data, and shared governance and coordination roles—operates across institutional boundaries, rather than inside any single entity. As ecosystems mature, growth depends not simply on strengthening individual partners, but on strengthening the connective systems that allow those partners to function as an integrated, evolving whole.



Implications for Ecosystem Investment and Growth

These findings suggest an important shift in how communities, funders, policymakers, and other partners approach ecosystem investment. While investments often focus on creating new programs or expanding learning opportunities, this research suggests that strengthening the infrastructure connecting those opportunities deserves equal attention. Participating communities consistently identified transportation, coordination, learner navigation, shared data systems, and credentialing as critical infrastructure needed to expand participation, improve equitable access, and strengthen ecosystem capacity over time. Although additional research is needed to understand the long-term effects of these investments, the findings suggest they have the potential to support both ecosystem growth and sustainability.

Across the domains of physical, digital, and social infrastructure, participating communities identified several areas where investment may yield particularly high leverage.

Physical Infrastructure

Reduce barriers to participation and expand access to learning opportunities across a community

- Transportation and mobility solutions that reduce geographic barriers and enable learners to access opportunities across settings
- Learning spaces and community facilities that support ecosystem activities, particularly in communities where access to physical space is limited

Digital Infrastructure

Support coordination, information sharing, and learning recognition across organizations and settings

- Digital credentialing and learner record systems that recognize learning across organizations and learning environments
- Shared data and information systems that help communities coordinate opportunities, track participation, and support decision-making

Social Infrastructure

Strengthen the relationships, coordination mechanisms, and support systems that enable ecosystems to function as connected networks rather than collections of isolated programs

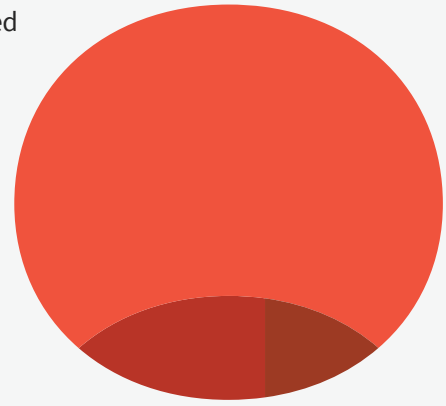
- Dedicated ecosystem coordination roles that support partnership development, communication, governance, and cross-sector collaboration
- Learner navigation and advising supports that help young people and families discover, access, and navigate opportunities across an ecosystem
- Professional learning and change-management efforts that support educators, organizations, and public agencies in adapting to learner-centered, ecosystem-based approaches

Many of the highest-leverage infrastructure investments identified by participating communities—including transportation systems, coordination roles, learner navigation supports, credentialing systems, and shared data tools—operate across organizational boundaries rather than within any single organization. This reinforces an important implication of the findings:

> Ecosystem growth depends not only on strengthening individual organizations, but also on strengthening the connective infrastructure that enables organizations to work together across settings.

Because these investments can simultaneously improve participation, coordination, and access, they have the potential to generate compounding benefits for ecosystem growth, equity, and long-term sustainability.

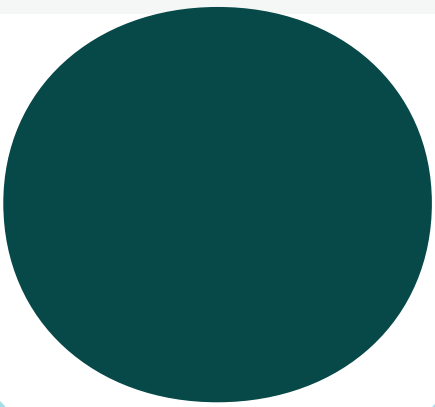
Across participating communities, the learner groups most frequently identified as benefiting from infrastructure improvements were also those most affected by longstanding inequities in access to educational opportunities, including learners from lower-income households, BIPOC learners, learners with disabilities, and youth experiencing homelessness or foster care. While these findings reflect practitioner estimates rather than measured outcomes, they suggest that investments in infrastructure development and cohesion may represent a promising strategy for expanding equitable participation while also strengthening ecosystem capacity.



Conclusion

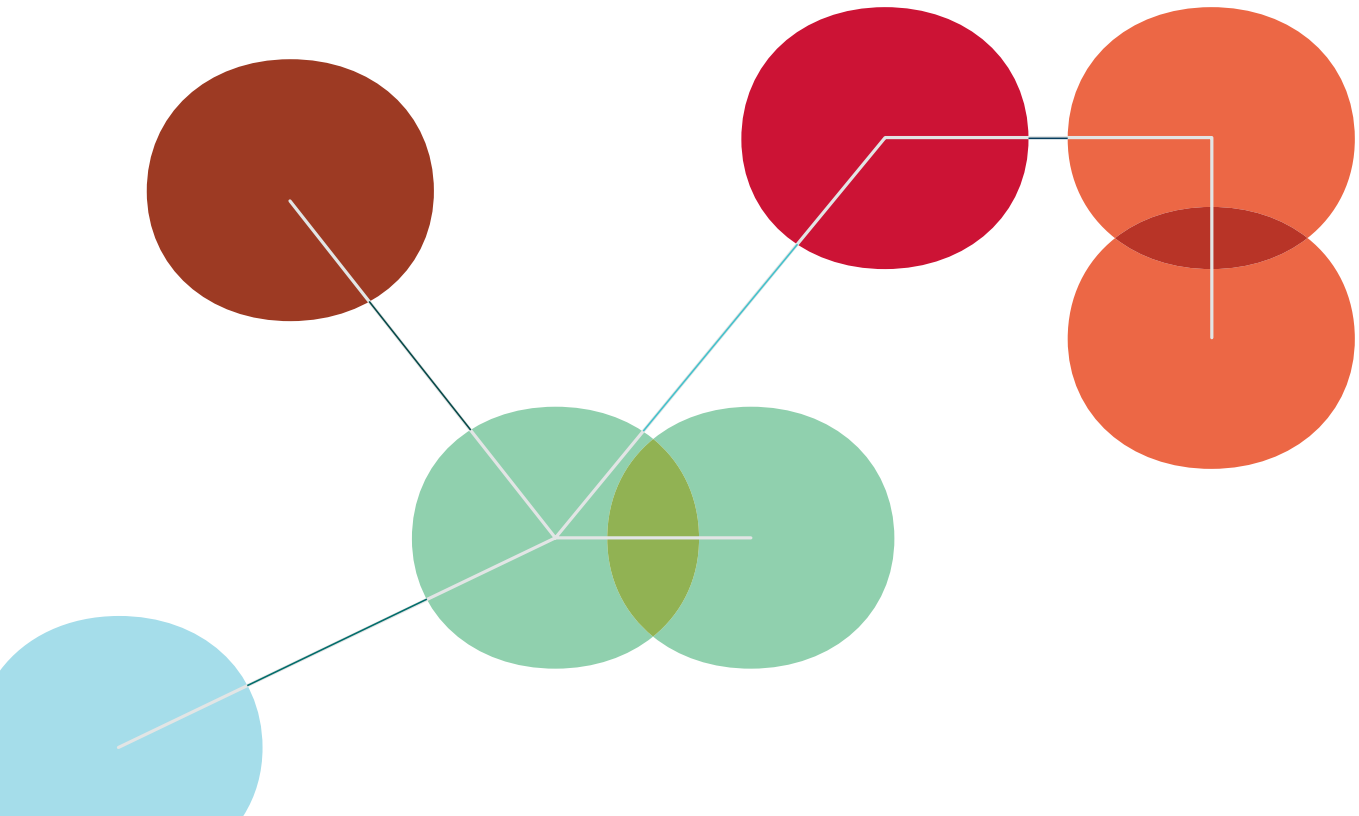
Learner-centered ecosystems do not scale through opportunities alone. They scale through the infrastructure that connects learners, organizations, and opportunities across settings.

Across participating communities, infrastructure shaped both who was able to participate in ecosystem opportunities and how many learners ecosystems believed they could ultimately reach and support. Physical, digital, and social infrastructure each contributed to ecosystem capacity in distinct ways, but communities consistently described these dimensions as interconnected systems that support participation, coordination, and long-term growth.



As learning becomes increasingly distributed across schools, community and civic organizations, employers, higher education institutions, and other settings, infrastructure becomes more than a logistical concern. It shapes who participates, how organizations coordinate, and the capacity of ecosystems to grow over time. Viewed through this lens, infrastructure is not separate from the learning ecosystem; it is part of the connective tissue that enables distributed learning to function across organizations and settings.

This study also points toward important questions for future research. While these findings suggest that infrastructure plays a central role in ecosystem participation, equity, and capacity, additional research is needed to better understand how different forms of infrastructure influence ecosystem development over time, which infrastructure investments yield the greatest benefits under different community conditions, and how infrastructure contributes to long-term ecosystem maturity and sustainability.



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