A Renaissance of Wonder
Supporting Creativity through Digital Media and Learning

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Acknowledgements

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Introduction

America’s system of learning is undergoing dramatic transformation as the demands and influence of the 21st century take hold. In Pittsburgh, philanthropy is working to drive innovation by working with educators and community leaders to stimulate new models of learning. Pittsburgh boasts numerous programs and projects that explore the intersection of technology and learning where educators and leaders at all levels are participating in the transformation.

GFE’s visit to Pittsburgh revealed a city where the education system is being reinvented with innovation and technology. GFE members experienced firsthand the promise of digital media and a glimpse at the world of learning in 2025. Here are some possible features:

- Customizable and personalized learning pathways based on student needs, abilities and learning styles
- Deeper interdisciplinary collaboration for educators and students
- Redefined roles for teachers to support these new learning pathways
- Learning environments that leverage partnerships between community organizations and institutions of higher education
- Anywhere, anytime technology-supported learning
- New governance systems that support new learning models
- Improved connections between education and economic systems
- Learning opportunities not limited by geography

The Pittsburgh visit was part of GFE’s Innovation Series. Launched in 2010, the learning series explores the most effective strategies and practices that support and prepare students for new models of learning and uses the spirit of innovation to make constructive changes to education. The Innovation Series, guided by GFE’s 10 Pathways to a New World of Learning in 2025, explores these strategic pathways as critical areas for funder investment (see page 10). In Pittsburgh, we explored the promise of digital media.
Why Pittsburgh?
We are fortunate to have a disproportionately large philanthropic community for a city of our size, and we’re lucky that these foundations have maintained their local focus.”

—Jared Cohon, President, Carnegie Mellon University

Pittsburgh is a city transformed by persistence and innovation and today finds itself exploring the very frontiers of technological and digital capabilities for learners of all ages. Well known for its world class research universities, local cross-sector leadership and well-resourced philanthropic community, Pittsburgh has embraced creativity, digital media and technology while staying focused on student-centered learning, engagement and achievement—from preK to career. Deep engagement and collaboration among all its sectors has allowed Pittsburgh to rebound from its collapse in the early 1980s to become a globally competitive city that’s on the leading edge of innovation.
Pittsburgh’s modern identity is increasingly defined by a collaborative, multi-disciplinary, cross-sector ecosystem that links education to economic opportunity, innovation to social change, and technology to learning. Led by two world-class universities—Carnegie Mellon University and the University of Pittsburgh—and a historically strong, locally focused philanthropic community, this ecosystem is an energized web of interconnectivity.

The philanthropic community has played, and continues to play, a catalytic role in driving innovation and change in Pittsburgh. Established philanthropic entities such as The Heinz Endowments, The Pittsburgh Foundation, The Grable Foundation, and the Claude Worthington Benedum Foundation, among others, serve as advocates for education and innovation, and provide opportunities for the city to build on its strengths and to pursue cutting-edge agendas linked to the future of learning.

“Without Carnegie Mellon’s presence in this community, there would be no Kids+Creativity movement.”
—Gregg Behr, Executive Director, The Grable Foundation

On the ground, innovation and creativity are also supported by The Sprout Fund, a local nonprofit organization that sponsors Spark, Pittsburgh’s Kids+Creativity Network. This network, in operation since 2007, is a kids-focused movement that fosters formal and informal learning both in and out of school. It is comprised of more than 400 innovators—people, projects and organizations—committed to “building a regional learning network” driven by new ideas that move quickly from concept to implementation. The Spark Fund ignites collaboration throughout the region, fostering relationships and partnerships to support learning, and new approaches to learning, for students of all ages. Numerous philanthropic partners support The Sprout Fund, including Pittsburgh’s leading regional foundations, corporate and individual donors, giving the organization the ability to provide seed funding—the average grant size is under $10,000—for creative and innovative projects using technology, media and the arts.

While Carnegie Mellon University has been a critical partner in Pittsburgh and consistently paves the way for pioneering projects that attract philanthropic investments, local philanthropic leaders have been central to supporting the Pittsburgh ecosystem, working to give it structure and shape with more refined portfolios of activity related to educational initiatives. They have been willing to take risks and operate with a sense of urgency, one that reflects a rapidly changing culture driven by evolving technologies.

Additional organizational leaders in the region support formal and informal learning opportunities. The Fred Rogers Center is an internationally recognized institute that promotes early childhood development and creates programs to support media-based learning. The Center for Creativity, Arts and Technology, a program operated by the Allegheny Intermediate Unit (a regional educational service agency serving 43 school districts in western Pennsylvania), provides support and professional development to educators integrating arts and sciences using new technologies.

Together, the collective efforts of individuals working in numerous capacities have given momentum to change through innovation. The collaborative, progress-oriented and deliberate nature of the efforts continues to take a more structured form. As the methodology and process becomes more established and productive, the likelihood of achieving concrete results for children and families improves.
Digital Media Is Transforming Education

Technology, when paired with effective pedagogy, can improve student engagement and learning. Peer-to-peer learning, for example, can be an effective way to teach narrative structure, the social use of language, and aspects of storytelling. Code switching—the ability of individuals to move between two or more dialects such as Mainstream American English and African American English—can be taught by code-switching peers. And technology can help. Avatars, virtual children, can positively impact student learning through human-computer interaction, yielding better results than human peers or adults. Using technology, students can learn how to maintain multiple dialects and more effectively engage in the classroom where Mainstream American English remains the most common language used.

These and other projects at Carnegie Mellon, such as the Computer Science Student Network (CS2N), aim to increase student interest in STEM and computer science degrees. The online network supports learning anytime, anywhere through lessons that use educational technology infused with academic concepts. Motivation and assessment are supported using a badge system, where learners can earn badges that indicate mastery of specific skill sets. Additionally, CS2N competitions use a peer review process to foster learning through peer evaluation and critique.

Learning Can Be Personalized to Improve Engagement and Achievement

Research indicates that less than 20 percent of learning for K–12 students takes place in formal learning environments, leaving 80 percent of student learning happening elsewhere. Skills and passions developed in children through informal learning experiences supported by parents and families typically translate into both adulthood and professional careers.

Research scientists at the University of Pittsburgh’s Learning Research and Development Center (LRDC) focus on what learners need to succeed in science and education by exploring the link between formal education experiences and out-of-school (informal) learning. LRDC scientists are working to answer specific questions about the needs of learners: When and how does “activation” begin, and how can educators help provide experiences that impact choices later in life? How can early interests and formative experiences be more clearly understood to facilitate learning as students move from education to career?
Additionally, the development and use of interactive technologies can also refine and customize learning pathways. Intelligent tutoring systems, online courses, English learning applications for mobile technology, virtual laboratories, game environments and other tools can tailor educational experiences to individual needs and abilities. These technological advances also present research opportunities to collect data about the mystery of learning—how and why students learn—using the information to build better tools to evaluate student performance and needs.

**Technology Can Be a Catalyst That Improves Access and Supports Social Change**

Technology is being used to improve access to learning tools, reach more students and support social change. Since its first seed grant from The Grable Foundation more than a decade ago to teach robotics to children in summer camps, the National Robotics Engineering Center (NREC) has developed curriculum, software and online educational tools that expose learners to science, robotics and programming. Local philanthropic support has helped NREC expand its reach and programming, and secure millions of dollars from national and federal entities. NREC continues to operate as a change agent for formal education, developing interactive software that teaches design and animation skills, web coding, robot communications and basic engineering principles—all at no cost for students and teachers.

Carnegie Mellon’s CREATE (Community Robotics, Education and Technology Empowerment) Lab engages the community with new technologies, drives cultural transformation and strengthens technical literacy in the region. CREATE Lab designs curricula and takes it to the community while training teachers, providing technical support and bringing projects to scale. The Children’s Innovation Project, for example, pairs classroom teachers in the Pittsburgh Public Schools with content specialists to engage students in the creative, hands on exploration of technology. Other projects such as the Gigapan, an image creation tool, and HearMe a suite of technological tools to elevate student voices, use storytelling and individualized expression to help students engage with the world around them.

The Entertainment Technology Center (ETC), also housed at CMU, is a globally active program that develops interactive media for both entertainment and education. Graduate students develop interactive games and programs and then develop partnerships with local organizations and schools to put them to work. Learners of all ages have engaged with projects initiated by ETC to learn scientific principles, US history, 3D modeling, robotics, biology, programming and more.
Learning from Pittsburgh

Leaders Must Take Risks and See Where the Work Takes Them

Visionary, effective leadership is at the heart of the Pittsburgh ecosystem, and educational, philanthropic and business leaders frequently drive innovation, implement new ideas and engage a wider sample of the community in their effort. At CMU, philanthropy has influenced a significant number of technology-based projects. Grantmakers have engaged not simply as investors, but as mentors and thought partners willing to take strategic risks linked to pioneering research, technology and pedagogy. This approach further reinforces the “maker-culture” embraced in Pittsburgh today, where doing and exploring leads to creative innovations.

“We don’t want it to be one child, one screen, one mouse. We want multiple children collaborating, because collaboration is the way to make learning happen.”
—Justine Cassell, Director, Human-Computer Interaction Institute

The Open Learning Initiative (OLI), spearheaded by Carnegie Mellon, was developed in partnership with The William and Flora Hewlett Foundation, the Kresge Foundation and the Spencer Foundation. This project represents yet another effort to change the education landscape by offering free, college-level online courses built by teams of content experts, learning scientists, and interaction design specialists. Granular data are collected through student interaction with technology, further exploring what happens when people learn. The project has paved the way for additional investment from the Bill & Melinda Gates Foundation and the Lumina Foundation to spearhead similar technology with courses for community college students.

A related project called the Pittsburgh Science of Learning Center (PSLC) was developed in a partnership between Carnegie Mellon University, the University of Pittsburgh, corporate partners and the National Science Foundation. Scientists study what happens cognitively when students engage and learn through online learning environments built using cognitive psychology, computer science and design principles. Data are collected to improve technology-based evaluation that measures student engagement, actions and thinking through and with technology, all in an effort to maximize learning.

CMU, however, recognizes that the technology employed at OLI and PSLC is in its infancy. While the goal is to expand online courses, collect valuable data and improve research on the science of learning, the road ahead contains many unknowns.
Try, Innovate and Create: Sometimes We’ll Fail, Sometimes We’ll Succeed

Pittsburgh’s Benedum and Grable foundations have stimulated innovation in dozens of schools with STEAM grants—STEM-related mini-grants infused with the arts, creativity and technology—to explore new models of learning and student engagement. Education leaders also reach out to community partners such as Carnegie Mellon and the Entertainment Technology Center to explore new technologies and ways for students to learn.

“Learning results from what the student does and thinks, and only what the student does and thinks.”
—Herbert Simon, Carnegie Mellon University

CAPA, the Pittsburgh School for the Creative and Performing Arts, is a magnet school that offers a comprehensive education through arts instruction and excellence. Students dedicate themselves to the process of creative practice in order to improve their skills and explore the edges of their craft. This is a valuable model for education leaders and grantmakers working to shape the future of learning today. Innovation requires a commitment to the creative process, one that can be supported by a community of peers and partners to support the work. Philanthropy is uniquely positioned to work with the raw materials in a community, evaluate needs and gaps, and assume leadership roles other institutions cannot. These process-focused efforts means success cannot be predicted, some projects will fail while others succeed, and innovation occurs through persistent, often incremental, efforts that build on what exists, focus on craft and move the needle of progress forward.

Learning from Pittsburgh

Top: Upper Saint Clair Pollinator Restoration and Education Program

Bottom: Digital Discovery Room at Carnegie Museum of Natural History
Connecting kids with museum naturalists via web-based media sharing, lets young citizen scientists contribute to museum archives.
Learning from Pittsburgh

Technological Innovations Will Shape the Work of Education Grantmakers

Investing in technology and digital media as educational tools is increasingly important for education grantmakers. Technological innovations are not only changing how educators and students engage, but transforming classrooms, pedagogy and student opportunities. The range of investment options is extraordinary, and exploring the Pittsburgh ecosystem shed light on practical examples for education funders seeking to influence the world of learning.

Key strategies for education grantmakers:

• Take strategic risks and be willing to “fail forward” when investing in promising digital media
• “Lead boldly” to shape education reform efforts linked to innovation
• Serve as catalysts, partners and mentors to take projects from ideas to implementation
• Map local assets, optimize strengths and capitalize on existing resources to develop and cultivate constructive initiatives
• Use applied and basic research related to learning, cognitive psychology, design, and engagement to inform investments
• Explore visionary leadership and knowledge creation at institutions like Carnegie Mellon University where the future of learning may already exist but depends on the process of bringing it to scale

The Sprout Fund: STEAM Studio at Crafton Elementary School
Hands-on learning that blends creative arts practice with science, technology, engineering, and mathematics.
Looking Forward, Acting Now

“It’s my hope that in 10 to 20 years we’ll find that we were making some right bets about the future, about the future of learning, about how kids learn and how to engage them in remarkable ways, ways that contributed to their grit, to their lifelong learning, and to the economy here in southwestern Pennsylvania.”
—Gregg Behr, Executive Director, The Grable Foundation

Technological innovations present tremendous opportunities to transform and support learning, to improve student access, engagement, opportunity and achievement. Increasingly, leaders and educators embrace the energy and excitement surrounding creativity and innovation because it’s clear our historical efforts have become outdated and are no longer effective. Embracing creative thinking and ideas unleashes possibility, as well as the potential to address issues in concrete ways that impact students, families and entire communities. New technologies, however, can only be used constructively if supported by people and communities committed to putting them into action in ways that support all students.

Pittsburgh’s network of collaboration is driven by a community that is clear about its natural strengths, has well-orchestrated and compelling leadership, works in concert with one another and is willing to take smart risks.

The dedicated efforts are meant to effect lasting change, not just for learners and systems of education, but for the region and economy as well. The conversation about the future of learning has already begun, resulting in ideas linked to action. Challenges include developing stronger relationships and partnerships between the Kids+Creativity Network and the Pittsburgh Public Schools, and addressing issues of scalability for projects and programs that are effective. But the fact that work remains only reinforces the idea that the spirit of innovation requires a focus on the process of change, on a culture of continuous improvement, and on creative ideas and bold actions that relate to a common vision—one that supports all learners in the 21st century and beyond.

As our technology-infused culture evolves, more collaborative, experiential and creative practices will impact our education systems and our national identity. Given these changes, it is important that grantmakers of all shapes, sizes and interests consider the intersections between technology, innovation, the future of learning and their present grantmaking strategies, looking forward and acting now. The year 2025 is close at hand. GFE’s 10 Pathways to a New World of Learning in 2025 (listed below) represent an effort to guide investments for education grantmakers as they shape learning environments and meet education challenges for future generations.

10 Pathways to a New World of Learning in 2025:
High-leverage Avenues for Investment

1. Framing a research agenda for continued improvement of learning
2. Defining 21st-century critical skills and knowledge—and setting these as outcomes for education
3. Prototyping and scaling new models of learning
4. Fostering personalized learning in a community context that extends beyond traditional schools
5. Delivering on the promise of digital media
6. Reimagining assessments of—and for—learning
7. Defining new governance models tailored to the particular learning contexts where they operate
8. Innovating funding mechanisms to enable greater choice, equity and/or new learning models
9. Fostering public will for new kinds of learning and new learning outcomes
10. Advocating policy that enables new kinds of learning and new learning outcomes
Pittsburgh’s Digital Media Tour

GFE visited key sites in Pittsburgh that serve as hubs for the creative and digital media ecosystem.

1. ToonSeum
   945 Liberty Avenue
2. National Robotics Engineering Center (NREC)
   10 40th Street
3. Human Computer Interaction Institute (HCII)
   5000 Forbes Avenue, CMU Campus
4. CREATE Lab
   5000 Forbes Avenue, CMU Campus
5. Entertainment Technology Center (ETC)
   700 Technology Drive, CMU Campus
6. The Children’s Museum of Pittsburgh
   10 Children’s Way, Allegheny Square
7. Pittsburgh School for Creative and Performing Arts (CAPA)
   111 Ninth Street
In 2010, GFE initiated a learning series designed to examine the future of learning, the role of grantmakers in shaping learner-centered education systems, and the role of innovation—as both a key function of forward-thinking grantmaking and an important strategy for transforming learning environments in the 21st century. In this effort, GFE has worked to more clearly define a new world of learning in 2025 and beyond, as well as pertinent investment pathways for education grantmakers.

As the series has continued, GFE has recognized a growing emphasis on collective action and collaboration to effect systemic improvements to education in communities across the United States. As grantmakers work to align and coordinate efforts, to stimulate student-centered innovation, GFE increasingly strives to locate the work of the philanthropic community inside a larger network of dedicated partners, those who can wholly embrace strategies and practices that support America’s learners on the path to successful education experiences and careers.

San Francisco, April 2010
Innovation in Education: Redesigning the Delivery System of Education in America
Working to refine the concept of innovation in education, GFE set out to explore the future of learning and what it might look like, key strategies and approaches for funders working to support transformative innovations, and an initial set of investment pathways to support learner-centered education.

Chicago, September 2010
Learning2025: Forging Pathways to the Future
GFE explored theories of change held by various funders, paying attention to how they intersected and/or differed and how they described investment strategies in the coming three years. The program sought to depict the impacts of successful investments in 2025, refine core investment pathways for funders and present a strategic framework for student-centered approaches to learning.

Detroit, June 2011
Innovation 2.0: Grantmaking to Transform America’s Education Systems
GFE built on the insights from the previous two programs by diving deeper into the funder’s role in generating new solutions to problems of education practice. The program laid the groundwork for ongoing cooperation through the 10 investment pathways and addressed a new and different process for how grantmakers can advance future-oriented investments.

Pittsburgh, April 2012
A Renaissance of Wonder: Supporting Creativity through Digital Media and Learning
A place-based program focusing on Pittsburgh as an innovation ecosystem, GFE explored numerous programs and partnerships that support formal and informal learning environments. Emphasizing the role of technology and digital media in promoting creativity and learning, GFE examined how education grantmakers can be catalysts for learning that spurs curiosity, nurtures talent and supports academic success.
Grantmakers for Education strengthens philanthropy to improve outcomes and expand opportunities for all learners. As a national network of more than 280 private and public grantmaking organizations supporting education from early learning through postsecondary education, GFE provides research, programs and resources to increase funders' ability to be strategic and capable in their education grantmaking. For more information or to learn about membership, please contact us.

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