Public-Purpose Utilities For The Future of Learning

v1

A Collaborative Learning Report from

LearnerStudio

Foreword

The idea for LearnerStudio was sparked in the midst of the COVID disruption, which laid bare the ways students' potential was being constrained by the fixed, rigid, pre-programmed structures of current schools, which too often are sources of boredom and disengagement. At the same time, COVID revealed that change was possible: remote learning – for all its drawbacks – was adopted in a matter of weeks, not years. It was suddenly clear that things that once seemed impossible were, in fact, possible. We are in a huge design moment. But trying to launch new things within an old system can be limiting and has the distinct likelihood of being futile. In order to do right by our young people, we need to pause, think strategically and beyond old constraints, and then co-design something new – for and with our young people.

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What today's young people need from us, if they are to be truly prepared to thrive in our modern economy and society (particularly given the acceleration of AI), is a re-architecting of the whole educational enterprise and the creation of a new agentic ecosystem of learning that provides them with opportunities to build trusting, robust relationships with peers and adults and engage in rigorous, authentic, meaningful work together.

This paper is one of our first offerings, centering on an essential design question: what infrastructure and "public-purpose utilities" will be needed to build an equitable and quality future-ready learning ecosystem? Recognizing that this question would require us to wrestle with the complex tensions of individual needs and the collective good, we brought together a dynamic working group of education and tech entrepreneurs, policymakers, and philanthropic, business, and community leaders across critical domains of knowledge: systems engineering, technology, policy, curriculum development, and the science of learning and human development.

LearnerStudio is not the only organization with this vision. Thankfully, we are joining the ranks of a growing collaborative community of innovators. But we occupy a particular role as a cross-silo convener, design question provocateur, and collective action orchestrator – bringing together leaders with diverse perspectives and domain expertise to break down the silos that have been holding current schooling in place, posing incisive questions, and supporting innovators building the new ecosystem.

This report synthesizes key components of the collective thinking of the working group – and serves as an invitation for others to join the conversation to re-imagine and re-architect the infrastructure and "public-purpose utilities" we need to underpin an equitable and high-quality future learning ecosystem.

Kim Smith

Founder, LearnerStudio

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Executive Summary

In a time of increasing polarization nationally and unprecedented shifts in the division of labor between humans and machines, LearnerStudio is exploring the concept of education as both an "individual good" (i.e., for individual learners and families) and a "public good" (i.e., for society, our economy, and our democracy) and addressing the infrastructure needed to bring this new concept into reality for all students. LearnerStudio has coined the term "public-purpose utilities" to describe the necessary utilities to equitably serve both individual learners and the public good. Given the complexity and importance of this moment, LearnerStudio recognizes the critical need to define the right goals, identify design questions, and bring together cross-disciplinary resources from the public, private, and nonprofit sectors to effectively – and equitably – facilitate the process of system redesign.

BEGIN WITH THE END IN MIND

LearnerStudio's vision for a future learning ecosystem is inclusive of, but broader than, today's concept of school. The new ecosystem is centered around equitable access to learning to ensure that learners thrive in life, their careers, and a democratic society, not just school. A future learning ecosystem will leverage the science of learning and development and will be supported by adults with flexible roles who guide learners along pathways enabling them to pursue their interests. Technology, including AI, will be seamlessly integrated into the ecosystem, and a new, interoperable digital architecture will capture learning that happens in and out of schools.

Such a future-ready learning ecosystem – one that can truly prepare all learners for life, a career, and full participation in a diverse democratic society – cannot become the mainstream in our nation until we **redefine, design, and build the required equitable, quality infrastructure.**

CONSTRUCT INFRASTUCTURE FOR EDUCATION

Constructing a new learning-focused ecosystem will require expanded and more equitable infrastructure designed around a set of principles that encourage flexible learning and can adapt to the full continuum of learners' needs. As originally described by the Siegel Family Endowment, this requires multidimensional shifts in infrastructure: physical (including facilities and expanded options for transportation), digital (e.g., new student data systems such as learning and employment records and credentialing systems), and social (e.g., new staffing models with flexible educator roles and equitable partnerships with families).

BUILD FOR THE COMMON GOOD

Historically, infrastructure and utilities have relied on a mix of public, private, and philanthropic sector support. The strategic coordination of all sectors is essential, because each one has benefits and drawbacks. The public sector typically expands access – but is not designed to innovate or change quickly. The private sector can spur innovation – but is not incentivized to prioritize expanding access for the public good. The philanthropic sector is well-positioned to establish new infrastructure and utilities.

Our nation's history provides illustrative examples of cross-sector collaboration integrating the strengths of private enterprises, government, and philanthropy to advance the public good by providing near-universal access to critical services, ensuring the quality of products, and enabling interoperability. These three functions — access, quality, and interoperability — will be critical for the advancement and success of a future learning ecosystem. In the near term, it is clear that without early philanthropic investment, possibly accompanied by a public-benefit governance structure, we should not expect the private sector to prioritize equity or quality or for the public sector to drive dramatic or system-wide reinvention.

WHAT WE NEED

There are existing public-purpose utilities in education that are critical for our new learning ecosystem (e.g., E-RATE, the National School Lunch Program), as well as some that need to be redesigned or reimagined (e.g., standards, Carnegie units, assessments). New utilities are emerging on the horizon in the form of innovative transportation, LER, and AI tools. As we leverage some existing utilities, repurpose others, and build new ones, access, equity, quality, and interoperability, as well as sustainability, should guide designs and initiatives.

CALL TO ACTION

The creation of a new learner-centered ecosystem calls on us to balance the thriving of individual learners or families with our investment in a civil society and the public good. Without engaging in proactive strategic development and investing in infrastructure and public-purpose utilities, the inequities embedded in our traditional infrastructure and utilities will persist and increase.

BUILDING PUBLIC-PURPOSE UTILITIES WILL REQUIRE:

- public awareness and demand
- equity safeguards
- co-design with communities
- common definitions of, and criteria for, public-purpose utilities
- sustained public support, political will, and funding
- trusted arbiters of learning
- strategic integration of philanthropic, private, and public funding

Table of Contents

Introduction

America's education system is not changing fast enough to equitably prepare all learners for the future. We need to protect and create learning opportunities for both individual learners and the common good if we are to build the nation's new learning ecosystem.

In structure, schedule, curriculum, and instruction, most current public schools mirror those of the early 1900s, with the exception (in some schools) of iPads, chromebooks, and smart boards where textbooks and blackboards used to be. Meanwhile, the shifts that have occurred in our daily lives over the past several decades are mind bending. Cars are beginning to drive themselves. Artificial intelligence (AI) is now poised to fundamentally shift the divisions of labor that exist between humans and machines. For all that is dynamic, innovative, and inspirational about our society and economy, it seems contradictory – and confounding – that we educate our students in nearly the exact same way that our grandparents were educated.

The highly personalized, technology-enhanced world today's students live in is not reflected in the one-size-fits-all approach of most current schools, which are designed for an "average" student and compartmentalized into grade bands by age, regardless of progress or skill level. The vast majority of school systems have not embraced what we now know about how students learn, or the scientific and technological advances (e.g., AI and adaptive automation) that are part of students' everyday lives outside of school and are embedded in today's workplaces.

Nor has our education system counteracted the negative effects of polarization and inequity in our country. Instead, it often perpetuates inequities, exacerbates racial and economic divisions, and bores students into apathy instead of activating their aspirations to solve the huge problems we face collectively.

1m	students opt out of current education system; homeschooling doubled
50%	fewer college students chose teaching as profession
44%	of adults say they would not recommend teaching as a career
1/10	principals exited the profession in the 2021-2022 school year
21	states have tax-credit scholarships, 15 have education savings accounts, 10 and District of Columbia have vouchers, 2 states have tax-credit ESAs1

And, a trend is underway that, if left unchecked, could undermine the way our nation prioritizes public vs. private good in education. A growing number of elected officials are spearheading policies and public funding increases for privatized education options. These advocates emphasize individual learners' needs, which is important. Yet, if these options replaced the entire system, they could de-emphasize the collective needs of children and the protection of education as a public good. Such a shift could increase the likelihood of perpetuating inequities and discrimination and could be ill-equipped to produce equitable access to high quality learning for those who who are marginalized – urban and rural students, multilingual learners, exceptional learners, those from low-income families, and those new to this country. Moreover, this shift does not address the increasing inability of our communities to engage across lines of difference in productive collective problem solving. Longer-term, a solely privatized system holds the potential to further divide our country and undermine our democracy.[2]

But there is hope. There is a small group of innovative educators, community leaders, families, students, funders, and organizations who are leading the way, working to tackle structural challenges and redesign our education system based on scientific, research-based evidence on how humans learn.

Mostly, these innovators have worked within the existing structures, rules, and infrastructure of the current system. But it's becoming clear that a true paradigm shift will require a bold redesign, and this clarity has created a new window of opportunity to redesign for the future.

As the LearnerStudio team envisioned the large-scale systems change needed to establish a learner-centered ecosystem, we realized there are critical new foundational infrastructure components upon which this future ecosystem will rest – most of which have yet to be designed and built. As we analyzed progress and barriers to a creating a new ecosystem that prioritizes access and quality outcomes, we realized:

1. There is **not yet a universal definition** of what new infrastructure is or the kinds of infrastructure needed for the future, and

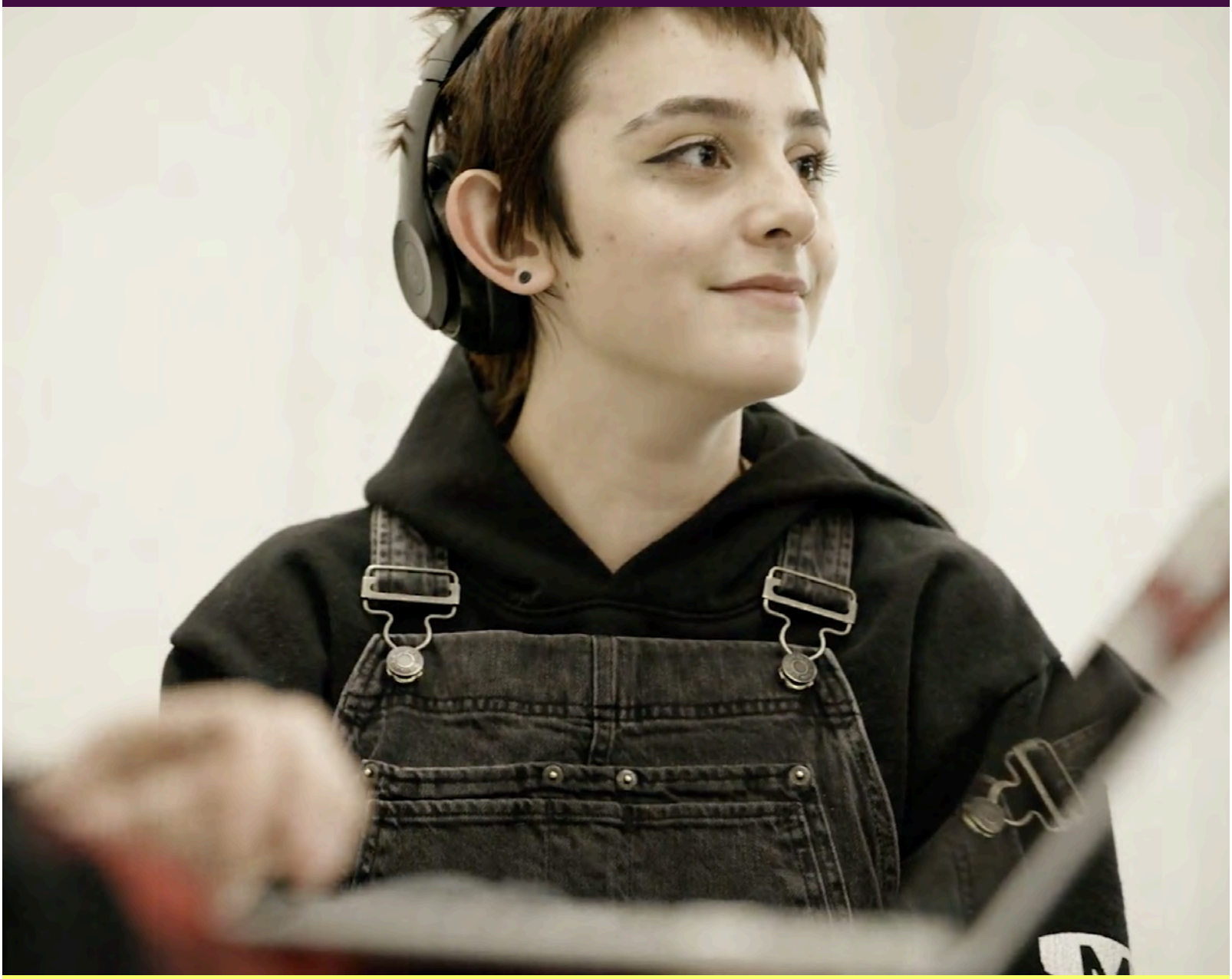
2. It is not yet clear **what parts of that new infrastructure should be left to the private sector and what parts need to be conceived of and invested in, for the public good.**

In this paper, LearnerStudio explores the concept of education as both an "individual good" (i.e., for individual learners and families) and a "public good" (i.e., for society, our economy, and our democracy) and addresses the infrastructure and public-purpose utilities needed to bring this new vision into reality for all students in the US.

LearnerStudio coined the term "**public-purpose utilities**" to describe the necessary utilities that seek to **equitably serve both individual learners and the public good.**

Begin with the end in mind.

The public education (eco)system we urgently need



The future ecosystem centers learners as active drivers and enables flexible learning that happens in both redesigned "schools" as well as many other places and times in our communities. Access to learning opportunities is also unbounded from today's residential real estate–based system, permitting learners to be both community based and globally connected as they are able to access "courses" or interactive learning experiences that interest them from across the state, country, or world. Learning is no longer tied to a rigid agrarian calendar, so different learners can pursue a different cadence or timing based on their family's needs or preferences.

It is most likely that a physical place called "school" will continue to exist for a long time – to provide for the care and safety of learners, social interaction, and the development of interpersonal skills. But it is also essential that "school" be organized much differently. This "both/and" approach is possible, providing custodial care, in-person interactions, and active hands-on learning experiences based outside of school buildings, online, and in communities, with additional services such as health care wrapped around students and families.

Such an ecosystem – one that can truly prepare all our learners for life, careers, and full participation in a diverse democratic society – cannot become the mainstream education system in our nation until we **redefine, design, and build the requisite infrastructure needed to ensure quality and equitable access, so all can learn and thrive in whatever future they choose.**

Principles of the Future Ecosystem

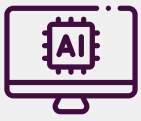
Learning is the focus, with a definition of success based on thriving in life, careers, and democracy, not merely achieving success in school.

Expanded, flexible, and differentiated educator roles exist to coach, support, and help navigate inside and beyond school- based classrooms during and after conventional school hours.

Expanded **equitable access** to quality learning opportunities is integrated into the design of every aspect.

A new, **inter-operative digital architecture** enables qualified credit accrual for learning within and beyond the walls of a classroom through learning and employment records (LERs) and lifelong learning portfolios.

Embedded **science of learning and development**-based practices are foundational premises of learning design.



Technological innovations, including AI, are seamlessly integrated into and enhancing learning, incorporating technology learners rely on in their daily lives, so learning is more authentic, interactive, and engaging.

Flexible pathways build around learners' interests and aspirations, and mastery-based progressions guide the learner experience.

Infrastructure for education

What does that mean?

The concept of infrastructure is familiar to most Americans – from the earliest nation-building days of our country, equitable access to quality infrastructure has been an essential component underpinning the strength of the US democracy and economy. Infrastructure is traditionally defined as "the system of public works of a country, state, or region, or the resources – such as personnel, buildings, or equipment – required for an activity."[3]

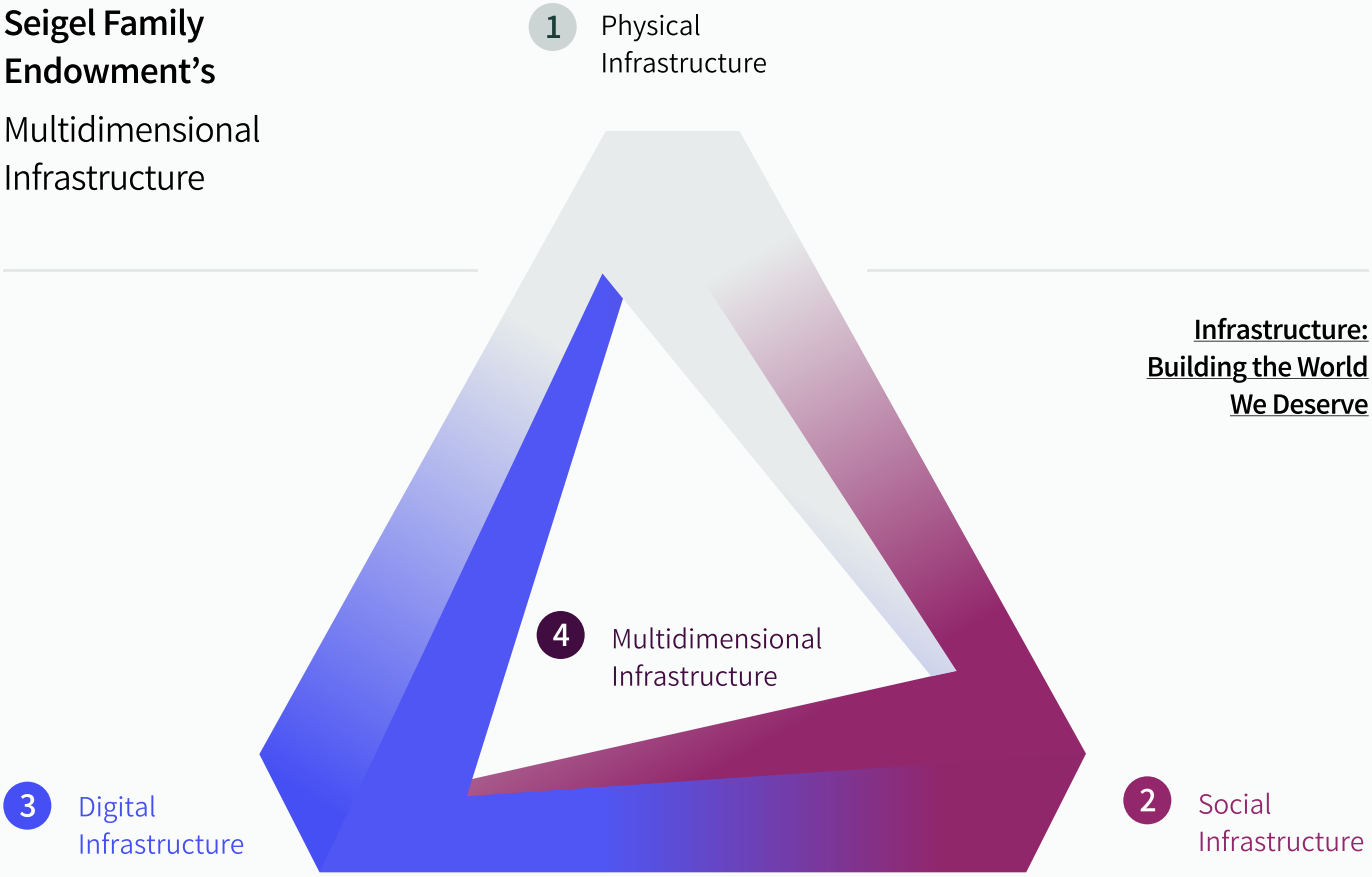
But the education sector of today needs a broader, definition to provide clarity about the types of infrastructure supporting – and bounding – current systems. In a recent paper on the subject, the Siegel Family Endowment broadened this definition to a "multidimensional" one that goes beyond physical infrastructure.

Constructing a new learning-focused ecosystem will require expanded and more equitable infrastructure designed around a set of principles that unleash, rather than inhibit, flexible learning and can adapt to and support the "jagged" learner profile of each student.[4] Given the complexity and importance of this moment of paradigm shift, it is critical to intentionally define the right goals, identify the design questions and constraints, and bring together cross-disciplinary resources from the public, private, and nonprofit sectors to effectively meet the moment of system redesign and reengineering.

Tables 1-3 provide examples of physical, digital, and social infrastructure that exist in the current system and those needed in the learning ecosystem of the future.

Seigel Family Endowment's

Multidimensional Infrastructure



Infrastructure: Building the World We Deserve

TABLE 1

Shifts in Physical Infrastructure

(illustrative, not exhaustive)

Infrastructure Component	Current Education Infrastructure	Future Learning Ecosystem Infrastructure
Facilities 	School district– controlled buildings designed for discrete “classrooms” of ~30-40 students. Accessible for classroom-based instruction from ~8 am-4 pm Monday-Friday, with occasional evening and weekend athletic/enrichment events.	Multi-use buildings accessible 24/7 for experiential and classroom learning as well as hubs for broader health and community services. May or may not be under the authority of a school district. Inclusive of physical learning environments in the community: museums, libraries, boys and girls clubs, 4H, employers, etc.
Trasportation 	Delivered by a fleet of vehicles serving large groups of students at one time (buses), owned in-district or contracted via vendors, with set routes, mostly during school hours.	Flexible, just-in-time, vehicles that provide safe, secure, reliable transportation before, during, and after school hours (e.g., HopSkipDrive, 4mative, public microtransit services) based on student need.

TABLE 2

This broader definition rightly includes "digital infrastructure": the "data, hardware and software, coding, and operating systems"; the assets that transmit the data, such as "cell towers, broadband cables, computer networks, and satellites"; and digital utilities such as "search engine capabilities and social media." It also includes "social infrastructure" – the"communities, organizations, and public spaces" within which people connect, including "public institutions (libraries, schools, voting booths), public spaces (sidewalks, gardens, green spaces), and community organizations (faith centers, neighborhood organizations, cultural groups)."[5]

Infrastructure Component	Current Education Infrastructure	Future Learning Ecosystem Infrastructure
Student Data Systems 	Student transcripts that are based on the Carnegie Unit, and owned/managed by the school/institution, learners must ask for (and/or pay for) access. Students moving from one location to another may not receive credits because of different graduation requirements. Data systems are often disjointed, not able to seamlessly connect students' education pathways with their future jobs, earnings, and labor markets.	Learning and employment records (LER) that include mastery-based progressions of knowledge and skills, where data is owned and managed by the learner, who can grant permission to schools, employers, etc. LER will be inter-operable so that progress can be updated, verified, and "credited," across locations and time periods. Plug-ins to enable diverse learning purposes. Accessible and seamless data systems that can track learners' progress into the workforce to inform research and development across the ecosystem.
Curriculum/ Content 	Educator-controlled, with age-based grade levels, focused in four academic content areas (math, English, science, social studies), which were defined by the Committee of Ten in 1892.	Learner-directed, centered on needs, interests, abilities, and future aspirations, contextualized for each learner, within a community of learners. Enables discovery, guided by educators. Learning experiences include cross-disciplinary, problem- based opportunities, like the real world. Content combines modernized academic knowledge, SEL mindsets, and competencies to thrive in community, careers, and democracy of the future.

TABLE 2

Infrastructure Component	Current Education Infrastructure	Future Learning Ecosystem Infrastructure
Assessments 	Standardized, summative, disconnected from learning, with long waits to receive results. Some growth-based and adaptive assessments but generally reliant on fee- based publishers. No mastery-based options.	Personalized, formative, context-based and choice-based, immediate and integrated within learning. Freely accessible and not requiring purchase of content. Mastery-based assessments embedded in learning processes that enable flexible progressions and credentialing.
Credentialing 	Complex links between K-12 and postsecondary workforce options that vary significantly across pathways and locations, with college pathways constrained by two providers of standardized entrance exams (ETS and College Board).	Flexible, clear pathways for learners to show their competencies and readiness, then match with high-quality postsecondary college and workforce opportunities (ex: Mastery Transcript Consortium).
Internet & computing 	Neither hardware nor reliable connectivity is yet universal or guaranteed for the future.	Powerful computing hardware and high-speed internet connectivity accessible to all learners as essential infrastructure and a precondition to learning.

TABLE 3

It is important to note that – because of the combination of technical complexity and the high levels of community engagement needed – designing the new infrastructure must combine both top-down and bottom-up processes. This work will need to center the "bottom-up" perspectives of a diverse group of stakeholders who comprise the relevant learning community – learners, teachers and other staff, families, and business and community members7– ensuring that they inform the design so that this new infrastructure actually meets their needs. At the same time, the top-down work of system design – thoughtfully integrated tools, structures, technology, and standards – is essential to ensuring the interoperability, effectiveness, efficiency, and sustainability of the new infrastructure.

As we identify and prioritize these necessary infrastructure shifts, there is also a need to fundamentally reconsider the utilities we provide to learners and families – with a focus on providing equitable access to high-quality opportunities. In the following sections, we will unpack what we mean by "public-purpose utilities" and begin to define what new and reimagined public-purpose utilities will be needed for our future learning ecosystem.

Infrastructure Component	Current Education Infrastructure	Future Learning Ecosystem Infrastructure
Staffing 	Narrowly defined adult roles, job descriptions, policies, license requirements not based on teaching skills, defining who can be the primary "teacher of record" and when, where, and what they can teach Roles that are constraining, the same year after year, and that unintentionally create a lack of sustainability and diminishing pipelines into the field.	Flexible roles based on learners' needs, "educators'" skills, interests, and SoLD that increase supply and sustainability (i.e., content designer, instructor, curator, coach, mentor, assessor, navigator, near-peer supports). Licensure addressing safety and quality but with flexibility around who can teach whenever and, wherever students can learn. A team-based set of flexible roles in which learners can access an array of expertise as needed.
Student Well-Being 	Provision of "safe" spaces, nutrition (breakfast and, lunch, during school hours), access to social workers and, psychologists, families responsible for other medical care. Reactive –- responding to crises, but not addressing root causes of mental health and physical health issues.	Wrap-around, comprehensive services inclusive of physical, dental, nutritional, and mental health and safety. Proactive –- accessing an interconnected web of services to support learners and their families in the context of their communities, enabled by cross-system data interoperability. Tools for enabling purpose finding and wayfinding so learners have agency and can make choices in their learning, which supports their agency and well-being.

TABLE 3

Infrastructure Component	Current Education Infrastructure	Future Learning Ecosystem Infrastructure
Family Partnerships 	Families are invited to participate in discrete activities at pre-set times, defined by schools and districts, such as attending curriculum night, volunteering for the parent-teacher association (PTA), or attending teacher conferences – usually to receive information about their learner, but not to provide it.	Families are constant collaborators and co- designers of their learners' experiences, along with a team of educators. Navigational tools enable agency and informed choices for learning experiences.

Build for the common good.

Infrastructure as
“public-purpose utilities”

In this moment of major re-architecting and transition, we have the opportunity to design with both individual learners and the public good in mind – to meet individual learners' needs with equity and quality assurance built in – instead of allowing those critical goals to be afterthoughts. For this to occur, we need to imagine a new set of what we're calling "public-purpose utilities" – infrastructure that undergirds the future-ready system to ensure equitable access and quality.

The evolution of our nation's infrastructure and utilities has shown that creating and expanding public- purpose utilities requires intentional focus – through public policy, organized market intervention by consumers (as we saw when consumers demanded organic food), and/or philanthropic support, to reduce the risks of relying solely on the private sector. Each sector carries benefits and drawbacks.

Public Sector

The public sector is typically focused on expanding access but is not designed to change quickly, nor is it nimble enough to innovate quickly. There are virtually no incentives for, and many barriers to, the public sector innovating and driving beyond current structures, established policies, regulations, and entrenched practices to redesign the system. The powerful inertial forces of the status quo, combined with scant financial resources available for future system redesign work, make it risky to rely solely on the public sector.

Private Sector

The private sector is effective at spurring innovation and growth but is not as effective at prioritizing the public good. Typically, there are few incentives for the private sector to invest in or prioritize anything other than profit. Private sector investments in public education generally address current demand (revenue), and to the degree investors support innovation, they tend to prioritize the consumers able to pay privately. Absent public subsidy, equitable access is not a priority that drives private sector investor incentives or rewards.

Building the public-purpose infrastructure – designed to enable quality learner-centered, flexible, widely accessible learning for every learner – will require public awareness and demand, cross-sector partnership, and early support from philanthropy to overcome the initial, inherent limitations of relying on the private or public sectors. There will be roles for the private sector to accelerate innovation or to expand applications or choices, and for the public sector to sustain quality, protect equity, provide ongoing oversight, and reach last-mile scale. **But without early philanthropic investment, possibly accompanied by a public-benefit governance structure[8], history shows us we should not expect the private sector to prioritize equity or quality, or for the public sector to drive dramatic or system reinvention.**

The infrastructure in the new learning ecosystem will need to be created and supported by a strategic combination of the private, public, and nonprofit sectors. We know this is possible because it mirrors the ways our current infrastructure is supported by the private and public sectors as well as public- private partnerships, examples of which appear in Tables 4-6. Just as TV cables and cell towers are owned by private companies and access is sold to consumers, some of the learning ecosystem infrastructure will be owned by the private sector. And similar to the way we expect our government to build and maintain roads, bridges, and public transit infrastructure, some of the learning ecosystem's infrastructure will be owned and operated by the public sector.

Creative new cross-sector collaborations will also be essential. Public-private partnerships can provide equitable access or assurances of quality, while taking advantage of cross-sector efficiencies and core competencies – perhaps analogous to public airport authorities that partner with private sector companies to deliver secure air transportation. Fortunately, our nation's history includes examples of bridging the strengths of the private sector, government, and philanthropy to advance the public good by providing near-universal access to critical services, ensuring the quality of products, and enabling interoperability. Following are examples of these three categories.

Ensuring Access

Public-purpose utilities are critical to ensuring access to key aspects of life for everyone. For example, access to electricity is nearly universal in the US due to requirements for electric grid access. In the communications sector, public- private partnerships have not only ensured access and availability to communications towers and bandwidth, but also ensured fair use of the systems of communication and a requirement that enables use for public emergency alerts across the country. Similarly, roads and highways connect nearly every part of the country and have uniform regulations and requirements around safety, signage, and accessibility. Libraries are an example of philanthropy jumpstarting public-purpose utilities, with Andrew Carnegie funding over 1,600 libraries in the early 20th-century US, until state legislatures authorized towns to levy taxes to establish and support them.

TABLE 4

Examples of Infrastructure to Ensure Access (non education)

	Public	Private	Partnership
Broadband	✓	✓	✓
Cell Towers		✓	✓
Roads, Bridges, Transit	✓	✓	
Libraries	✓		
Energy	✓	✓	✓

✓ Primary Function
✓ Secondary Function, minimal access

Ensuring Quality

Public-purpose utilities are critical to ensuring access to key aspects of life for everyone. For example, access to electricity is nearly universal in the US due to requirements for electric grid access. In the communications sector, public- private partnerships have not only ensured access and availability to communications towers and bandwidth, but also ensured fair use of the systems of communication and a requirement that enables use for public emergency alerts across the country. Similarly, roads and highways connect nearly every part of the country and have uniform regulations and requirements around safety, signage, and accessibility. Libraries are an example of philanthropy jumpstarting public-purpose utilities, with Andrew Carnegie funding over 1,600 libraries in the early 20th-century US, until state legislatures authorized towns to levy taxes to establish and support them.

TABLE 5

Examples of Infrastructure to Ensure Quality (non education)

	Public	Private	Partnership
Energy Star	✓		✓
USDA Organic	✓		✓

✓ Primary Function

✓ Secondary Function, minimal access

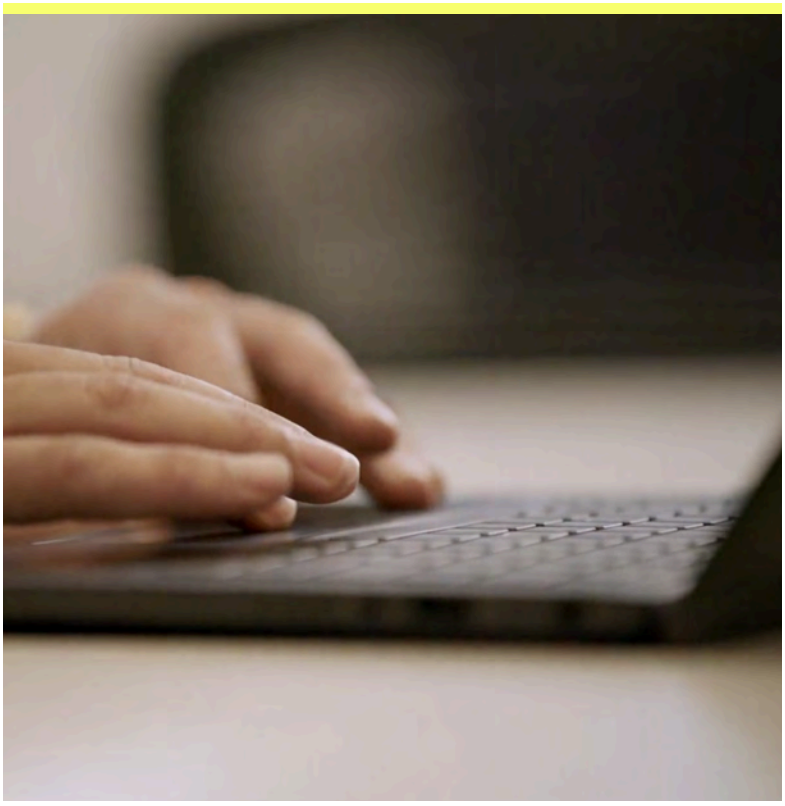


TABLE 6

Examples of Infrastructure to Ensure Interoperability (non education)

	Public	Private	Partnership
Electric Outlets			✓
ATM		✓	
Medical Devices		✓	

Primary Function ✓
Secondary Function, minimal access ✓

Ensuring Interoperability

Finally, public-purpose utilities are critical to ensuring interoperability. Interoperability can seem technical and wonky, yet it is critical to ensuring our utilities work. A well-known example is household electrical outlets, which are standardized so that all plugs work in any electrical socket in the US (with two standards: 120 and 220 volts). Using a credit card from any bank at any ATM is another example of interoperability. The ATM network and credit card companies use standardized protocols to allow for interoperability. Similarly, medical devices are designed to share data with each other: a pacemaker can communicate with a blood glucose monitor to adjust insulin levels automatically.

Yet, interoperability is not an automatic or inevitable outcome of private sector innovation investments. For example, interoperable charging stations for electric vehicles are not yet universally accessible, which means that, as our nation seeks to move toward cleaner electric power, electric vehicle owners cannot rely on access to the energy to power their vehicles as they travel longer distances. The emerging vehicle charging infrastructure is a piecemeal arrangement of private electric vehicle service providers operating charging stations under a variety of business models, including proprietary software and subscriber services. As with gas stations, the goal is to achieve interoperability in which all drivers can access energy from any owner/operator through a common platform with an easily accessible way to pay.[9] Such interoperability is most likely to occur via policy incentives and regulations that ensure safety and compliance with common standards.

The strategic and thoughtful creation of public-purpose utilities to support the future of learning will be a critical feature in the success of the new learner-centered ecosystem. Public awareness/demand, cross-sector partnership, and early support from philanthropy to build the critical infrastructure will be crucial to ensuring that the future system is accessible to all, high quality, and interoperable. These three core aspects will serve as critical foundations for equity, effectiveness, access, and efficiency in the new learner-centered ecosystem.

Determine what we need.

What new infrastructure and public-purpose utilities will we need for the future of learning?

Some key elements of the new infrastructure and public-purpose utilities are already in place, while others are being built. This section describes existing education infrastructure and public-purpose utilities that are critical for our new learning ecosystem, as well as utilities emerging on the horizon. As we leverage existing utilities, repurpose others, and build new utilities, access and equity, quality, and interoperability, as well as sustainability, should guide all designs and initiatives.

Existing public-purpose utilities with broad support and reach

E-Rate

Solving the internet access problem

The FCC's $4.5B E-Rate program is an important example of a public-purpose utility that has made broadband internet more affordable – and therefore more accessible and equitable. Since 1996 and with bipartisan support, schools and libraries have used E-Rate funding to receive discounts ranging from 20% to 90%, based on poverty levels, with the highest- poverty schools and libraries eligible to receive higher discounts.[10] The value of E-Rate for rural areas is especially high, as US Senator Lisa Murkowski (R-AK) describes: "In my state and many rural states, internet is spotty at best. And we can give the kids as many laptops as they want, but if it doesn't connect, it doesn't get them anywhere. We know that E-Rate is what provides support to our school districts in so many rural areas."[11] Currently, a court case threatens E-Rate, calling into question its ability to function under the FCC, potentially impacting 130,000 schools and libraries nationwide.[12]

National School Lunch Program (NSLP)

Mitigating hunger so learners can learn

NSLP is another important example of existing public-purpose utilities in education. NSLP provides nutritional, low- or no-cost meals to learners each school day, and it served 28.5 million breakfasts, lunches, snacks, and summer meals every day in 2023.[13] Since 1946, the program has enjoyed broad, bipartisan support from the general public – a 2021 poll found that 74% of likely US voters supported free breakfast and lunch for all students on a permanent basis. During the pandemic, regulatory waivers permitted schools to distribute grab-and-go meals and provided higher per-meal reimbursements to help cover pandemic costs. In 2022, the Keep Kids Fed Act extended additional funds for school meal programs and waivers but put an end to the free meals that kept so many children from going hungry.[14] In the future ecosystem, it will be critical to sustain NSLP as a public-purpose utility.

These two examples of public-purpose utilities in education have existed for decades and enjoy broad support. Our ability to sustain existing public-purpose utilities like these will be critical if we are to build the learning ecosystem of the future.

Infrastructure to re-architect, redesign, repurpose

In the future learning ecosystem, we will need to think differently about some of the infrastructure and public-purpose utilities that the current education system has taken as "givens." If learning is the focus of the new ecosystem, instead of schooling, then the building blocks of our current system – standards, Carnegie units, and assessments – will need a fundamental overhaul.

STANDARDS

A quality bar to address rigor across variability of contexts

The prior era of standards-based reform institutionalized content standards that provided detailed requirements for all K-12 teachers in academic content areas. This focus on content standards as requirements, and the political process of defining them, has resulted in too many standards and controversy about which ones to follow – contributing to a hurried, narrowed, "check the box" approach to learning in which students feel bored and teachers feel burnt out. This approach leaves little time for the authentic, integrated learning that leads to deeper, long-lasting learning and skill attainment, yet the current standards-based structure is not conducive to simply tacking on these essentials. The learning ecosystem of the future will require us to let go of our concept of standards as content requirements, and to make room for interdisciplinary learning experiences, vital college and career competencies, durable skills, and social-emotional skills and mindsets.[16] More needs to be done to re-architect states' standards and connect with emergent "portrait of a graduate" frameworks, with an eye toward what can be feasibly implemented by educators. One promising, recently launched model is reDesign's , a public-purpose utility that defines nine essential skill sets for preparing young people to navigate and shape our future world.

CARNEGIE UNIT

A common unit of measure for skills and knowledge acquisition

For more than a century, the Carnegie unit has been the universal norm for organizing high school content knowledge into time-based components. Designed to efficiently track learning in comparable modules, Carnegie units emphasize "seat time" and de-emphasize learners' mastery of content. In 2022, the Carnegie Foundation for the Advancement of Teaching announced a new effort to replace the Carnegie unit with mastery-based learning experiences, creating a new building block of learning that will provide flexible pathways for students, postsecondary schools, and employers.[17] Conceiving of credentialing skill and knowledge acquisition as a public-purpose utility is essential, given its potential for near-universal impact on the learning ecosystem. Yet, if this fundamental re-engineering of the sole "public utility" currently used to define, track, and credit learning is to improve the quality and equity of learners' experiences, it will require an enormous investment of time, energy, and resources – as well as the addition of new arbiters of quality.

ASSESSMENTS

Measuring what matters for learners

Assessment of learning is crucial to understanding student mastery, competence, and progress. Yet, today's standardized assessments focus on rote content knowledge and summative, moment-in- time demonstrations in dominant content areas, thereby incentivizing some of the worst "drill and kill" aspects of the industrial education model. In a learner-centered ecosystem designed to help learners flourish in the modern world, learners will rely on assessments for vital information about their progress in developing knowledge, skills, character, and meta-learning, and assessments will need to be more humane, engaging, and meaningful to learners.[18]

Emerging public-purpose utilities we need for the future of learning

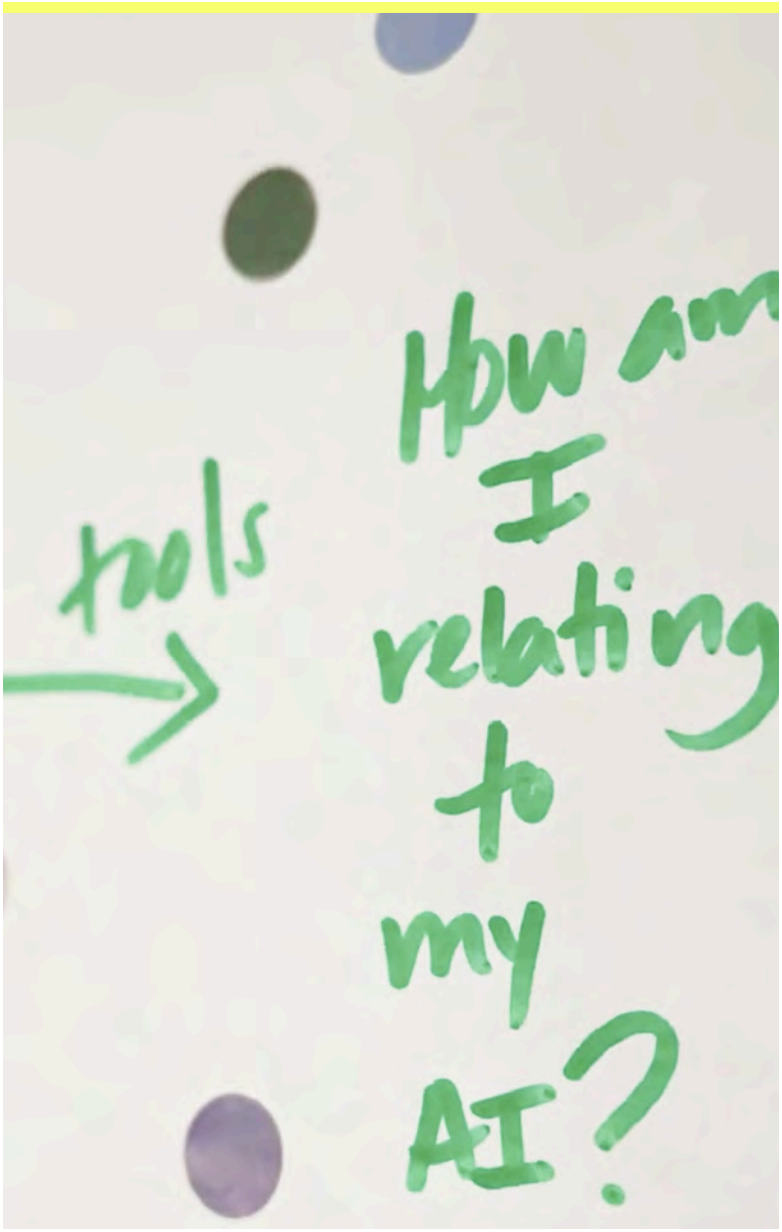
If the full potential of the future learning ecosystem is to be realized, we will need entirely new public-purpose utilities that enable learners to truly drive their own learning pathways. Some of these new utilities are beginning to emerge, and here we describe three promising public-purpose utilities: learning and employment records, transportation, and artificial intelligence tools.

Learning and employment records (LER)

Chief among the infrastructure we need for the future of learning is a tool to enable learners to track and account for learning across sites and institutions via an interoperable technology backbone. Often referred to as learning and employment records (LER), this digital public-purpose utility permits learning and work progress and mastery records to be tracked across institutions, locations, and time, and then accessed with learner permission to assess learners' abilities when pursuing education and employment opportunities. Given how important this infrastructure is, a number of education[19] institutions and third-party intermediaries are working to make LERs more widely adopted as a way to document and share individuals' skills and competencies.[20] In fact, it is a busy, fragmented LER market right now. See Appendix 3 for more discussion of the opportunities and challenges for LERs.

Transportation

The learner-centered future of education will require a new system to move learners across multiple learning sites according to their interests via a safe, and flexible, transportation infrastructure. Transportation in our current education system means buses that run on rigid schedules, constrained by bus driver shortages and high fuel costs and unable to flex to accommodate various learners' needs. Transportation schedules often dictate school start and end times and program availability, rather than learner needs. The ecosystem of the future will require a dynamic system that can transport individuals and small groups of learners to an array of learning opportunities with flexible scheduling. One emerging example is , an Uber-like, efficient alternative or complement to school buses, with flexible, personalized transportation from safety-screened drivers for just-in-time access to learning experiences. The provision of safe, affordable, reliable, and flexible transportation is a key component in ensuring that all students have access to high-quality learning opportunities – especially for students from low-income households and those with special needs.



Artificial Intelligence (AI) Tools

In the learner-centered ecosystem of the future, educators will be leveraging AI to customize learning opportunities, meet their learners' unique needs, unleash learners' potential, and make new educator tasks more doable and less time intensive so they can focus on tailoring instruction to individual learners. A new public-purpose infrastructure of AI tools and development platforms will need to emerge to not only ensure equity, access, and quality but also prioritize the human- centered development and use of tools in the new learner-centered future. One emerging nonprofit model that seeks to provide an equitable, accessible, public- purpose utility is , a nonprofit that enables leaders, teachers, and students to design AI-powered tools that save time by automating tasks.

Call to Action

Design provocations for building equitable public-purpose utilities

We are at a critical moment for action.

The creation of a new learner-centered ecosystem calls on us to balance the tensions between the individual liberty of a given learner or family with **investing in our civil society and our public good.**

The danger of not proactively attending to infrastructure and public-purpose utilities now is that without strategic development and investment, inequities not only will persist, but will grow dramatically as the system shifts. We know because we have seen this play out across traditional infrastructure and utilities. Even with more than a hundred years of public, private, and philanthropic investments in a federal system of roads, a power grid, and a supply of clean water, inequities still persist.[21]

COVID spurred momentum and public interest in a new approach to learning that better serves learners and families. But efforts in that direction do not always include prioritizing what we need to strengthen our communities, society, democracy, and economy. Post-pandemic dissatisfaction with traditional schooling has shifted mindsets and is driving more families and educators to leave in search of more flexible, authentic, relevant, personalized, and engaging learning opportunities. While this approach may help families meet an individual learner's needs better, there are considerable risks to such a privatized system – including increased societal fragmentation.

Seeds of a new, more flexible learning ecosystem have been sprouting for decades – outside the traditional system, often in private or homeschooling environments. Yet, individual seeds do not grow into equitable, high-quality systems at scale without appropriate incubation, nurturing, and support. Here, we share design considerations that will require cross-sector collaboration to collectively move us toward the future learning ecosystem all of our learners need.

Call to Action

PUBLIC AWARENESS AND DEMAND	For the ecosystem of the future to emerge, there will need to be considerable demand from stakeholders such as families, learners, and educators. Kicking off a campaign that builds public awareness about the vision for, and necessity of, a new ecosystem is a critical early step to launching the learning ecosystem.
EQUITY SAFEGUARDS	It will be vital to ensure that those who are marginalized in the current system will have equitable access to quality learning opportunities in the future ecosystem, which will require targeted and sustainable funding and continual community asset mapping to ensure learning opportunities are equitably distributed.
COMMUNITY ENGAGEMENT TO CO-DESIGN	New coalitions of "uncommon allies" – across public and private sectors, and across the political and ideological spectrum – need to be established to inform and educate ecosystem creators, stakeholders, and decision-makers.
COMMON DEFINITIONS AND CRITERIA	Establishing definitions and criteria will be critical to determining what "qualifies" as public-purpose – and, therefore, what is eligible for funding and support.
SUSTAINED PUBLIC SUPPORT, POLITICAL WILL, AND FUNDING	Preserving and strengthening existing, bipartisan, accessible, impactful public-purpose utilities will be key in establishing the learning ecosystem of the future. A critical immediate example is the need to preserve and sustain E-Rate, while updating the program to collaborate with large language model (LLM) companies and include support for the AI tools of the future. Efforts to continue to strengthen and modernize these public-purpose utilities will be pivotal to ensuring their long-term success.
TRUSTED QUALITY ARBITERS OF LEARNING	Since the new ecosystem will be much more decentralized than the current education system, it will be essential to develop trustworthy, objective arbiters that can provide the oversight needed to assess and monitor quality – and to intervene if quality metrics are not met.
COMMUNITY ENGAGEMENT TO CO-DESIGN	It is likely, perhaps inevitable, that investments from philanthropy will be needed to jumpstart the new ecosystem's creation, bringing the resources and attention that will build momentum and encourage private and public sector investments. Over time, we will need to create and support a strategic combination of the private, public, and nonprofit sectors – and likely new configurations of cross-sector partnerships. One vital near-term consideration as we build toward the future ecosystem is the relatively small portion of federal funding currently designated for public education. Shifting to a public-purpose mindset may mean that more public funding is needed, not to shore up old systems, but to create new, equity-focused elements of a new ecosystem.

Collective Action Priorities

These action steps are critical and complex but not comprehensive; our most important call to action is to prioritize more collaborative design conversations that enable us all to co-create the future-ready learning ecosystem. See Appendix 1 for a list of design provocations.

BUILD

- Public awareness and demand
- Common definitions and criteria

ESTABLISH

- Trusted quality arbiters
- Equity safeguards

FOSTER

- Community engagement to co-design Public support, political will, and funding

INCREASE

- Strategic philanthropic, private, public funding

The creation of a future-ready learning ecosystem brings with it the promise of unleashing a new generation of talent that can uplift the common good and spark an era of individual thriving across America. By building in guardrails for equity and quality **the new ecosystem can uplift our society, economy, and democracy.**

Appendix 1

Essential questions to spur collective thinking, design, and collaboration

Unless we begin building a new future-focused public education model, the steady dismantling of American public schools – and the persistence of inequities – is the future default path. Indeed, that is the path that is already unfolding.

So, what are some of the challenges and tensions that educators, school leaders, education innovators, learners and parents, tech entrepreneurs, state and federal policymakers, and philanthropic and community leaders might collaboratively tackle to move us toward a more equitable learning ecosystem? We propose a beginning set of design questions that cut across domains and sectors to guide conversations and spark collective action.

EQUITY IN ACCESS

Ensuring every student in each community (rural, urban, suburban) has access to high-quality, learner-centered, active modern learning experiences they choose

- How do all families find out about and access the high-quality learning opportunities available around them that best fit their learners?
- If fees are required for some learning opportunities, for what and when are they palatable? If so, would need-based subsidies be required, perhaps for those with learning differences?

GOVERNANCE

Mechanisms for overseeing and making decisions about infrastructure providers

- Is a universal definition needed for a “public-purpose utility”? Should it include criteria that guide the setup of utilities so that there is a quality standard – one that emphasizes “public-purpose”?
- What new systems might be needed for the oversight of public schools? Will the concept of “school districts” need to be expanded and more flexible? Or will a new model emerge, perhaps one that spans across regions and state lines, or even into new countries?

Appendix 1

THE ROLE OF PRIVATE, PUBLIC, AND PHILANTHROPY

Aspects of the infrastructure and public-purpose utilities spurred by philanthropy or provided by the private sector, the public sector, nonprofits, and/or public-private partnerships

- If philanthropic funding jumpstarts the funding of infrastructure and utilities, where should public funding be primary? For longer-term sustainability? To ensure equity? For utilities and infrastructure that will not be profitable?
- If the private sector builds, delivers, provides – then what happens when the market changes, when providers are acquired, dissolved, etc.?

COLLECTIVE ACTION, COMMUNITY ENGAGEMENT, CROSS-SECTOR COLLABORATION

Creating an inclusive approach in which diverse perspectives, communities, and sectors engage in a collaborative process

- How do we effectively connect technical expertise with local community and stakeholder insights and needs?
- How might we engage communities in asset mapping, developing an understanding of gaps between existing and needed infrastructure and utilities, and a plan for filling those gaps in ways that are consistent with community priorities?

These questions and more will need to be addressed by cross-sector coalitions of public, private, and philanthropic leaders – for and with the stakeholders who will rely on the infrastructure and public- purpose utilities to support their learning.

Appendix 2

Public-Purpose Utility Examples from Other Sectors

The education ecosystem of the future will depend upon the development of public-purpose utilities – like those we have funded in the past – to ensure access to buildings/facilities, transportation, high-speed internet, and learning technology. Below are some examples from other sectors.

Energy

A widely accessible energy grid – composed of a mix of public and private entities, from major regional electric utility companies and their power lines to privately owned corporate gas stations or more recently branded non-standardized electric car charging stations – delivers the energy we need for light, heat, air conditioning, and refrigeration and the electricity that powers our technology, vehicles, and public transportation systems. At various important moments, public investments and interventions like the Tennessee Valley Authority or the Hoover Dam project brought the public good equity and accessibility interests to bear on this largely private sector industry. Current efforts to support energy as a public good focus on things like the need to address the climate crisis by providing public incentives to the private market to invest in renewable or non-polluting energy sources, as well as new equitable infrastructure investments such as electric vehicle charging in areas not prime for private investment.

Communications

From telephone landlines to TV cables and cell phone towers, we have a wide-ranging infrastructure to support our communications needs. A particular kind of public-purpose in communications was once addressed by the Fairness Doctrine and common decency, but as social mores shifted and legal precedents moved, this public good was relinquished to the private sector – for better or worse. Our expectations about prioritizing public goods in the communications sector are evolving, with the FCC attempting to articulate and navigate the boundaries between public vs. private good, across the digital spectrum. Still, the serves as an abiding example of public-purpose utility, providing government emergency services with the ability to take over the private infrastructure of cable lines, cell towers, and telephone lines to communicate necessary emergency information in the interest of public safety.

Transportation

An interconnected system of accessible roads and highways continues to be one of the most critical pieces of US infrastructure. The system is owned and operated mostly by various public entities from towns to states and the federal interstate highway commission. These public investments ensure the efficient transfer of goods across state lines, which is critical to our national economy, and they are available for safety or military transport should the need arise. They contribute to US population expansion, providing access to a diverse workforce and employment opportunities; connecting urban, suburban, and rural communities; and providing safety transportation as needed. Because of these benefits, in some areas of the country, the public has defined a public-purpose utility to include an efficient, reliable public transportation system as a critical component of a thriving economy.

Appendix 2

Public-Purpose Utility Examples from Other Sectors, cont.

If our new education ecosystem is to ensure that all learners thrive, then it must include provisions that ensure quality learning opportunities. Models like the USDA Organic movement and ENERGY STAR provide lessons for what could be built in public education.

USDA Organic

Originally created and promoted by a consumer-based organizing effort to identify organic produce – free of potentially harmful pesticides – USDA Organic eventually was adopted and made consistent by a federally regulated organic label. Farmers and businesses claiming to be organic must meet strict standards for the growing, processing, and handling of their products. This labeling ruling ensures consumers who want organic foods receive consistent and uniform information, and thus it ensures competitive fair trade practices – by eliminating untruthful marketing. It is a meaningful public good to a big portion of the public that the label "USDA Organic" indicates that the food or other agricultural product is certified organic and has 95% or more organic content. The private sector proved untrustworthy in meeting this consumer-demanded public good, and thus public oversight became necessary.

Energy Stars

A symbol for energy efficiency, ENERGY STAR is a label that nearly 40% of Fortune 500 companies have earned to certify that they deliver cost-saving energy efficiency solutions that protect the climate, improve air quality, and protect public health. ENERGY STAR is a voluntary labeling program in which products that meet energy efficiency specifications earn the ENERGY STAR label. EPA partners with thousands of home builders, developers, energy rating companies, and utilities across the US who construct, verify, promote, and incentivize ENERGY STAR–certified products and homes.

Appendix 3

Learning and Employment Records (LER)

From Dr. Jennifer Groff of Learning Futures Global for the LearnerStudio.

An ideal LER can document learning wherever it occurs, including at the workplace or through an education experience, credential training, or military experience. It can also include information about employment history.[23] LERs, already active in the higher education and workforce sectors, hold promise for public K-12 education because they provide learners with more flexibility in their learning environment and control over information about their education and experience, making it easier for them to find new jobs or advance at their current organizations. Using LERs, candidates can pursue learning in different environments, verify their competencies and credentials for employers, and ensure they are selecting education/training providers that align their curriculum, credentials, assessments, and career services with the needs of a rapidly changing job market. Well-designed and intentionally interoperable LERs can also enable a diverse market of providers for apps, widgets, and plug-ins for things like wallets, portfolios of demonstrated learning or performance, competency assessments, badges, and other credentials.

However, there are current implementation challenges if LERs are to play a central role in the future learning ecosystem. The first is determining how LERs will be seamlessly integrated into primary/secondary education transcripts, diplomas, and other assessment tools, as well as the college gateway and admission process. LERs will need to work seamlessly across multiple postsecondary pathways. Second, the right role for the private sector in the development of LER tools, and the influence of these actors, has yet to be established – making it critical to include LERs in a conversation about what public-purpose utilities focused on the public good we need to ensure equitable access to quality LER tools during and beyond primary/secondary education. Third is the challenge of whether or how the K-12 LER will connect to and be interoperable with existing postsecondary LERs.

Endnotes

1. In the first year of the pandemic, roughly 84% of school-age children were enrolled in public schools, and by the 2021-2022 school year, enrollment had dropped to 79%; these numbers have not rebounded post- pandemic. The share of K-12 students enrolled in schools outside the traditional public school system grew by almost 4 percentage points between the 2015-2016 school year and the 2021-2022 school year. T. S. Dee (2023). Where the Kids Went; Pew Research Center (2022). A Dwindling Number of New U.S. College Graduates Have a Degree in Education; NORC at the University of Chicago (2022). Few Americans Would Encourage a Young Person to Be a Teacher; National Center for Education Statistics (2023). Roughly One in Ten Public School Principals Left Profession in 2021-22 School Year; L. Stanford, M. Lieberman, and V. A. Ifatusin (2024). Which States Have Private School Choice?
2. Brookings Institution (2023). Research on School Vouchers Suggests Concerns Ahead for Education Savings Accounts.
3. Merriam-Webster (n.d.). Infrastructure.
4. T. Rose (2015). The End of Average: How We Succeed in a World That Values Sameness; Digital Promise (n.d.). Learner Variability Project.
5. Siegel Family Endowment (2020). Infrastructure: Building the World We Deserve.
6. D. L. Schwartz and D. Arena (2009). Choice-Based Assessments for the Digital Age.
7. Siegel Family Endowment (2022). Schools as Community Infrastructure.
8. A public-benefit governance structure could, for instance, mirror the governance of some public utilities – like power companies – in which community members serve as board members, overseeing the utilities that serve them, or it could take the form of a quasi-public entity like Amtrak.
9. Electric Power Research Institute. (2019). Interoperability of Public Electric Vehicle Charging Infrastructure.
10. Federal Communications Commission (2024). E-Rate: Universal Service Program for Schools and Libraries; Universal Service Administrative Co. (n.d.). E-Rate.
11. Funds for Learning (2023). E-Rate Trends Report.
12. A. Gifford (2023). Federal Lawsuit Threatens E-Rate, Affordable Connectivity Programs; Funds for Learning (2023). More Than 130,000 Schools and Libraries Supported.
13. National School Nutrition Association (2024). School Meal Statistics.
14. K. Belsha (2023). Most Americans Support Giving All Kids Free Breakfast and Lunch at School, New Poll Finds.
15. Ibid.
16. Some examples of these are already underway, such as the Durable Skills Framework and the 4D Competencies Framework.
17. R. Ali and T. F. C. Knowles (2023). Credit Hours Are a Relic of the Past. How States Must Disrupt High School – Now.
18. Fortunately, several promising initiatives are underway, including the Education Testing Service (ETS) and the Carnegie Foundation for the Advancement of Teaching Skills for the Future, XQ's Student Performance Framework, NGLC's Full Spectrum of Evidence toolkit, One Stone's Growth Transcript, and the Center for Curriculum Redesign's 4D Framework and Competencies.
19. LERs are similar to or also referred to as a comprehensive learner record (CLR) and interoperable learning record (ILR). CLRs seek to capture, record, and communicate learning when and where it happens in a student's higher education experience; this includes learning from courses, programs, and degrees, as well as experience outside the classroom that helps students develop career-ready skills and abilities (often known as co-curricular learning).
20. Learn & Work Ecosystem Library (n.d.). Comprehensive Learner Records (CLRs).
21. In fact, it is only in the past decade that most states' energy utilities have incorporated "equity" as a primary component of their missions – an acknowledgement that while "fair distribution of the benefits and burdens of energy production and consumption" is the goal, it has yet to be achieved. See GRID Modernization Laboratory Consortium, US Department of Energy (2021). Advancing Equity in Utility Regulation.
22. In the United States, education spending falls short of benchmarks set by international organizations such as UNESCO. The US puts 12.7% of public funding toward education, well below the international standard 15%.
23. T3 Innovation Network (n.d.). Intro to Learning and Employment Records.