# Executive Summary

# pockets of potential

**Using Mobile Technologies to Promote Children's Learning**

Carly Shuler, Ed.M.
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The Joan Ganz Cooney Center at Sesame Workshop

The mission of the Joan Ganz Cooney Center at Sesame Workshop is to harness digital media technologies to advance children's learning. The Center supports action research, encourages partnerships to connect child development experts and educators with interactive media and technology leaders, and mobilizes public and private investment in promising and proven new media technologies for children.

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# foreword

Education policies have helped promote advances in student achievement in the past two decades, but not yet at a level suitable to prepare a U.S. workforce with the skills and knowledge demanded by universities and employers in a global economy. In some urban school districts, more than half of all students will drop out before earning their diploma. American students, more generally, are lagging behind many of our international competitors in college attendance and completion rates.

The trajectory for academic and life success is established in the preschool and primary years, when children are developing new habits for learning and social development. This is where the ubiquity of children's engagement with media is so critical. According to the Kaiser Family Foundation, children as young as eight years old spend as many hours engaging with various "screens" as they do in school. Health and development experts and concerned parents are increasingly asking whether this is a harmful phenomenon. The Center's perspective is that the primacy of digital media in children's lives is here to stay. While concerns about health and safety must be addressed, a new emphasis on the potential of digital media to aid learning, especially for low-income children, is overdue.

The report *Pockets of Potential: Using Mobile Technologies to Promote Children's Learning*, by Cooney Center Industry Fellow Carly Shuler, makes the case that our nation's leaders should not overlook the role mobile technologies can play, if well deployed, in building human capital and in helping to stimulate valuable innovation. As *Sesame Street* has proven over four decades of remarkable work, exposure to research-tested educational media starting early in life can accelerate children's skills, while producing enduring economic benefits to society.

*Pockets of Potential* argues that despite legitimate public concern about the "disruptive track record" of mobile devices in schools, there is reason to be excited about their potential. As an analysis of key industry trends, opportunities, and challenges, including small-scale studies of academic and industry projects, the paper recommends a series of urgent action steps for key sectors to consider. Of particular note are the promising innovations developed by an international group of mobile technology thought leaders — from Silicon Valley to Seoul to sub-Saharan Africa — whose pioneering work is featured in this report and its appendices.

The report joins a series of studies the Cooney Center has undertaken since launching one year ago. We hope to stimulate a new debate that will lead industry, funders, scholars, and caregivers to consider how the devices children now rely upon as their social currency may one day help them learn essential skills needed for success. As Mrs. Cooney recently noted, "Now is the time to turn the new media that children have a natural attraction to into learning tools that will build their knowledge and broaden their perspectives." Unless we do, the gulf between what children do informally and in school will widen, diminishing the educational opportunities all of our children need and deserve.

Michael H. Levine, Ph.D.
Executive Director, Joan Ganz Cooney Center at Sesame Workshop

# executive summary

Just as *Sesame Street* helped transform television into a revolutionary tool for learning among young children four decades ago, advances in mobile technologies are showing enormous untapped educational potential for today's generation.

This report, undertaken by the Joan Ganz Cooney Center at Sesame Workshop, draws on interviews with a cross-section of research, policy, and industry experts to illustrate how mobile technologies such as cell phones, iPod devices, and portable gaming platforms might be more widely used for learning. More than half of the world's population now owns a cell phone and children under 12 constitute one of the fastest growing segments of mobile technology users in the U.S. Examining over 25 handheld learning products and research projects in the U.S. and abroad, the report highlights early evidence and examples of how mobile devices may help re-define teaching and learning in the decade ahead.

## The current state of mobile learning

As mobile technologies become increasingly prominent in the lives of children worldwide, national ministries and local schools are experimenting with the use of these popular devices for a range of different teaching and learning purposes. This report presents an inventory of more than 25 handheld learning projects in the U.S. and beyond. It shows how mobile devices can help promote the knowledge, skills, and perspectives children will need to compete and cooperate in the 21st century. Projects focusing on deepening children's mastery of key literacy, world languages, STEM (Science, Technology, Engineering, and Mathematics) subjects, collaboration, and critical thinking skills, both inside and out of school, are featured.

The inventory highlights numerous inspiring examples of mobile learning. Some employ the most innovative features of mobile devices; others rely on more standard ones. Some capitalize on the personalization capabilities of handheld technologies; others show how these devices can encourage collaboration when used by a team. Some exploit mainstream devices, others use devices developed specifically for education. While this diversity opens up future opportunities, it also reveals tensions in the field of mobile learning, with consequent trade-offs on issues such as distribution vs. innovation and mass-market vs. education-specific.

Our experts were disappointed by the lack of well-financed, coherent, or highly visible efforts in mobile learning in the U.S., compared to our economic competitors, especially in Europe and Asia. Education leaders, perhaps sensing limited public or policy support, have not yet developed a strategy on how mobile learning should be deployed, or even if it should be used at all. Model initiatives are fragmented and lack resources to scale up. While notable efforts have spawned innovative "pockets" of mobile learning, multi-sector leadership is needed to connect disparate efforts in educational research, industry, teacher professional development, and policy-making.

## Key opportunities in mobile learning

The report highlights five opportunities to seize mobile learning's unique attributes to improve education:

*1. Encourage "anywhere, anytime" learning*
Mobile devices allow students to gather, access, and process information outside the classroom. They can encourage learning in a real-world context, and help bridge school, afterschool, and home environments.

*2. Reach underserved children*
Because of their relatively low cost and accessibility in low-income communities, handheld devices can help advance digital equity, reaching and inspiring populations "at the edges" — children from economically disadvantaged communities and those from developing countries.

*3. Improve 21st-century social interactions*
Mobile technologies have the power to promote and foster collaboration and communication, which are deemed essential for 21st-century success.

*4. Fit with learning environments*
Mobile devices can help overcome many of the challenges associated with larger technologies, as they fit more naturally within various learning environments.

*5. Enable a personalized learning experience*
Not all children are alike; instruction should be adaptable to individual and diverse learners. There are significant opportunities for genuinely supporting differentiated, autonomous, and individualized learning through mobile devices.

## Key challenges in mobile learning

A number of critical challenges must be addressed to unleash the educational potential of mobile technologies. Five key challenges outlined in the report include:

### *1. Negative aspects of mobile learning*

Cognitive, social, and physical challenges must be surmounted when mobile devices are incorporated into children's learning. Disadvantages include: the potential for distraction or unethical behavior; physical health concerns; and data privacy issues.

### *2. Cultural norms and attitudes*

Though many experts believe that mobile devices have significant potential to transform children's learning, parents and teachers apparently are not yet convinced. A 2008 study done by the Joan Ganz Cooney Center in collaboration with Common Sense Media found that most teachers see cell phones as distractions and feel that they have no place in school.

### *3. No mobile theory of learning*

Currently, no widely accepted learning theory for mobile technologies has been established, hampering the effective assessment, pedagogy, and design of new applications for learning.

### *4. Differentiated access and technology*

Wide diversity among mobile technologies represents a challenge for teachers and learners who wish to accelerate academic outcomes as well as the producers who seek to facilitate such learning.

### *5. Limiting physical attributes*

Poorly designed mobile technologies adversely affect usability and can distract children from learning goals. Physical aspects of mobile technologies that may prevent an optimal learning experience include: restricted text entry, small screen size, and limited battery life.

## Relevant market trends and innovations

The mobile market is one of the most rapidly evolving industries in the world. Over the last decade, as power and functionality has increased, device size and price has decreased. The report outlines a number of market developments that could have the greatest impact on children's learning:

### *Extreme convergence*

Almost all cell phones are now built with features that used to be the expensive add-ons, such as color screens, cameras, and mobile web. There is also a move from "feature phones," on which certain functions like making a call or taking a picture can be performed, to smart phones that have an operating system just like a computer.

### *Location, location, location*

By October 2009, about half of the phones in the U.S. will have GPS, and there are other emerging technologies that enable mobile devices to receive location-based data. The educational potential enabled by these applications — especially when used in combination with social networking applications — are significant.

### *Consolidation at last*

It has been extraordinarily difficult to develop software applications for mobile phones due to proprietary platforms, and the mobile phone industry has been slow to address this problem. Now, through mobile operating systems — some of which are open-source — a number of different platforms are consolidating.

### *The 21st-century button*

Users have traditionally interacted with mobile devices via buttons and keypads, which prevent children from achieving full control of pocket-sized devices. Developments in touch screen and gestural input may significantly improve the way children interact with mobile devices.

## Goals for mobile learning

The report outlines five goals — learn, develop, promote, prepare, and stimulate — and an action plan to transform mobile learning from a state of uneven and scattered innovation into a force for dynamic educational impact.

### *1. Learn: Understand mobile learning as a unique element of education reform*

Handheld technologies and their learning applications require a systematic research inquiry to determine how they can become an important driver of technology integration in education. Public and private sector support for needed R&D should:

- ***Invest in understanding the development of "mobile kids"*** – Researchers, educators, and parents have entered new territory in digesting the implications of children's ubiquitous involvement with technology. Key developmental and health issues should be carefully researched.

- ***Develop new theories and models for leveraging mobile technologies*** – Existing applications of mobile learning tend to employ design and evaluation principles taken from traditional or e-learning theories. This results in "mobile versions" of established approaches and fails to take into account the unique affordances of learning through mobile technologies.

- ***Learn from other countries*** – Mobile education offers an interesting case for cross-national learning and collaboration. Developed nations have the opportunity to learn from developing countries, where program developers have little or no track record of e-learning to contend with and are skipping immediately to mobile technologies because of their low cost and ubiquity. In addition, some European and Asian countries have large-scale, government-funded mobile learning initiatives.

### *2. Develop: Build mobile learning interventions*

Mobile devices have features that are distinctive, and developers of applications must leverage unique mobile assets and surmount special challenges. Industry should be given more powerful incentives to:

- ***Design educational innovations to capitalize on unique affordances of mobile*** – It is entirely ineffective to take educational applications that have been developed for a big screen and simply shrink them down to be used on mobile devices. Developers need to discern what is special about mobile devices and design interventions that take advantage of those attributes.

- ***Counter the disadvantages and limiting physical attributes of mobile devices*** – Mobile technologies have numerous disadvantages (e.g., can be distracting) and limiting physical attributes (e.g., difficult text entry) that — if not taken into consideration — might detract from the learning experience.

- ***Avoid constant defaults to the latest technology*** – In order to develop scalable models, it is important to emphasize features that will become ubiquitous. Relying on features that are more common on less-expensive phones will help ensure that mobile technologies can help close rather than amplify the digital divide.

- ***Create development tools for educators*** – Most development tools are oriented toward industry and computer scientists, and not accessible to educators or learners. Once there are more practical tools that conform to how educators design instructional materials, the opening up and consolidating of cell phone platforms could greatly accelerate the use of mobile devices for children's learning.

### *3. Promote: Engage the public and policy-makers in defining the potential of mobile devices for learning*

Though numerous studies and a growing number of experts believe that mobile devices have significant potential to transform children's learning, most parents and teachers do not yet view these devices as educational allies. To promote public understanding and prepare for the effective use of such devices, government, industry, and philanthropic organizations should expand resources to:

- ***Scale up and disseminate innovative exemplars of mobile learning*** – Federal and state education agencies should place priority on identifying and disseminating mobile technology and learning innovations that can advance educational goals. A national "best practices" initiative to disseminate effective uses of mobile technology for education should be established with support from philanthropic and policy leaders.

- ***Provide incentives for needed infrastructure*** – To help economize and accelerate school adoption of mobile devices, we must move away from an approach in which schools exclusively provide educational hardware and introduce ways to use the mobile devices many children already own. For students from low-income households, we should press forward with expansion of needed infrastructure, including new investment in E-Rate, to achieve digital equity.

- ***Develop educational standards for industry*** – As mobile applications for children's learning proliferate, federal regulatory bodies, industry groups, and parent advocates should collaborate on a consumer protection initiative to better describe educational effectiveness in interactive media products for children.

### *4. Prepare: Train teachers and learners to incorporate mobile technologies*

Often the bulk of spending in incorporating technology into education is on the technology itself; however, preparing teachers and learners to use these technologies effectively should be a higher priority. National, state, and community leaders should:

- ***Build capacity: Digital teacher corps*** – Teachers cannot teach what they do not know, and most have not been trained to use new technologies in their classrooms or afterschool settings. It is not just a matter of showing teachers how to use the devices; rather, it is crucial to provide them with methodologies for ways in which they can incorporate technologies within their curriculum. Professional development is essential to the future of mobile learning. To build professional capacity, we recommend the creation of a "digital teacher corps," which would be established to enable educators to help students learn to transform information for discovery and problem-solving by working with a range of digital media.

- ***Modify and gradually eliminate classroom bans*** – Most school districts limit cell phone use in classrooms and some have banned their use altogether. We recommend the gradual introduction of mobile devices in schools. By devising established norms of behavior, we can build acceptance among teachers, parents, and students themselves to discover mobile devices' educational value.

- ***Integrate mobile themes in media literacy curricula*** – State and school leaders should educate students on mobile etiquette and capabilities, expanding media literacy to include a new "mobile literacy."

### *5. Stimulate: Generate new leadership support for digital learning*

As a new administration that has committed to improving education and rebuilding public infrastructure for economic renewal begins, we recommend that priority be placed on how mobile technologies in particular, and digital media more generally, can advance children's learning in the global economy. The new administration should:

- ***Create a White House Initiative on Digital Learning*** – The President and new administration should develop a White House Initiative on Digital Learning, beginning with an audit of current government investments in digital technologies for learning. The report also calls for a White House Summit and a digital investment fund to accelerate education reform and promote mobile innovation to help benefit the economy.

Mobile devices are an integral part of children's lives and they are here to stay. The social and cultural phenomena, market opportunity, and, most importantly, the "pockets of educational potential" documented in this report must not be dismissed. Our national debate must shift from *whether* to use these devices to support learning, to understanding *how* and *when* they might best be used. Just as *Sesame Street* introduced generations of children and their families to the potential of television as an educational medium two generations ago, today's children will benefit if mobile becomes a force for learning and discovery in the next decade.

# list of interviewees

For the purposes of this report, we interviewed experts who are directly involved in the research, design, development, or implementation of educational mobile technologies for children. We would like to thank the following interviewees for taking the time to share their experiences with mobile learning, as well as their hopes and concerns for its future.

- Richard Beckwith, Research Psychologist, People and Practices Research Group, Intel
- Cornelia Brunner, Deputy Director, Center for Children & Technology
- Warren Buckleitner, Founder and Editor, *Children's Technology Review*
- Linda Burch, Chief Program and Strategy Officer, Common Sense Media
- Jan Chipchase, Principal Researcher, Nokia Research Center
- Katherine McMillan Culp, Senior Research Scientist, Center for Children & Technology
- Sébastien Doré, Line Producer, Games for Everyone, Ubisoft
- Allison Druin, Director, Human-Computer Interaction Lab; Associate Professor, College of Information Studies and Institute for Advanced Computer Studies, University of Maryland
- Jim Gray, Director of Learning, LeapFrog
- Shawn Gross, Project Director, Project K-Nect
- Mizuko Ito, Research Scientist, University of California, Irvine
- Eric Klopfer, Associate Professor and Director, MIT Scheller Teacher Education Program
- Liz Kolb, Adjunct Assistant Professor, Madonna University
- Okhwa Lee, Professor, Chungbuk National University (South Korea)
- Chee-Kit Looi, Associate Professor, National Institute of Education, Nanyang Technological University (Singapore); Head, Centre of Excellence in Learning Innovation
- Mark Nieker, President and Executive Director, Pearson Foundation
- Roy D. Pea, Professor, Stanford University; Co-Director, Stanford Center for Innovations in Learning
- Marc Prensky, Author, Speaker, and CEO, Games2train; www.marcprensky.com
- Glenda Revelle, Vice President for Education and Research/Creative Development and Digital Media, Sesame Workshop
- Yvonne Rogers, Professor, Open University, UK
- Jeremy Roschelle, Director, SRI International
- Mike Sharples, Professor of Learning Sciences and Director of the Learning Sciences Research Institute at the University of Nottingham, UK
- Elliot Soloway, Arthur F. Thurnau Professor, University of Michigan
- Kurt Squire, Assistant Professor, University of Wisconsin-Madison; Co-Founder and Director of Games, Learning, and Society Initiative
- Dan Sutch, Learning Researcher, Futurelab
- John Traxler, Reader in Mobile Technology for e-Learning; Director, Learning Lab, University of Wolverhampton
- Scott Traylor, Founder and Chief Kid, 360KID
- Célia Hodent Villaman, Manager, Strategic Innovation Lab, Ubisoft
- David Whyley, Consultant Headteacher, Learning2Go, Wolverhampton

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Carly Shuler is a researcher, developer, and author in the children's media and toy industry. Currently, she is a Fellow focused on industry initiatives and research at the Joan Ganz Cooney Center at Sesame Workshop. Throughout her career, Carly has worked with a host of children's media and entertainment groups, including Sesame Workshop, Spin Master Toys, the Michael Cohen Group, and WGBH. She holds a master's degree in Technology, Innovation, and Education from the Harvard Graduate School of Education, where she studied how media and technology can be used to educate children effectively. Carly is passionate about the magic that happens when fun, research, and education converge, and is dedicated to working on quality children's products that inspire thought and creativity. Carly can be contacted at carly.shuler@sesameworkshop.org.

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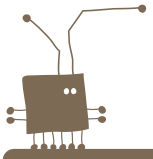

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