Amplified Policymaking

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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.[1] 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*[2] 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[3] 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,*[4] 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[5] 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.[6]

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.[7]

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[8] 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

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.[9]

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[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.[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.[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"),[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.[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[15] to study the educational potential of these new platforms. Their research revealed

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.

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]

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

upon lesson plans and other curricular components (e.g., Wikieducator,[17] OER Commons,[18] and Curriki[19]). 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.[20]

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.[22] 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.[23] 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.[24] 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.

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. [21]

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.

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.

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.

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.[31] 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."[32] 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.[33]

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.[34]

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

[5] Examples of "keep track of me" applications can be found at http://twitter.com, https://presentlyapp.com, and http://brightkite.com.

[6] http://www.trackyourhappiness.org

[7] See Hotz, R. L. (2008, June 10). Cell phone data track our migration patterns. *The Wall Street Journal*, p. A12, available from http://online.wsj.com/article/SB121304382688758305.html; see also this brief research description from Science Netlinks at http://www.sciencenetlinks.com/sci_update.php?DocID=175

[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

[16]See http://www.boston.com/news/education/k_12/articles/2009/04/16/anti_bully_pulpit/?page=full, http://www.wickedlocal.com/norton/homepage/x882232838/Computer-game-for-schools-takes-aim-at-bullying, and http://www.braincells.net

[17]www.wikieducator.org

[18]www.oercommons.org

[19]www.curriki.org

[20]http://harvardbusiness.org/product/connect-and-develop-inside-procter-gamble-s-new-mo/an/R0603C-PDF-ENG?N=516185+4294934919&Ntt=innovation

[21]http://lesley.edu/gsass/audubon/about.html

[22]http://en.wikipedia.org/wiki/Software_release_life_cycle

[23]http://www.infed.org/thinkers/senge.htm

[24]http://prodsol.co.nz/provisionalsolutions.html

[25]www.knowledgegarage.org

[26]http://arstechnica.com/web/news/2009/05/some-of-googles-services-may-ditch-the-perpetual-beta-tag.ars

[27]http://en.wikipedia.org/wiki/Perpetual_beta

[28]http://oreilly.com/web2/archive/what-is-web-20.html?page=4

[29]http://www.cmswire.com/cms/enterprise-20/for-google-apps-the-perpetual-beta-is-over-004989.php#evt-never, http://www.slate.com/id/2222434

[30]This 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.

[31]See *Building Policy Platforms for Resilience* at http://www.futureofed.org/taking-action/policy-briefs/ or download the forecast at www.futureofed.org

[32]Takahashi, D. (2008, October 9). IBM's Innovation Jam 2008 shows how far crowdsourcing has come. *Venture Beat.* http://venturebeat.com/2008/10/09/ibms-innovation-jam-2008-shows-how-far-crowdsourcing-has-come

[33]http://www.ibm.com/ibm/jam/, https://www.collaborationjam.com/, and http://venturebeat.com/2008/10/09/ibms-innovation-jam-2008-shows-how-far-crowdsourcing-has-come

[34]http://www.dellsocialinnovationcompetition.com

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