About the Authors

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Forward

The 2020 Forecast: Creating the Future of Learning (the forecast) is the second future forecast created by KnowledgeWorks Foundation with the Institute for the Future. Continuing a partnership that began with the publication of the first forecast, 2006–2016 Map of Future Forces Affecting Education, Mid-continent Research for Education and Learning (McREL) and KnowledgeWorks offer this policy brief as part of a series designed to engage leaders in co-creating the future of learning, resulting in high academic achievement and improved life outcomes for all students and transforming the world of schooling into a world of learning. The partnership also aims to promote greater understanding among the national education community about the external forces impacting learning today and in the future, in areas such as demographics, technology, economics, globalization, and policy.

The 2020 Forecast explores how future forces are pushing educators to become more active than ever in creating a future that meets the needs of all learners. It posits that, over the next decade, most innovations in education will take place outside of traditional institutions. If this is true, what is the role of policy in creating the future of learning? Rather than watching from the sidelines as these innovations develop at the grassroots level in communities around the nation, KnowledgeWorks and McREL propose that policymakers engage proactively in creating a new system of learning, developing policy platforms that can help take promising innovations to scale and move the entire learning enterprise closer to achieving its goals.

Proactive policy responses to change enable an organization not only to adapt to future conditions but also to play a role in crafting the future, especially in times of great uncertainty. These policy briefs speak to policymakers who are similarly committed to shaping the future of learning through policy. This series of briefs explores the six drivers of change presented in the forecast: A New Civic Discourse, Platforms for Resilience, Pattern Recognition, Amplified Organization, The Maker Economy, and Altered Bodies. The first brief, Building Policy Platforms for Resilience, called upon policymakers to build policy Platforms for Resilience, characterized by flexibility, collaboration, and transparency, to support the inevitable transitions in systems of learning on the horizon.
Introduction

This brief examines the policy implications of two drivers of change presented in the 2020 Forecast: Creating the Future of Learning—Pattern Recognition and Amplified Organization. These drivers point toward a series of cultural shifts and illuminate how we are developing new ways of organizing, constructing, and managing knowledge. They describe a world in which we will increasingly collaborate, improvise, and work together to assemble meaning from vast arrays of data, while also creating new learning experiences combining physical and digital realities.

In this brief, we expand on themes presented in the previous brief in this series, Building Policy Platforms of Resilience. That brief described A New Civic Discourse, or new types of communities that arise around new forms of communication. It also described Platforms for Resilience, which refers to the flexibility and responsiveness necessary in the face of disruptions and system shocks occurring throughout society.

Here, we explore new skills required to handle the ubiquity and transparency of data, along with the implications for using those skills to extend individual and organizational capacity. Taken together, these four drivers describe a policymaking environment that demands what we call “amplified policymaking,” the development of new skills and competencies that acknowledge and prepare for these changes. Policymakers must:

- Amplify their own skills to ensure that they can fully participate along with their constituents in making sense of data and navigating a world of newly emerging communities defined in nontraditional ways;
- Open up their policymaking to a more collaborative process, bringing in constituents from the beginning and letting go of power in order to gain effectiveness; and
- Create conditions that enable innovation, both by establishing their own “amplified” policymaking machine and by creating new policies that enable new learning experiences and the use of data to advance teaching and learning.

In short, policymakers must become “superheroes,” developing and combining the attributes and practices necessary for successful policymaking in the future envisioned in the forecast.
Drivers of Change

The Pattern Recognition driver

Pattern Recognition refers to new skills required, and opportunities presented, in a world of ubiquitous data. The challenge is not in finding data, but in making sense of the flood of data pouring in from every direction. Not only is the amount of information increasing; so too are the myriad ways information is presented, from text and numbers to 3-D imagery and graphics. Because of increased social expectations of involvement and the sheer amounts of information, “sensemaking” is becoming a collective enterprise among consumer groups, families, and decision makers—anyone with a stake in participation. Data are ubiquitous and free; success lies in finding, and applying, meaning.

Data trails

New communication and collaboration capabilities supported by emerging technologies anchor us to data. Not only are we becoming increasingly dependent on information in our new communities and relationships, but we are also generating even more data as we actively participate in a culture of information. This proliferation of data and information may have unintended, but potentially useful, consequences. As when the first astronauts stepped on the moon and left behind their footprints on a previously untouched landscape, we will increasingly stamp our data footprints in ways that we do not always anticipate as we explore new forms of interactions and communities.

Going about our daily business, we leave data trails. Sometimes, we intentionally share data about ourselves; the phenomenal popularity of “keep track of me” technologies such as Twitter, present.ly, and BrightKite illustrate the new-found need to stay in touch at all times. We might also choose to track personal metrics about ourselves. For example, anyone with an iPhone can opt in to Track Your Happiness.org, a scientific research project that investigates what makes life worth living.

We may also generate data trails unintentionally through the “someone is watching you” tracking that happens in the course of using tools such as ATMs, credit cards, and cell phones. Consider, for example, the analysis of automatically generated data from cell phones. Powered-on cell phones leave behind a unique data point that others are able to use to track everything from traffic patterns within cities to national and international migratory patterns of people. Although unintentionally generated, these data become available for the consumption and analysis of individual and collective behaviors without the explicit consent, or even the knowledge, of the person carrying the cell phone.
An evidence-based culture

Picture a society where data are converted to “evidence” through interpretation and sensemaking. Such a society is likely to be more invested in and dependent upon evidence for making decisions. This resulting evidence offers tremendous possibilities to impact our lives as we track more and more of our activities. In an evidence-based culture, we may need to alter our view of what constitutes reliable evidence because the collection and analysis of data will no longer be the exclusive purview of “experts” or of individuals with specialized access. Instead, experts will mingle with amateurs in the realm of ubiquitous data. As we all try to manage and make sense of high volumes of data, we will be able to ask our own questions of the data. Trend analysis shows how relatively informal uses of data and information already are extending beyond the purview of traditional education research, with sensemaking taking place in many ways and among many people. Furthermore, analysis shows that social networking, disregarded by some as being nothing more than gossip via technology, is increasingly reflected in education-related literature as being used to address real-world concerns.

Consider how parents make decisions about the quality of nearby schools and of the district. “Expert” evidence stems from requirements in the No Child Left Behind Act that states provide information on schools’ and districts’ progress toward proficiency. Official, pre-packaged, pre-analyzed reports summarize school and district student test data. While parents probably take into account that official information, they also have formed “amateur” communities sharing evidence about school quality. They congregate on www.greatschools.net to rate schools, post comments, and ask questions. They can go to www.schooldatadirect.com to download raw data for free and perform their own analyses. They can go to www.ratemyteachers.com and read what other parents and students say about particular teachers. This culture of evidence around selecting a school has entirely transformed the process from the long-gone days of walking down the street to the closest neighborhood school to one of fairly sophisticated sensemaking from multiple sources of evidence by self-motivated consumers. These consumers were probably initially grateful for the additional information about teachers and schools; then, they came to expect it; now, they demand it.

Visual literacy

As we have more data available and share and manage it in new ways, advances in visual technologies also are beginning to enable data display to go far beyond simple words and numbers. As this trend continues, we can expect
to see highly complex visualizations and simulations that convey the meanings of abundant and diverse data through multi-sensory modes such as color, 3-D spatial rendering, and even sound. In order to use and interpret increasingly sophisticated visual displays, we will need to develop new skills in visual literacy.

Early examples of using visual tools to discern the underlying stories amid vast data streams include the Centers for Disease Control’s state-by-state mapping of the increase in obesity from 1985 to 2008\textsuperscript{10} and the HealthLandscape interactive Web atlas that allows health professionals, policymakers, academic researchers, and planners to combine, analyze, and display health and social data to gain insight into community well-being.\textsuperscript{11} In the world of learning, Chicago’s Tutor Mentor Connection is using interactive mapping to document failing and struggling schools and to connect volunteers with nearby tutoring and mentoring programs to which they could offer help as a tutor/mentor, donor, and/or business partner.\textsuperscript{12}

New learning experiences

Today’s learners are self-taught technologic masters accustomed to multi-sensory experiences in the games they play, in their social interactions, and in the learning situations to which they are drawn. These learners, along with other information consumers, will seek out educational experiences that utilize new learning platforms, such as games and the combination of physical places with digital technologies (called “metaverses”),\textsuperscript{13} which engage multiple senses in the analysis and interpretation of multiple data streams. As an early example, the global initiative Skoolaborate is using a blend of technologies, including blogs, online learning, wikis, and virtual worlds, to provide engaging collaborative learning experiences for students between the ages of 13 and 18. Its projects aim to integrate curriculum and digital technologies through global units of work designed by teachers.\textsuperscript{14}

Many educators have been quick to dismiss the educational benefits of games and may not yet see the potential of games and metaverses as new learning platforms. However, Microsoft and MIT, two undisputed experts in technology and education, teamed on a project called Games to Teach\textsuperscript{15} to study the educational potential of these new platforms. Their research revealed

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Example: Crowdsourcing Crisis Information

Ushahidi is a platform enabling people to crowdsource crisis information by contributing text messages from mobile phones, e-mail, and Web forms. Its premise is that gathering crisis information from the general public provides new insights into events happening in or near real-time.

Ushahidi, whose name means “testimony” in Swahili, began as a Web site mashup combining citizen-generated reports and Google Maps after the 2008 post-election violence in Kenya. That first version of the platform has since been used in several countries and projects, including the monitoring of the Mexican elections on July 5, 2009, the tracking of swine flu reports, and the mapping of xenophobic attacks against non-South Africans in South Africa. It is currently being redeveloped as a free and open source software platform that will include mapping, news and incident clustering, and charting and graphing.\textsuperscript{9}
ties between games and engagement, as well as between problem-based learning and conceptual understanding, and debunked some previous beliefs regarding video games and aggression. These conclusions showed that, when games are intentionally designed around educational objectives and pedagogy, they can have great potential in offering new learning experiences that make use of the data trails, evidence-based culture, and visual literacy highlighted by the Pattern Recognition driver of change.

The Amplified Organization driver

The Amplified Organization driver of change takes the individual skills discussed in Pattern Recognition, as well as in A New Civic Discourse, to the organizational level. In Amplified Organization, individuals with enhanced skills will come together to “amplify” the organization, creating new organizational capabilities and stretching traditional organizational boundaries. These individuals become organizational “superheroes,” reshaping the organization with their collective enhanced capabilities to use social networks, data and evidence, and collaborative processes. Amplified organizations thrive where transparency, responsiveness to change, and ubiquitous data are present.

Ad hoc leadership

Amplified organizations are characterized by ad hoc leadership, where leaders emerge according to the situation rather than from formal authority. This type of leadership is enabled by the increased use of social, collective, and improvisational technologies, as well as by open organizational cultures.

Formal leaders, then, should enable ad hoc leadership by fostering a culture of collaboration, trust, and consensus-building. Such a culture requires that formal authority over process and outcomes be relinquished. This means that information cannot be hoarded, that challenges need to be openly acknowledged, and that solution finding cannot be the exclusive purview of top-level staff.

One way to achieve such a culture is through the broad and open circulation of resources through internal and external networks, thus enabling information to find the right people at the right place and time. We see such circulation of information at the school level, where teachers have access to a host of open education resources—Web sites where they can exchange, co-create, and build

Example: Gaming away Bullying

The middle and high schools in Massachusetts’ Bridgewater-Raynham Regional School District are using video games to teach students about the dangers of bullying on the Internet and in real life. They use “Braincells,” a series of interactive computer games and quizzes, to work through how to handle computer and cell phone hacking, bullying, and cyberbullying before it happens. In addition to giving students an opportunity to try out responses, the activities help them understand the impact of circulating comments about, and photos of, other students.16
upon lesson plans and other curricular components (e.g., Wikieducator, OER Commons, and Curriki). At the policy level, this openness requires similar use of technology to circulate resources and information to the public.

**Permeable organizational structures**

The new amplified organizations are likely to be more permeable than those to which we have grown accustomed, looking much less like sealed hierarchical entities. Organizations have been moving in this direction by forming new kinds of partnerships, including outsourcing innovation and research and development through networks of interested individuals, some of whom are experts and some of whom are not. For example, Procter & Gamble increased its research and development productivity nearly 60 percent through its connect-and-develop approach, which searches a network of suppliers, competitors, scientists, entrepreneurs, and others for technologies, packages, and products that Procter & Gamble can improve, scale up, and market.

As organizations become more interdependent with their communities, they will define value not just in relation to traditionally stated outcomes, such as graduation rates or shareholder value, but also in relation to broader student, community, and environmental interests. Such partnerships are likely to become more deeply embedded in organizational practice, such that it might be hard to see where one starts and another begins.

**A collective beta culture**

Trends also show the emergence of a “beta culture” characterized by transparency, collaboration, rapid iteration, open critique, and reflective practice—all elements from the world of software development, where “beta” describes a partially developed piece of software or Web application that has been released to users for testing. It also reflects Peter Senge’s concept of the learning organization, which fosters continuous learning at all levels so as to stay flexible, adaptive, and productive. A beta culture is a fluid, continuously adapting collective culture that responds to the demands of the moment and resists rigid, rote responses to challenges.

In a world of rapid change, people will need to try out provisional solutions by simply starting somewhere, even when a challenge seems daunting, and learning from that initial experience to improve, refine, or replace that solution and try something else. It is likely that this kind of iterative approach to change will have greater impact than attempting to turn around a large system, or it might need to complement efforts toward large-scale systems change.

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**Example: Transformation through Education**

Higher education brings to mind mental images of historic buildings, manicured grounds, stately professors, and insular ideas, but some concepts simply do not translate well in such traditional settings. Instead, permeable organizational boundaries are needed.

The Audubon Expedition Institute at Lesley University in Cambridge, Massachusetts, blurs the line between the organization and the subject being taught. Students are immersed in environmental studies, sleeping in tents rather than dorms, visiting environmentally impacted sites, and having grassroots activists and lobbyists join them as teachers. In this environment, there is no such thing as detached learning within formal boundaries; the boundaries between the learner, the institution, and the subject are blurred by the necessity of adequately imparting a complex message.
With the emergence of a beta culture, we can expect to engage frequently in “collective sensemaking.” Because of the quantity and variety of data surrounding us, individuals and organizations will have to tap collective intelligence in order to make sense of it all. Open and flexible organizational structures will best provide access to the knowledge and expertise that might be hard to spot, but which can lead to an essential insight needed to address a critical issue. The challenges of the next ten years, as presented in the forecast, will demand that we augment individual capacities through collaboration: not only will we be able to do more together and do it better; we will be able to do things together that we could not do alone.

It may be tempting to dismiss the possibility of a beta culture in education policy, where reform and change meet the resistance of ingrained ways of thinking. However, strides have already been made. In August 2009, Knowledge Alliance/Center for Knowledge Use, the Stupski Foundation, and West Wind Education Policy convened a national innovation summit that aimed to unleash knowledge and innovation for the next generation of learning by proposing a design orientation to education research and development. Using the metaphor of the knowledge garage to describe “ideas hatched in unlikely places by unlikely people, but ideas nonetheless that can ultimately change the world,” the hosts proposed that education research and development be redesigned to transform learning.25

Their proposal included seven basic elements for a redesigned system of education R&D: 1) a mission that focuses on solving problems of practice; 2) a Knowledge Ecosystem that constantly captures, generates, and disseminates new knowledge; 3) dynamic networks that guide, aggregate, and accelerate innovation and improvement; 4) a development process that promotes both rapid responses and rigorous testing and scaling; 5) Innovation Centers and their interdisciplinary design teams that manage and coordinate the development process; 6) participating research sites that provide workable environments for the three phases of the development process; and 7) funding that is ongoing, sustainable, and sufficient.

A disciplined approach to innovation drawing upon research and development in other fields would be critical to the approach they propose. It would incorporate a future orientation, the co-creation of compelling model solutions, the avoidance of central control, an adaptive and modular approach, and the creation of integrated platforms enabling many independent participants to be part of the solution.
Policy Implications and Recommendations

The Pattern Recognition and Amplified Organization drivers of change and the associated implications make the case that policymakers must amplify their skills, engage in collaborative policymaking, and create the conditions for innovation.

Amplify your skills

The implications about the skills necessary to handle the ubiquity and transparency of data and about the use of those skills to extend individual and organizational capacity are inescapable. Policymakers must take an active, participatory role in making sense of data and integrating knowledge into policy development.

Traditionally, these processes have meant pouring over text and numbers, searching for patterns or relationships. Now, however, a computer program can produce frequency outputs and rankings and a whole host of reports in the blink of an eye. Policymakers need the ability to analyze and interpret such reports in a way that provides meaning and context for constituents and provides an opportunity to bring in issues that are less easily automated, such as equity, fairness, and ethics. The injection of this human element is critical for finding meaning that is actionable and informative to policy.

Example: Perpetual Beta

Google is well known for keeping many of its products, such as Gmail, Google Calendar, and Google Docs, in a state of perpetual beta for many years.26 These products are developed in the open, and new features are frequently released as they become available, even if they have not been fully tested.27 Open source advocate Tim O’Reilly has described how, in this model, users become co-developers as Web developers monitor which features they use and make adjustments based on their behavior.28

In July 2009, Google removed the beta label from these three products, partly out of business users’ concern about their stability (although they seem unlikely to stop releasing frequent updates).29 Nonetheless, the idea of perpetual beta, or continuous improvement on a flexible, easily deployed schedule, provides a model for being able to iterate rapidly through new ideas and solutions in other contexts.

Of course, policy should be crafted with an eye toward what is already known from existing evidence. This is a fundamental principle of “knowledge use” and requires that policymakers objectively look at evidence about an issue while setting aside preconceptions.30 Policymakers often have relied on experts to tell them what to think about evidence, accepting their role as amateurs in the arena and focusing on the constructive application of that evidence to the crafting of policy. However, the ubiquity and transparency of data illuminates the changing nature of evidence and research. With the democratization of data, the role of the expert diminishes, and the policy community must be ever more discerning when choosing a body of evidence upon which to rely. Policymakers must themselves develop the capacities to read and understand raw data, as well as research reports, and to extract meaning from them.
Engage in collaborative policymaking

Policymakers need to pursue a highly collaborative approach to policy development, taking advantage of the ubiquity and democratization of data and serving as the maestros of the collective sensemaking needed around the data. Constituents will likely be defined in new ways in the future, such as by areas of interest rather than by geography. Education constituents in the new society may include virtual communities, geographically dispersed individuals, and powerful, engaged educitizens. Collaborative policy development in a new civic model requires the recognition and inclusion of new consumers and stakeholders.

In addition, amplified “superhero” policymakers will need to be quick on their feet—or at least in their heads. In a world in which a data-rich report can be released online first thing in the morning, the blogosphere can be filled with hundreds of comments on it by mid-morning, advocacy associations can have released position statements on it by noon, and governors can have called for legislation in response to it before the evening news, policymaker “superheroes” need at times to move “faster than the speed of light”! The days of thoughtful deliberation about most policy issues may have passed us by.

Example:
Amplified Business Machines

Since 2001, IBM has used innovation jams to involve its more than 300,000 employees worldwide, along with outside experts, in exploration and problem solving. Their premise is that “public discussion of research ideas could solve problems faster than IBM’s own researchers tackling them secretly.” Their 2006 jam resulted in ten new divisions, and their 2008 jam involved employees from 1,000 companies representing 20 industries. IBM also co-hosts innovation jams to address social issues. For example, the 2005 Habitat Jam hosted by the Government of Canada, UN-HABITAT, and IBM brought together tens of thousands of participants to address urban sustainability, thus shaping the agenda for the June 2006 UN World Urban Forum.

Similarly, Dell partners with the University of Texas to hold an annual social innovation competition that invites college students to design ingenious ways of tackling pressing social issues, with a grand prize of $50,000 to implement the plan. Anyone online can comment and vote on the submissions. The 2009 grand prize went to Gardens for Health International at Yale University for a sustainable approach to nutritional independence for people living with HIV/AIDS in Rwanda, which involves legal support to form cooperatives, land advocacy, home gardens, seeds and tools, and training in sustainable agriculture and nutrition.
Learning how to tap continuously into reliable sources of data; use credible authorities to assist with their interpretation; set up useful social networking mechanisms in order to constantly access input from stakeholders; and then move forward in an iterative way, relying on beta testing whenever possible, may be the mode for policymakers in the future.

Create the conditions for innovation

In pursuing collaborative policy development, policymakers would do well not just to cultivate relationships with stakeholders, but also to make space for new solutions to emerge within the public education system, as well as in other learning environments and through hybrid approaches. Some areas calling for new solutions appear below.

Standards

There are implications for the standards movement in the ubiquity of data and the myriad new ways of displaying data. What knowledge and skills do students (indeed, all citizens) need to have about making sense of data in order to be successful in the 21st century? In the “math wars,” some argue for the inclusion of courses in statistics in the high school curriculum before the traditional sequence of algebra, geometry, and calculus. How might policymakers raise this issue when it comes to reframing state standards and accountability systems?

Assessment

We will increasingly have the opportunity to use newly available data to inform new kinds of assessments. The U.S. Department of Education will soon make available funds for the development of a new national assessment. Given our digital native students’ tremendous facility with technology, the advancements of digital networking, and our ability to gather all kinds of data trails, policymakers should be advocating for the development of a state-of-the art assessment that takes advantage of everything known about gathering and utilizing data for improvement.
**Technology and the Internet**

Who has not heard the familiar student lament that they “power down” when entering the school building? We all know that there is an awkward boundary between the online lives of our students and the barriers to cyberspace imposed in most schools. Privacy concerns notwithstanding, the future of learning, as foretold in the forecast, is at least partially virtual. Schools need the policy community to help them resolve the critical tensions that exist between keeping students safe when accessing the Internet, while maintaining their ability to explore freely the virtual universe of information.

**Gaming**

As early experiences with serious games such as World Without Oil have shown, there is rich possibility for creating new learning experiences that combine digital and physical realities. Policymakers could consider how to provide resources for developing new kinds of learning experiences. Possibilities include not just providing technology dollars for schools, but also fostering collaboration within and across communities to identify partnerships for facilitating rich learning experiences. Policymakers could also foster conversations about what kinds of pedagogies best serve the future of learning; for example, could gaming become a pedagogy for a volatile, uncertain, complex, and ambiguous world?
Conclusion: Amplified Policymaking

Increasingly ubiquitous data require a new set of skills to find and communicate meaning. Fully utilizing these skills positions policymakers to become superheroes in the data-rich world of the future. Furthermore, as individuals leverage these skills through social and collective networking technologies, new organizational structures may emerge that are more responsive and relevant to meeting the challenges posed by rapid change.

By amplifying their skills, engaging in collaborative policy development, and creating the conditions for innovation, policymakers can become the superheroes in creating a future of learning that benefits all students. Key aspects of this leadership include making space for solutions to arise throughout the learning system and encouraging the open circulation of information across such solutions so that everyone engaged in the learning process can build toward the best possible future of learning.
Endnotes

1 www.iftf.org

2 Request a copy, explore an online version, or download the forecast at www.futureofed.org

3 The 2020 Forecast describes drivers of change as “major forces of transformation that will shape our efforts to remake learning. They represent the convergence of several trends into emerging ideas and phenomena that will disrupt traditional narratives and assumptions about learning.”

4 Available from http://www.futureofed.org/taking-action/policy-briefs


6 http://www.trackyourhappiness.org


8 SchoolDataDirect is an online service of the State Education Data Center, a service of the Council of Chief State School Officers.

9 http://www.ushahidi.com

10 http://www.cdc.gov/obesity/data/trends.html

11 http://www.healthlandscape.org

12 http://www.horizonmapping.net/projects/tmc/tmc_gallery/Tutor_Mentor_school_maps.html

13 In its simplest definition, a “metaverse” is a real physical place augmented by virtual technology (sometimes called “augmented reality” or “AR”). See an example at http://www.wikitude.org. The definition of “metaverse” can get more complex; see Metaverse Roadmap at http://www.metaverseroadmap.org to explore more.

14 http://www.skoolaborate.com

15 http://icampus.mit.edu/projects/GamesToTeach.shtml
17www.wikieducator.org
18www.oercommons.org
19www.curriki.org
21http://lesley.edu/gsass/audubon/about.html
23http://www.infed.org/thinkers/senge.htm
24http://prodsol.co.nz/provisionalsolutions.html
25www.knowledgegarage.org
27http://en.wikipedia.org/wiki/Perpetual_beta
30This first step in policy development is thoroughly described in McREL’s comprehensive approach to policy development, *Policy Leadership for the Future of Education.* Contact McREL for more information.
31See *Building Policy Platforms for Resilience* at http://www.futureofed.org/taking-action/policy-briefs/ or download the forecast at www.futureofed.org
34http://www.dellsocialinnovationcompetition.com
About the Authors

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Introduction

This brief examines the policy implications of two drivers of change presented in the 2020 Forecast: Creating the Future of Learning—Altered Bodies and the Maker Economy. These drivers point toward a new future in which teaching and learning could look very different from the way they look today and also raise significant concerns about the way society will manage the implications of this new future.

The Maker Economy Driver

The Maker Economy driver of change describes an economic shift from large-scale industry and production to bottom-up design and manufacturing. Driven by social and technologic forces, our economies are being transformed by unprecedented collaboration among users, designers, and manufacturers. Unlike in the past, when consumers’ choices were dictated by dominant producers, in the Maker Economy, production and consumption are limited only by individual imagination. New tools, such as 3-D printers, computer-controlled machine tools, and online networking applications, are creating a do-it-yourself culture allowing designers and consumers to “make” their own solutions to local needs.

The Altered Bodies Driver

The Altered Bodies driver of change highlights the dichotomous nature of our world in which advancements in bio-engineering offer the promise of tremendous enhancements to our cognitive and physical performance, even though our biological, ecological, and built environments show signs of stress and deterioration. Over the next ten years, the forecast suggests that we will gain new understandings of how the mind works and be able to alter it with brain exercises, medications, and technological devices. We can also expect to see highly sophisticated prosthetics and other innovations that may allow quadriplegics to walk, amputees to play major league baseball, and blind people to see. At the same time, environmental degradation and climate change—along with chronic illness, pollution, and the emergence of pandemics—are likely to cause unprecedented levels of bio-distress.

Strategies for Policymakers

The drivers described in this brief help us envision both opportunities and challenges in the creation of learning for the future. Previous briefs in this
series have described strategies policymakers can use to support emerging forms of teaching and learning suggested by the forecast and to provide resilient structures for managing change. These strategies are equally important when dealing with the likely consequences of the Maker Economy and Altered Bodies drivers. Policymakers should

- Approach problems and develop policy with responsive flexibility, constantly monitoring results and making necessary modifications.
- Include multiple stakeholders within the policymaking process by collaborating on policy solutions, using technology whenever possible.
- Shine a light on the policymaking process by ensuring transparency in all policy matters.
- Support innovation and adaptation from the statehouse to the schoolhouse.

Using the new knowledge and skills discussed in this and previous briefs, policymakers can be proactive creators of a new educational enterprise.

**Opportunities within the Drivers**

**Retooled learning**

If you can't find it, make it—that is the mantra of participants in the Maker Economy. Not content merely to shop for what is offered by manufacturers, these new producers take advantage of social networks and a prevailing culture of sharing to co-design and co-produce their own goods, creating a society of “makers.”

The industrial model of schooling, which has long been viewed as outmoded in a global economy, is obsolete in the Maker Economy. In a society of makers, schooling must prepare students to participate actively as makers, not just as passive learners. Indeed, schools may find it necessary to become part of the local economy and to contribute to the community in new ways or risk being replaced by learning opportunities that are created according to the vision of the makers. Not only will successful schools serve as hubs of design knowledge and new skills for a new economy, but learners also will have the opportunity to contribute directly to that economy through authentic learning experiences.

Such opportunities are beginning to emerge. Some schools, including Troy Howard Middle School in Belfast, Maine, are becoming producers by
growing food. The school’s garden project aims to contribute to academic success in science, mathematics, technology, and social studies while helping students “integrate sustainability into their lives by producing and learning to satisfy needs locally.” Along with a vegetable garden, greenhouse, and trails, the school runs a pond and streams project, an apple tree restoration area, and an heirloom seed garden whereby students experience hands-on learning while connecting with the community and the local economy. Food grown is used in the district’s school lunch program, sold at a school farmers’ market, or donated to the local food co-op. Students learn to run businesses and apprentice at jobs throughout the community. In this way, blurring the boundaries between school and community helps identify both community needs and community resources.

Several policy conditions can lend support to similar endeavors. For example, local school board members, together with city council members, might create an intergovernmental agreement to facilitate the sale of products created by student makers through community businesses. In addition, state and local policymakers might consider revising content standards that govern curricula to acknowledge the new knowledge and skills required for this new economy.

**Enhanced cognition**

In an example of the ways in which the Altered Bodies driver is influencing education today, schools and other learning providers are drawing upon our evolving understanding of how the mind works to explore new forms of learning in the Tools of the Mind program. The program uses role-playing to teach children as young as three how to exercise cognitive and emotional self-control, developing what neuroscientists call the “executive function.” Learning cognitive and emotional self-regulation helps young children with other activities and is proving to be a better predictor of later academic success than IQ tests. The program has been used with 18,000 prekindergarten and kindergarten students in 12 states around the country.

Another early indicator of a move toward cognitive fitness is Sharp Brains, a market research and advisory company that focuses on providing high-quality information and guidance about the emerging brain fitness and

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**“Tinkering” Leads to Authentic Learning**

Students engage in authentic learning experiences in the Tinkering School, a six-day summer camp started by software engineer and tinkerer Gever Tulley. The school’s exploratory curriculum, for students from ages 7 to 17, is based on the idea that everyone can figure things out by fooling around. With no set curriculum or tests, students use real tools to build real things—bridges, boats, and roller coasters—and spend time experimenting with basic and advanced building techniques and principles. The camp provides hands-on, immersive experiences, in which problems are approached as puzzles, and failures are celebrated and analyzed.
cognitive health market. In *The SharpBrains Guide to Brain Fitness* (2009), authors Alvaro Fernandez and Elkhonon Goldberg present information about brain research, identifying lifestyle factors and products that can contribute to brain fitness. The Sharp Brains website\(^{10}\) also provides brain fitness resources and games for keeping the mind sharp. Another website, Brains.org, aims to identify practical classroom applications of current brain research.

The forecast raises the possibility that, as such interventions become more prevalent, some educators might specialize as “learning fitness instructors” who help learners build and strengthen their cognitive, emotional, and social abilities through simulations, biofeedback, and hands-on activities. Together, these activities promise to help learners reduce stress and hone their mental capabilities. This possibility might lead policymakers to rethink the traditional role of teachers as defined by policy through school district employment contracts. Ultimately, a more differentiated approach to the teaching role might include the innovations and new knowledge about how to optimize brain function.

**Sustainable schools**

Part of the trend in the Altered Bodies driver toward enhancing our bodies and minds is a focus on improving the overall health and sustainability of our environment, especially our schools. For example, the Healthy Schools Network has been working since 1995 “to ensure that every child has a healthy learning environment that is clean and in good repair.”\(^{11}\) Through research, information, education, coalition-building, and advocacy, the organization influences policy and systemic reforms and helps parents and students make classrooms and buildings healthier. Factors that the Network examines include pest prevention; promotion of good indoor air quality; advanced communication about potential hazards; methods for responding to complaints; and the level of energy efficiency of a school’s heating, lighting, ventilation, windows, doors, and buses.

The movement toward healthy and sustainable schools sometimes intersects at the state and local levels, as exemplified by Ohio Governor Ted Strickland’s decision that beginning in 2007, all new school building construction would follow LEED for Schools standards.\(^{12}\) In accepting the 2008 Leadership Award for Advocacy from the U.S. Green Building Council, he cited energy efficiency and improved educational environments as two key motivators. Franklin Brown, a planning director with the Ohio School
Facilities Commission, sees green school buildings as helping to make it second nature for children to recycle or turn off the lights, thereby promoting a culture change that will help prepare us for the future.13

At the community level, in Cincinnati, a grassroots nonprofit called Alliance for Interconnection and Leadership (ALLY) has fostered connections and brokered relationships to encourage stakeholders in Cincinnati Public Schools to green the schools. As a result, in 2009, the city’s Pleasant Ridge Montessori School became the first LEED-certified PreK–8 public school in Ohio, achieving a 21 percent reduction in water usage and a 36 percent reduction in utility costs.15 The district’s vision includes connecting to the community and changing the curriculum, as well as designing and constructing greener and healthier schools. ALLY is now collaborating with Cincinnati Public Schools, the Cincinnati Health Department, and the University of Cincinnati on an anti-idling campaign to raise public awareness about the impact of airborne particulates on children’s health while also providing training for district bus drivers.

Such initiatives illustrate how to create safer environments for children while fostering tomorrow’s environmental stewards and building overall community resilience. Policymakers can support similar efforts by creating mechanisms for shared governance among school and community organizations, facilitating dialogue among stakeholders around shared values, and encouraging innovative approaches to solving environmental dilemmas.

**“Home” economics**

The new millennium introduced a growing trend of social and environmental consciousness, and with it came some familiar touchstone events: in 2007, the global warming documentary, An Inconvenient Truth, won an Academy Award; the New Oxford American Dictionary proclaimed “locavore” the new word of the year; and Mayor Bloomberg proposed a five-year plan to replace all of New York City’s 13,000 taxis with hybrid vehicles. Then, the national and global economy hit serious hard times. One end result of these circumstances has been an increasing awareness that helping the economy and the environment begins close to home.
Local currencies reappear

The recession is strengthening the trend toward all things local. New production and collaboration technologies allow more goods to be produced and exchanged locally, and some local economies have even started printing their own currencies to promote local consumption.

For example, the BerkShares currency, offered in the Berkshire region of Massachusetts, is specifically intended to promote exchange among locally owned businesses, in hopes that the BerkShares will do for the local economy what national currencies have done on a larger scale—maximize trade within a defined region. BerkShares will not, and are not, intended to replace federal currency. Users aim to strengthen the regional economy by favoring locally owned enterprises and local manufacturing, while reducing their dependence on an unpredictable global economy.17 Widely used in the early 1900s, local currencies are again being recognized as a tool for sustainable economic development.

The absence of credit and dollars in the recession is another reason why more communities are printing their own currencies. In what may be an unwelcome parallel, alternative currencies flourished during the Great Depression as thousands of banks failed. There are an estimated 2,500 alternative currencies worldwide, and six U.S. states have alternative currency systems.18

Urban farming spreads

Just as local currencies are one way of enabling localism, urban dwellers are finding ways to break down food production barriers to localism. “Urban farming” promotes small-scale food production of everything from organic vegetables to honey to homemade cheese. Community farming co-ops, radio shows, books, and local experts educate city dwellers on the finer points of animal husbandry while lobbying for zoning reform to allow farm animals in residential areas.19

In one example of a community-supported agriculture program, local residents pay a fixed fee to a farm in exchange for a share of the food that it produces. Cincinnati, Ohio-based Turner Farm grows vegetables organically and involves people from the community through member work commitments, sales at local farmers’ markets, school partnerships involving hands-on experiences at the farm, and classes for adults.20 Finding that community-supported agriculture programs are becoming more popular than area programs can accommodate, Turner Farm offered a fall 2009 seminar to encourage others in the area to start similar programs.
Pie Ranch in San Mateo, California, operates as a model center of sustainable farming and food system education. It produces pie ingredients, including wheat, fruits, eggs, milk, and butter, on its 14-acre pie-slice shaped piece of land and sells its crops at its farm stand, through local bakeries and an egg share program. The ranch works with educators and community collaborators to help students from regional high schools participate in farm-based programs and activities and apply what they have learned in their daily lives. For example, students from nearby Mission High School’s English and science classes visit the farm monthly, and Oceana High School students can spend their intersession week there. 21

**Think locally, act globally!**

The movement to local production and consumption is a response to social and environmental awareness and economic stresses that are local, national, and international in nature. New economic tools will form within the Maker Economy and will require new policies, relationships, and mechanisms to support the health and welfare of both the local economy and the global community. Good policy will support the movement toward localism and will reward the individual initiative and creativity that spawns it, while also guarding against the rise of parochialism or the denial of the interconnected reality of our global economy in the 21st century.

**Challenges within Opportunities**

**Bio-distress**

Even as possibilities for new forms of learning and new local economies proliferate, stressors, such as environmental degradation and climate change, are likely to cause unprecedented levels of bio-distress. Chronic illness, pollution, increasing urbanization, food insecurity, and the emergence of pandemics may exacerbate distress in and around learning environments. While the specific mix and levels of bio-distress vary with local conditions, this phenomenon may cause physical harm to anyone exposed to the stressors and mental harm, at the very least, by distracting from teaching and learning.
More pandemics to come

Take, for example, the current outbreak of the H1N1 flu virus, which challenges schools to manage the possibility of widespread absences and the spread of the disease while minimizing closures. Guidance for K–12 schools from The Centers for Disease Control and Prevention includes a checklist that asks whether all of the right stakeholders are involved, whether there is sufficient information about infection and absenteeism rates, whether the proposed response is feasible, and whether it is acceptable. Variables in determining acceptability include whether dismissing schools could impact students’ access to health services and nutrition as well as their educational progress. 

Indicators are that pandemics could become more and more a part of our future. Policymakers would be wise to consider developing systems to help educators manage these crises in a way that preserves, or even enhances, their ability to continue the learning process for children at such times.

Chronic conditions persist

With one in three children and adolescents in the United States overweight or obese due to increasingly sedentary lifestyles and diets high in sugar-laden processed food, chronic conditions are affecting children’s health and raising questions about what schools can do to help mitigate or manage them. The Center for Ecoliteracy’s Rethinking School Lunch program helps schools address childhood obesity by looking at it as part of a whole system that includes curriculum, school lunch quality, and schools’ purchasing decisions. That program also offers a Model Wellness Policy Guide that places health at the center of the academic curriculum while linking it to surrounding factors. Similarly, the National Farm to School Network promotes healthy eating habits—and creates local markets for farmers while mitigating the effects of transporting food long distances—by connecting schools and farms around school meals; health and nutrition education opportunities; and waste management programs, such as composting.

These are examples of the ways in which schools can become platforms for resilience for communities struggling with health and environmental challenges. To promote schools as safe havens for communities under distress, policymakers should consider how to re-invent school governance structures and regulations regarding facility use.
**Ethical dilemmas**

As we become increasingly able to tinker with our brains through cognitive fitness programs, medications, and other approaches, and to modify our bodies through prosthetics and other innovations, we can anticipate ethical dilemmas around fairness and equity. As new mental and physical capabilities challenge norms, we must consider their impact on teaching and learning and create appropriate forums for examining standards and deciding whether or how to accommodate such alterations in the classroom and other learning environments.

We also must address questions of access: while some innovations might have been created for people with disabilities, their availability to others who also could benefit from them is likely to vary across socioeconomic settings. Just as we have had debates about access across a digital divide, we can expect debates about who gets to alter their minds and bodies, how they can alter them, when they can do so, and about how people with varying capabilities get assessed in a range of environments.

**Greater use of “mind-altering” drugs**

As off-label uses of some medications to enhance mental capacity are growing in sophistication, law and opinion about their use is shifting out of sync. An April 2009 *New York Times* article reported that a majority of respondents to an online poll by the journal *Nature* indicated that “healthy adults should be permitted to take brain boosters for nonmedical reasons” and that concerns about feeling pressure to use neurostimulants to keep up with coworkers have begun to emerge in some workplaces.²⁶ For example, Adderall, an amphetamine-based drug that increases alertness and concentration while decreasing fatigue, is approved for the treatment of attention deficit hyperactivity disorder (ADHD) and narcolepsy but is being used by university students to help them study longer.²⁷ Provigil is another prescription drug used to improve wakefulness in people who suffer from obstructive sleep apnea, shift work sleep disorder, and narcolepsy. Although its manufacturer paid a civil settlement in connection with a criminal charge for marketing Provigil for uses other than those approved by the Food and Drug Administration,²⁸ up to 90 percent of prescriptions continue to be for off-label uses ranging from age-related memory decline and depression to jet lag and cocaine addiction.²⁹
New definition of “disabilities”

Innovations designed for people with physical disabilities have also begun to challenge norms. For example, athlete, actor, and activist Aimee Mullins encourages people to rethink their views about prosthetics. Born without fibular bones and having had both her legs amputated below the knees as an infant, she set world records at the 1996 Paralympics in Atlanta and, while a student at Georgetown, she became the first double amputee to compete in NCAA Division 1 Track and Field. With 12 pairs of prosthetic legs, she spoke at a February 2009 TED talk about how her experimentation with prosthetics has caused her to question what it means to have a disability:

It is no longer a conversation about overcoming deficiency. It’s a conversation about augmentation. It’s a conversation about potential. . . People that society once considered to be disabled can now become the architects of their own identities, and indeed continue to change those identities by designing their bodies from a place of empowerment. 31

The world of running illustrates how, even as some people push toward such empowerment, society will need to negotiate the ethics of enabling innovations. South African Paralympics runner Oscar Pistorius, who is also a double amputee, was initially banned from competing for the 2008 Summer Olympics because the International Association of Athletics Federations ruled that devices, such as his artificial lower legs, give people unfair advantage over able-bodied runners. Although that decision was overruled, and he was able to participate in South Africa’s Olympic trials, the debate highlights how issues of fairness and equity easily come into play when we modify our capabilities through means that seem artificial. 32

Equity and fairness

There is an inherent equity in the concept of cooperative design and production, especially when it is associated with the common good. Most theorists agree that the sharing of ideas, labor, production, and wealth helps level the playing field. Kevin Kelly of Wired magazine describes it as “digital socialism”:

We’re not talking about your grandfather’s socialism. In fact, there is a long list of past movements this new socialism is not. It is not class warfare. It is not anti-American; indeed, digital socialism may be the newest American innovation. While old-school socialism was an arm of
the state, digital socialism is socialism without the state. This new brand of socialism currently operates in the realm of culture and economics, rather than government—for now.33

Whatever it is called, this movement toward a Maker Economy based on collaborative design and collective benefit has an associated ethical element. Richard Stengel wrote in Time magazine about it this way: “What we are discovering now, in the most uncertain economy since FDR’s time, is that enlightened self-interest—call it a shared sense of responsibility—is good economics.”34 But what happens when the inherent equity of a collaborative culture meets with barriers to participation?

The shared responsibility inherent in a collective economy as described in the Maker Economy works until the “sharing” becomes unequal. Although the tools of the Maker Economy, such as 3-D printers and computer-controlled machine tools, allow designers and consumers to design and manufacture their own products on a small scale, unequal access to these tools and to the necessary collaborators creates inequity. Some people will be more able than others to access the new economy.

This may be true at the school level, as well. Just as we currently see inequities among the quality of teachers, equipment, books, and tools within schools, students and schools in the Maker Economy may experience unequal access to new technologies. This inequity in access to the necessary skills, capabilities, and tools must be addressed if schools and students are expected to participate in the Maker Economy.

**Opening access to resources**

One non-profit organization with locations in California and Colorado that is beginning to address inequities is Resource Area for Teaching (RAFT).35 RAFT provides educators with tools for engaging students in hands-on learning experiences. It offers educational resources and inexpensive supplies, many of which are donated by local businesses, to enrich preK–12 education and community programs. In addition, it provides professional development workshops and ongoing support for teachers.

On a global scale, MIT’s Fab Lab program36 makes design and production resources available to people around the world, from inner-city Boston to rural India to the North of Norway. This network draws upon MIT research on digital fabrication to make prototyping tools for personal fabrication.
Activities include technological empowerment, peer-to-peer project-based technical training, local problem solving, small-scale tech business incubation, and grass-roots research. Fab Labs has helped produce solar- and wind-powered turbines, thin-client computers, wireless data networks, instruments for agriculture and healthcare, and custom housing, among other items.

Other ways of opening access to machine tools and instruction include community-based locations, such as TechShop, a 15,000-square-foot workshop located in Menlo Park, California, where members can drop in to work on projects at their own pace or take classes on using the tools, machines, and equipment. Alternatively, there is the Instructables website, which provides a platform where people can collaborate and share their expertise. In a similar vein, Ponoko is an online marketplace where designers, digital fabricators, materials suppliers, and buyers meet to make products as close to the point of consumption as possible.

Implications and Recommendations

There are tremendous opportunities for innovation in teaching and learning for the future. New forms of production at the local level, along with biotechnical enhancements to cognition could lead to a retooled educational system for greater achievement. At the same time, stressors ranging from environmental pollution and climate change to the ethical dilemmas posed by advancements in bio-engineering raise significant challenges. How can we ensure that policy is appropriately responsive to the new conditions created by the Maker Economy and Altered Bodies drivers of change?

Many familiar policy solutions will continue to serve education well in the future. For example, to support the emergence of new forms of schooling mentioned in this brief, policymakers should consider creating shared governance agreements and in other ways blur school and community boundaries. By so doing, they can increase the pool of community stakeholders available to invest in and benefit from new solutions. Exploring
new content standards and expanding and differentiating teaching roles will help to create the conditions for innovation. And, of course, policymakers can play an important role by simply fostering dialogue around shared values and offering the opportunity for stakeholders to develop new approaches to schooling for sustainability, as well as new structures to support global and local economies.

Regardless of how familiar the solution, the strategy for developing and implementing it may be very new. In *Building Policy Platforms for Resilience*, we described an approach to policy development in times of great change through the forecast driver called Platforms for Resilience. The premise is that with so many system shocks and disruptions anticipated over the next decade in the areas of economics, globalization, technology, and social values, policymakers should be more flexible, collaborative, and transparent in their decision making. In this way, they will help develop the space for communities to confront and resolve the deep dilemmas and complex challenges they will face. Such an approach to policymaking could lead to schools and other learning providers becoming centers of resilience for communities dealing with climate change and economic shifts. Schools have the potential to become centers for health, environment, community, and learning.

Alternatively, policymakers may respond to the signals of bio-distress and the ethical dilemmas posed by the implications of major cognitive and physical modifications on our students with self-defeating *autoimmune responses*. Such responses are common in times of great change. One example might be a local school board deciding simply to ban the use of any cognitive modification or enhancement devices for students due to concerns about equity rather than developing new policy that addresses equity issues in light of the availability of new technology.

In *Amplified Policymaking*, we urged policymakers to become “amplified superheroes” themselves, ensuring that they are able to fully participate in the robust technological networks available to their constituents and also to access and apply data in meaningful ways to solve critical problems. Such skills, along with a transparent and collaborative approach to problem solving, could place the policy community in a leadership role in helping today’s educators—and perhaps others—prepare for an increasingly green economy, understand principles of sustainability, and consider how to live in consonance with the earth. In addition, using social networking tools, policymakers could initiate and monitor stakeholder conversations about the deep ethical dilemmas raised by the innovations described in the Altered Bodies driver of change.
Conclusion

It has been said that the future is here... it is just not evenly distributed. The 2020 Forecast: Creating the Future of Learning and the examples highlighted in this series of briefs make this clear. When we think back a decade and remember what a small part of our lives cell phones were, it is not hard to imagine that the trends identified as “emerging” in the forecast could be fully embedded into teaching and learning a decade from now. If this is true, how should we prepare?

Learning about these trends and forces of change is an important first step. Seeking information about the ways in which innovative approaches are being implemented in learning environments everywhere and sharing it with others is critical, as well. But, as policymakers, it is important to do more. The policy community must be a leader in the creation of the future of learning, not just a reactor to innovations already formed.

The Introduction of this brief summarized the need for the policy community to be more responsive, flexible, collaborative, and transparent in terms of policy development. Moreover, and specific to the Maker Economy and Altered Bodies drivers, policymakers should seek out ways to enable new forms of teaching and learning rather than engage in autoimmune responses. Specific opportunities for policymakers include these:

- Consider revising content standards that govern curricula to acknowledge the new knowledge and skills required for this new economy.
- Rethink the traditional role of teachers as defined by policy through school district employment contracts.
- Create mechanisms for shared governance among school and community organizations.
- Support the movement toward localism and reward the individual initiative and creativity that spawns it, while guarding against the rise of parochialism or the denial of our interconnected global economy.
- Prepare for pandemics and other disruptions to learning in a way that preserves, or even enhances, educators’ ability to continue the learning process for children at such times.
- Address inequities in access to technologies and social structures that enable collaboration.
It bears repeating that proactive policy responses to change will enable leaders not only to adapt to future conditions but also to play a role in crafting the future, especially in times of great uncertainty. By using the skills of an amplified superhero, by helping to build platforms for resilience, and by collaborating with flexibility and transparency throughout the policy development process, policymakers can keep the momentum moving toward a new and better future for learners everywhere.
Endnotes

1www.iff.org

2Request a copy, explore an online version, or download the forecast at www.futureofed.org.

3The 2020 Forecast describes drivers of change as major forces of transformation that will shape our efforts to remake learning; they represent the convergence of several trends into emerging ideas and phenomena that will disrupt traditional narratives and assumptions about learning.

4Available from http://www.futureofed.org/taking-action/policy-briefs

5Available from http://www.futureofed.org/taking-action/policy-briefs


8See http://www.mscd.edu/extendedcampus/toolsofthemind


10http://www.sharpbrains.com

11See www.healthyschools.org/who_we_are.html


13http://www.greenschoolbuildings.org/resources/vid_strickland.aspx

14See http://www.greeneducationfoundation.org

15http://pridge.cps-k12.org/pdfs/factsheet_PRM_SHP.pdf

16The lacavore movement promotes eating food grown closer to (or at) home as a way to reduce the environmental impact of the food transport, promote local economies, and eat more nutritiously.


18Haley, J. (2009, April 22). Some communities are printing their own currency.


20 http://www.turnerfarm.org

21 See http://www.pieranch.org

22 http://www.cdc.gov/h1n1flu/schools/schoolguidance.htm

23 http://www.foodincmovie.com/about-the-issues.php

24 http://www.ecoliteracy.org/programs/rsl.html


27 See http://en.wikipedia.org/wiki/Adderall


29 http://www.provigilweb.org/off-label.htm

30 TED is a nonprofit organization dedicated to spreading ideas. See http://www.ted.com/pages/view/id/5 for information about TED, the TED conference, and videos of speakers.

31 See http://www.ted.com/talks/lang/eng/aimee_mullins_prosthetic_aesthetics.html#


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36 http://fab.cba.mit.edu/about/faq
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38 http://www.instructables.com
39 http://www.ponoko.com
Building Policy Platforms for Resilience

Laura Lefkowits and Carolyn Woempner
Mid-continent Research for Education and Learning
About the Authors

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Forward

The 2020 Forecast: Creating the Future of Learning (the forecast) is the second future forecast created by KnowledgeWorks Foundation with the Institute for the Future. Continuing a partnership that began with the publication of the first forecast, 2006–2016 Map of Future Forces Affecting Education, Mid-continent Research for Education and Learning (McREL) and KnowledgeWorks offer this policy brief as part of a series of briefs and workshops designed to engage leaders in co-creating the future of learning, resulting in high academic achievement and improved life outcomes for all students and transforming the world of schooling into a world of learning. The partnership also aims to promote greater understanding among the national education community about the external forces impacting learning today and in the future, in areas such as demographics, technology, economics, globalization, and policy.

The forecast explores how future forces are pushing educators to become more active than ever in creating a future that meets the needs of all learners. It posits that over the next decade most innovations in education will take place outside of traditional institutions. If this is true, what is the role of policy in creating the future of learning? Rather than watching from the sidelines as these innovations develop at the grassroots level in communities around the nation, KnowledgeWorks and McREL propose that policymakers engage proactively in creating a new system of learning, developing policy platforms that can help take promising innovations to scale and help move the entire education enterprise closer to achieving its goals.

Proactive policy responses to change enable an organization not only to adapt to future conditions but also to play a role in crafting the future, especially in times of great uncertainty. These policy briefs speak to policymakers who are similarly committed to shaping the future of learning through policy. This series of briefs will explore six drivers of change presented in the forecast: A New Civic Discourse, Platforms for Resilience, Pattern Recognition, The Maker Economy, Amplified Organizations, and Altered Bodies.
Introduction

This brief examines the policy implications of two drivers of change presented in the 2020 Forecast: Creating the Future of Learning. These drivers—A New Civic Discourse and Platforms for Resilience—point to emerging trends in the areas of participatory media and virtual communities that are empowering individual citizens to organize around common interests and that pressure institutions to change in fundamental ways.

As seen in the related scenarios appearing throughout this brief, the forecast calls attention to emerging systems and frameworks of teaching and learning. The scenarios not only challenge educators to stretch their perceptions of current reality; they also collectively point to a rapidly developing alternative learning system that demands flexibility and innovation in the context of a society redefined by technology and communication pathways. Some of these scenarios may sound far-fetched, while others present plausible, albeit uncomfortable, situations for policymakers. Still others may open exciting new opportunities. Though they elicit different responses, these scenarios have one thing in common: they all are occurring in real time, right now.

We call on policymakers to respond to these changes and other shocks and disruptions to our geopolitical, economic, environmental, and social systems with new strategies. Specifically, we recommend that policymakers build policy Platforms for Resilience, characterized by flexibility, collaboration, and transparency, to support the inevitable transitions in systems of learning on the horizon.
A New Civic Discourse

A New Civic Discourse refers to new community models, communication methods, and spheres of influence that arise in a global society in which community is no longer defined geographically. Rather, the technology and communication tools that undergird a truly global society also generate new forms of interaction and community-building that span geographic identity. The forecast makes the case that individuals will affiliate around common needs instead of common geography, and will claim rights to learning that have previously been the purview of the education elite. Education will become a contested resource among those who seek a claim and demand to participate.

Participatory media

Today, information is an exchangeable commodity to be collected, synthesized, packaged, and distributed along top-down, bottom-up, horizontal, and diffuse channels. Students in schools know of threats, fights, social activities, and mass congregations (smart mobs) before those in “authority” hear a word. Teenagers play online video games, forming spontaneous global communities that span continents and time zones with the goal of defeating a common (virtual) enemy. Global communities are formed, dissolved, and formed again in the space of an evening while those students are doing homework. And, breaking news stories are often first reported by “civilians” on the scene. CNN has benefitted from having millions of potential live-on-the-scene reporters, called iReporters, post their own news broadcasts on a separate Internet site, from which CNN picks up the best for its own site.3

Virtual community

Another arm fueling the shift toward A New Civic Discourse is the formation of communities around common roots and self-ascribed identity. These communities are largely self-organizing and self-affiliating, and are enabled by communication technologies that allow individuals to locate each other and congregate in virtual spaces. Barack Obama’s campaign team acknowledged the inherent potential of these unrecognized and non-traditional communities and raised astronomical amounts of money for his presidential campaign. In one month alone, Mr. Obama raised a record-setting $55 million dollars without

An instant global community takes action

Protesting immigration reform, students use text messaging to mobilize thousands of their peers to walk out of class, disrupting schools and even compromising the district’s finances through absenteeism fines. School administrators encourage the students to stay in school and express their opinions through traditional political avenues, such as writing letters to their state legislators. Students, however, have found their own collective voice and continue to stage smart-mob walkouts.

personally hosting a single fundraising drive. How? By tapping into a new movement the forecast calls “diverse diasporic movements,” where virtual communities of dispersed populations form around a shared common interest and identity. By looking outside of the traditional Beltway fundraising mechanisms, his team found a virtual community of individuals who congregated around a political message and who would otherwise have been impossible to reach.

**Education as contested resource**

As community and society continue to take on new shapes, education will become a contested resource. Today, accountability reports spell out how well schools are performing on statewide tests, feeding the information needs of education consumers. Online and homeschooling are both increasing in popularity, as parents seek learning experiences for their children outside of traditional schooling. And grassroots efforts at the community level, such as DC Voice, which focuses on informing and mobilizing the public to improve its community schools, have illustrated the collective capacity of bottom-up frameworks of influence.

As these trends gain strength, the forecast envisions the rise of the “educitizen,” the empowered citizen activist who asserts his or her rights to a high-quality, meaningful, and personalized education. If the perception is that such an education is not available from traditional forms of schooling, the forecast projects, new forms of schooling will emerge. The school choice movement is a manifestation of this force for change in today’s world as education consumers have catalyzed around a common educational vision and goal to create new learning communities.

**Platforms for Resilience**

The term Platforms for Resilience refers to the growing need for new responses to the institutional disruptions and system shocks occurring throughout society. Consider the challenges faced by President Barack Obama in his first 100 days in office. A short list includes an economic recession on a par with the Great Depression, escalation of the war in Afghanistan, bankruptcy and government takeover of the U.S. auto industry, revelations about the previous administration’s “enhanced interrogation techniques,” the first seizure of an American vessel on the open seas by Somalian pirates, and a swine flu pandemic.

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Each of these events signals a major disruption to our economic, security, military, medical, or global systems.

The forecast makes the case that such disruptions require leaders to respond differently than in the past. Leaders must learn how to meet these challenges with even more flexibility, greater collaboration, and increased transparency. Policymakers, in particular, should look for ways to create or enable the creation of Platforms for Resilience. These newly formed institutions will be spaces in which flexible, innovative strategies can develop for building the resilience of communities as they respond to complex challenges.

**System shocks and disruptions**

The global economic failure that began in 2008 has had dramatic consequences for education. As seen in the 3-day weekend scenario at right, schools have experienced a major disruption from the financial fallout. Rising energy costs, coupled with the economic meltdown, landed a double-punch that has sent districts and states reeling. While districts grappled with the rising cost of transporting and housing students, they were simultaneously hit with massive ballot rejections of their bond proposals and mill levy overrides. Suddenly, schools had more students eligible for free- and reduced-lunch, more students needing bus transportation as their parents tried to save gas money, and more students facing homelessness and uncertainty. These pressures are not likely to ease anytime soon. Energy costs dipped slightly in early 2009, but they are expected to rise again as demand surpasses output and refinement costs increase.

As challenging as maintaining necessary resources is the systemic shock of educating a new and very different generation of students. Indeed, students already are showing up at classroom doors with their digital tools in hand. Students today are “digital natives”; information and the technology with which they access, consume, manipulate, and distribute it is as essential and natural to them as the air they breathe. Young incoming teachers are themselves digital natives, comfortable with technology and ready to incorporate electronic tools and approaches into their teaching practices. These students and teachers prefer multi-media, simultaneous streams of information in their learning environments; prefer graphics to text; and prefer random access over guided instruction. They are adept

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**Students get three-day weekends, like it or not**

The superintendent of a large, suburban school district calls a press conference to announce that, in light of soaring energy prices, the district is moving to a four-day, extended-day school schedule to trim transportation and utility costs. Working parents are outraged, wondering how they will get supervision for their children on the days they are not in school. The superintendent knows she’s replaced one headache with another. But, given that the state has already announced that it is reneging on promised funding for full-day kindergarten and a desperately-needed new middle school, she is almost numb to the battering.

at using their technologic tools to sort, manage, and distill the streams of information that wash over them. However, those education veterans who cling adamantly to their own educational experiences of guided lectures and expert piece-by-piece delivery of information face a disruption that will test their ability to adapt.

**Building Policy Platforms for Resilience**

Policymakers concerned about the future of America’s public education system and the traditional values it supports, if not its structures, would do well to pay attention to these trends and to choose policy responses wisely. The quality of response to disruptions, whether in the arena of generational differences, energy, finance, climate, or education, is a critical indicator of the likelihood that institutions will survive and thrive through system shocks and disruptions.

**Autoimmune responses**

Unfortunately, during times of dramatic change and significant challenge, rather than respond in resilient ways, society often chooses strategies that can be self-defeating. The forecast refers to these strategies as “autoimmune responses;” similar to autoimmune diseases, in which the body’s immune system reacts against substances and tissues normally present, resulting in the body actually attacking its own cells, such responses destabilize and weaken systems. Some authors have cited high-stakes accountability policies, including the No Child Left Behind Act (NCLB), as well as the common ban on cell phones in schools, as examples of autoimmune responses to change. Such responses attend to the symptoms but do not adequately address the signals of deep change associated with the problem. In the case of NCLB, some argue, the approach to teaching and learning is outdated, and the focus on testing and accountability limits the opportunity to build innovative new forms of learning that might ultimately result in improved student achievement. In the case of student cell phone use, having multiple forms of social networking are a fact of life for the Millennial generation; rather than try to prevent their use, schools should try to capture the opportunities inherent in these technologies for improved student achievement and engagement.

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**Californians dreamin’ of better times**

2014 is approaching and California is starting to worry. Much like new homeowners who mortgaged their homes with huge deferred balloon payments, California and 22 other states set modest student performance goals in the early days of NCLB, hoping to somehow be saved when the “balloon” came due. Now, more and more California schools are failing to meet the ballooning performance demands as their promised performance targets continue to rise, and the associated punishments doled out under NCLB make it even harder to get on track.

Sources:

http://www.edweek.org/ew/articles/2008/02/14/424calif_web.html
An autoimmune response in such cases is like anchoring a boat in a hurricane. Despite best efforts, the hurricane is ultimately in charge. Similarly, policy responses that only moderately tweak the system, are reactive, or are made without considering the long-term emerging trends toward which they are aimed, will not be sufficient. There must be a strategy for building flexibility and innovation into the education system—a Platform for Resilience.

Building this flexibility and innovation into the education system requires a systemic approach. Transformation on this scale demands a willingness to reconceive the education system; in essence, it requires the opposite of an autoimmune response. While an autoimmune response may well be the easiest path in the short term, significant system change that embraces the precepts of a platform for resilience needs sustained attention at the systems level.17

**Moving toward Flexibility, Collaboration, Transparency and Innovation**

The new norms described in A New Civic Discourse driver of change will lead inevitably to a transformation of practices in all social domains. What might a policy Platform for Resilience to support the new practices in the future of teaching and learning look like? Resilient platforms are characterized by responsive flexibility, distributed collaboration, transparency, and innovation and adaptation. Can policy be imbued with these qualities in order to support positive outcomes?

**Responsive flexibility**

Building flexibility into policy development will allow for adaptation to changing conditions. Flexible policies, like all policies, should have targeted outcomes and accountability measures. By including a monitoring provision in policies, with the option to modify and even sunset a policy if conditions warrant, policymakers can better respond to the environment in a rapidly changing world.

An example of a highly flexible approach to selecting curricular materials is the rise of open education resources (OER). Not only do these online open source projects, such as Curriki, iTunes University, OER Commons, and Flat World Knowledge hold the potential to dramatically decrease the cost while increasing the relevance of classroom materials, they can provide flexibility and transparency to local school boards as they make curricular decisions.
Consider the possibility that, rather than adopting printed textbooks from a single publisher once every several years, district leaders have access to a host of content developed by multiple experts in each subject area. Moreover, content can be updated routinely. There will be no more excuses for children, who witnessed in real time the inauguration of President Obama as a moment of historical significance, to use an outdated textbook that contains no information about his election or, even more confusing, staidly asserts that America has never elected an African-American president. Consistent monitoring of new scientific discoveries, geopolitical developments, and Nobel prize winners can be incorporated into curricular materials as easily as cutting and pasting into a document.

**Distributed collaboration**

Shareholder actions, initiative and referendum processes, and interest group mobilization are increasingly influencing or eclipsing policymaking inside the boardroom, the State House, and the halls of Congress. Consider the rising civic engagement demonstrated by Millennials who seek ways to engage politically but distrust the “official party line.” They want authentic, unbiased information on which to make decisions. This disposition, coupled with the availability of technology that enables multi-pathway communication and opportunities for participation, makes it imperative to craft policy by seeking the advice of, and partnering with, experts, end-users (those most affected by the policy), and the public at large. To do otherwise is at best a wasted opportunity and at worst a disaster waiting to happen.

One of the first questions effective policymakers ask when confronted with a policy dilemma is, “What is the research on this?” Seeking input from experts on the issue, reading research reports, and searching for information on the Web are all important activities before moving toward solutions. In addition, policymakers should talk with those who are affected by the issue, especially students; this step is too often overlooked, perhaps because it has been difficult to gather groups of individuals together for face-to-face sessions. Today, however, all that is needed is to set up a Facebook page or identify a group of students and put out a survey online through Survey Gizmo or other survey software. These tools and techniques are inexpensive and easy to use, and the information they provide can go a long way toward improving the quality and buy-in to the policy solution ultimately developed.

An example of “advice seeking” in municipal government is a process known as “participatory budgeting.” This process of direct democratic deliberation on a public budget, pioneered in Porto Alegre, Brazil, over a decade ago, has
been shown in a World Bank study to have led to improved conditions for the
poor. The process has spread around the world and has been applied to school,
university, and other public budgets. The forecast also tells the story of Future
Melbourne, the well-known and award-winning collaborative community
planning project that has involved over 15,000 individuals, businesses,
organizations, and community groups from across Melbourne and the world
using face-to-face and online forums and wikis.

**Transparency**

Transparency in policy development translates to a commitment to being
open and connected to citizens. C-span paved the way for 24/7 transparency
in Congress, and many local school boards televise their meetings today. All
states and school districts have sunshine laws requiring free and open access
to public meetings and documents. Many organizations, such as the Sunlight
Foundation and the Sunshine Review, are dedicated to helping citizens
gain access to information about public processes and officials. And, certainly,
the U.S. Department of Education is attempting to set a high standard in
terms of transparency in the use of federal stimulus dollars for education. The
department has established a Web site where taxpayers can not only see how
the money is spent, but also report any abuses.

What else can make policy development and the deliberations of policymakers
more open and transparent to the public? Simple steps, such as ensuring that
school, district, or state Web sites contain up-to-date and accurate information,
help maintain good public relations. Moreover, as soon as a policy has been
enacted, quickly posting the documents with explanatory text and graphics on
a Web site is a critical communication step.

Local school board members might consider taking advantage of the
technology skills of students on your school board to get the word out through
Facebook, Twitter, or a student-written blog. Alternatively, you can start your
own blog. Information in the 21st century is ubiquitous. Make certain that the
public has easy access to the information that seems most important for them
to know and understand when it comes to creating the future of learning.

**Innovation and adaptation**

Even before the recent economic downturn, the need for Americans to be
“creative” and “innovative” was on everyone’s minds. Influenced by such
writers as Thomas Friedman and Richard Florida, metropolitan areas revised
their strategic plans to attract the “creatives” who would drive their local
Today, commentators from President Obama to business consultants see innovation as the key to America’s economic future. Yet, many of these same commentators express concern that our education system is not preparing all young people to contribute to society or the economy through creative and innovative thinking and action. In addition, neuroscientists learn more every year about how the human brain develops and works, and about how students learn.

This new knowledge cries out for innovation in education, and for policies that, while still ensuring strong outcomes, allow for wider implementation of both new and proven innovations in student learning. Proven innovations are not hard to find, especially at the secondary level: just look at project-based learning at the New Tech Schools or the “do-think-do” approach of Big Picture Schools or the ideas shared regularly in Edutopia magazine or on its Web site. Educators across the nation already are exploring new approaches, and as the forecast shows, new opportunities for innovation will continue to emerge. In areas such as Pattern Recognition and the implications of The Maker Economy, design becomes a basic skill.

How can policymakers support this kind of innovation? One way is to allow “space” for innovation within the confines of education rules and legislation. Just as waivers allowed for measuring student progress by using “value-added” systems under NCLB, the re-authorized Elementary and Secondary Education Act should provide opportunities for states, districts, and schools to use alternative measures that would drive innovative learning programs. State accountability acts should similarly allow for such waivers. Other important supports include the federal funding for innovation that is already in place and the funding being considered by states. Policymakers who get the connection between economic and educational innovation should use every tool at their disposal to propel the innovation that is a key component of Platforms for Resilience.
Conclusion

The real-life scenarios presented throughout this brief support potential policy platforms for taking grassroots innovations to scale. Perhaps the incident of stealth participation in online college classes alongside traditional, tuition-paying students is a harbinger of a flexible, adaptive learning ecology. Or, the virtually-organized student smart mob might be the first of many spontaneous, self-organized communities mobilized by a common goal.

The 2020 Forecast: Creating the Future of Learning reveals both the need for and the promise of new learning systems for the benefit of all students. By focusing attention on the future, even as the day-to-day challenges of the present loom large, and by acknowledging the presence of a new civic discourse that is empowering individuals to take control of their own learning, the education policy community can build a platform for resilience upon which these new systems can emerge. With flexibility, collaboration, transparency, and innovation as the guiding principles, policymakers can be leaders in creating the future of learning.
Endnotes

1http://www.iftf.org
2Request a copy, explore an online version, or download the Forecast at www.futureofed.org
3http://www.ireport.com
5http://www.nheri.org/Research-Facts-on-Homeschooling.html
6http://www.dcvoice.org
7For example, see The Alliance for School Choice at http://www.allianceforschoolchoice.org/Home
12For an explanation and additional resources, see http://www.energybulletin.net/primer

17 KnowledgeWorks’ Transformational Dialogue for Public Education initiative at http://www.kwfdn.org/schools_communities/icc.asp


20 www.sunlightfoundation.com

21 www.sunshinereview.org

22 www.recovery.gov

23 See, for example, http://cincinnati360.com/report/next.asp, *Agenda 360: A Regional Action Plan for Greater Cincinnati*. One of its three goals is to keep talented workers and attract new ones because of the entrepreneurial aspirations, vigor and creativity some economists think this group offers.


26 http://www.newtechfoundation.org/index.html

27 http://www.bigpicture.org/innovation

28 http://www.edutopia.org

29 http://www.futureofed.org/driver/Pattern-Recognition.aspx

30 http://www.futureofed.org/driver/The-Maker-Economy.aspx