

Education 2.0: Teaching and Learning in the Information Age

Leonard J. Waks
Temple University, Philadelphia, USA

Abstract *The Internet offers a powerful new platform for learning and teaching. Web 2.0 technologies and new digital tools – cameras, video and voice recorders, drawing tablets and the like – have the power to transform schools as we have known them and usher in new forms of educational organization and collaboration. The key to this process is the power of individual network participants to “cast nets” – to use social media and search to make themselves and their capabilities known online, and to link up with others for collaboration and collective action. Entrenched hierarchical educational organizations cannot accommodate these new powers. To embrace the Internet, schools and colleges will thus need to shift from hierarchies to networked organizations.*

Keywords organizations, networks, hierarchies, fundamental change

Introduction

In thinking about “other education” – especially about frameworks for education other than our familiar schools – it is difficult to avoid consideration of the Internet as a new platform for learning and teaching. I will argue in this paper that the Internet – particularly in the form of Web 2.0 - will transform schools as we have known them and usher in a new era - Education 2.0. I develop my argument in four steps:

- I. The Internet creates a quantum leap in individual, group, and collective power;
- II. Our hierarchical organizations like large firms and schools are poorly equipped to integrate these new powers;
- III. But new networked organizations can make use of them to challenge, out-compete, and even eliminate hierarchies;

Leonard J. Waks
Temple University, Philadelphia, USA.
lwaks@temple.edu

IV. Networked organizations are emerging in education outside the one best system. They can out-compete and out-educate standard schools and open the way to revolutionary change.

I. The Internet and Action Power

The Law of the Instrument

Abraham Maslow said “If the only tool you have is a hammer, everything looks like a nail” (1966, p. 15). This is often called “Maslow’s Hammer.” Maslow himself called it the “law of the instrument” and said it could be explained simply: “Give a small boy a hammer and he will find that everything he encounters needs pounding” (Maslow, 1966, p.15). The operative terms here are “small” and “pounding.” Small people have limited fields of vision, and adopt crude measures to achieve narrow goals.

This law is turned on its head by the World Wide Web, especially in its current rich, interactive form (Web 2.0). Individuals on a global scale are now equipped with an extraordinarily powerful tool, the mobile broadband networked device. This tool is broadening our field of vision, the scale of our ambitions, and our potential for significant action.

Networks and Networked Action

To understand our new powers we must be clear about networks. Networks are aggregations of items (nodes) that can be connected by links. The brain is a network of neurons (nodes) connected at synapses (links). The mind is a network of memories and ideas (nodes) connected by association and laws of logic (links). A family is a group of members (nodes) connected by norms of kinship and bonds of affection (links). Any aggregate of connectable items can be conceived as a network.

Applying the law of the instrument, when people, even rather ordinary people, have a network device, everything looks like a linkable node. The fundamental change today is that everyone can act with a networked device. They can, in the words of Judy Breck (2004), “cast a net.”

In March 2008, 11 year old Tavi Gevinson of Oak Park Illinois, a suburb of Chicago, cast a net, connecting to the Internet by posting a first entry in her aptly named blog *Style Rookie*: “Well, I’m new here. Lately I’ve been really interested in fashion, and I like to make binders and slideshows of ‘high-fashion’ modeling and design.”

A year after this first online post Tavi was declared the “new darling of the fashion industry.” Her blog was getting 1.5 million hits a month. While her classmates struggled with long division and parts of speech, Tavi dashed off to front row seats at runway shows in New York, Paris, Tokyo and the world’s other major fashion centers. *USA Today* profiled her and soon she was seen on the cover of *Pop*,

and in feature articles in *Sassy*, *Love* and the *New York Times Magazine*. Top fashion designers Kate and Laura Mulleavy, hooked on Tavi's cutting edge fashion commentary, and featured her as the inspiration for their 2009 *Rodarte* collection for Target. Soon other top designers came running with new projects. In October 2011 Tavi was selected as cover girl for the 90th anniversary issue of *L'Officiel*, the leading Paris fashion magazine.

You don't even have to publish a blog to get notices. Here are two other ways you can cast a net:

a. Search. You can do a Google search for a topic of interest and locate powerful web sites on the first page. These sites have been selected by a Google algorithm as having the most and best links. Some will connect to key documents, others to prominent experts or to library and museum help desks along with their email addresses and phone numbers. If you can present yourself appropriately you can obtain assistance. In interacting with others you will come up with interesting ideas and other useful links. You are no longer working alone; you have a team.

b. Social Media. You can also cast a net by posting on a social media site like Facebook or Twitter, LinkedIn or Yahoo Answers. "I am interested in learning more about this topic. If you know anything about it, or any people who do, please contact me and please share." This will also connect you to resources with which you can engage and interact.

Clay Shirky (2008), in his account of the power of the Web, *Here Comes Everybody*, notes that a social network is a cross between a "tool" and a "community." People have a *dual visibility* online, Shirky explains: they can rapidly be *found* and *assessed* (2008). Assessment generates trust; if you can judge who you are dealing with you are more willing to connect. Google's algorithm contains a built in form of assessment: the most linked people in a field are likely to be experts: in a "climate-change" search a climate scientist will have more links than a change-denying kook. You can check others out and they can check *you* out and choose whether or not to connect.

New Capabilities

Networked action opens up new capabilities. With new digital tools linked to websites you can make a high quality picture or video and share it on Flickr or YouTube. Others can find it, share it, republish it, alter it, or mix it up with other things to create something new. They can also use social tools to find and connect with

you, engage you in their projects, join with you in collective action. Sebastien Paquet calls this “ridiculously easy group formation”¹ – it is this ease of connection that has provoked the quantum leap in individual and group action power.

Those who have been skeptical of such claims need only consider the recent revolution in Egypt, where a few well-linked young people cast a net and overthrew a determined dictatorship.

In an interview with CNN's Wolf Blitzer, Wael Ghonim, the marketing manager for Google credited with lighting the spark that ignited the revolution, said:

This revolution started on Facebook. This revolution started when hundreds of thousands of Egyptians started collaborating content. We would post a video on Facebook that would be shared by 60,000 people on their walls within a few hours. I've always said that if you want to liberate a society just give them the Internet.” When asked what he did to start the revolution, he said "I'm not a hero. I was writing on a keyboard on the Internet.” (Smith, 2011)²

He was, as Judy Breck would say, just “casting a net” (2004). To anticipate section II: everyone in schools today – students, teachers, and administrators – has access to networked devices. They can all cast nets. But they rarely do because the results of network action are hard to fit into conventional school routines.

Professionals and Amateurs

Networked action challenges professionals – including professional educators - as the Internet places professional-level capabilities into the hands of amateurs. Armed with the Internet and Web 2.0 technologies, people can rapidly learn useful new skills at a high level.

The concepts of “professional” and “amateur” are historically specific, acquiring their current sense in the late 19th century. From that time until the age of global networks, large scale action required management and expensive infrastructure: manufacturing firms with managers and plants; newspapers with editors, presses and distribution systems; schools with administrators and large buildings or campuses.

The organizations’ costs for finding and assessing people and bringing them onto the team, so-called transaction costs, were high. Costs of hiring lower cost workers in the open market were, because of these high “transaction” costs, higher than those of incorporating them as higher-paid employees. Think of trying to run a school if you had to find a new crop of teachers in a market environment every day! Better to pay more for stable, reliable employees.

¹ See the Wikipedia article on Paquet, online at http://en.wikipedia.org/wiki/S%C3%A9bastien_Paquet, accessed June 25, 2010

² See also Ghonim (2012).

But even regular employees have to be located and assessed as competent and manageable – at least once. “Professionalism” was introduced to address this problem. Before the late 19th century university-based professional education hardly existed. Doctors, lawyers and engineers learned by working with and under others. In the culture of professionalism introduced after 1870 (Bledstein, 1976), being a professional came to mean having a university-based credential signaling a standard level of competence.³ Hiring only “professionals” lowered search and assessment costs.

But today, people can collaborate and coordinate actions with free network tools. They don’t need management and infrastructure to do significant things – the Internet makes these things unnecessary. They can gain high-level skills through online experiences, and then leverage the web and its social networks like Facebook and LinkedIn to make themselves known to those seeking skills and offering opportunities. Neither those developing and offering relevant skills nor those providing opportunities in the age of the Internet will necessarily possess prior professional degrees or access to expensive infrastructure. This is a big challenge to both professionals and to the top-heavy, expensive organizations that credential and employ them.

The Net Generation

Use of the web is expanding around the world. By 2010 – the last year for which reliable statistics are available – Internet penetration in the U.S. reached 77%, and President Obama called for 98% of Americans to have 4G wireless within five years. Even in Africa, the continent with the lowest penetration, 11%, penetration has grown by an astonishing 2500% in the last decade. It will not be long until almost everyone, everywhere, has a very powerful, continually improved, cheap, easy to learn, easy to use, mobile digital device.

Internet use penetration is greatest among young people. According to a 2010 study by the Pew Center for the Internet and Society, nearly three quarters of online teens and young adults use social network sites (Madden, 2010). Older adults are not as linked; about 40% of adults 30 years and older were using these sites in the fall of 2009. The young are the ‘netcasters’.

Don Tapscott (1999) speaks of a “net generation” - those born after 1977 – those who came of age along with the Internet. Today they would be 35 or younger. We can also think of a web 2.0 generation, reaching their teens and forming their media habits when web 2.0 came online around 2003. This group would consist in those

³ According to Sheila Slaughter and Gary Rhoads (2009), the “culture” of university based professional roles backed up by educational job credentials and state licenses is now being replaced by an “academic capitalist” knowledge/learning regime.

born after 1990 – those 21 and younger, entering the workforce today and in the future.

Tapscott says that the net-generation values speed, creativity, sharing and collaborating, openness and authenticity, values that derive from network action. They want to do innovative things quickly, with people they trust. Of course people alive before 2003 also valued these things, but their desires were rarely fulfilled. Today's young people are experienced in network action – they expect opportunities for creativity and collaboration and are frustrated when these values are denied. They bring these values to school, where they are frustrated as teachers confiscate their mobile phones and schools block web sites. As they grow older they bring these values to their work, and seek situations where they are appreciated and respected. This is another big challenge for top-down, tightly managed organizations.

Complexity

Pounding everything you encounter with a hammer is “simple.” You know the tool and its effect. Networked action is inherently “complex.” Complexity arises from the number and types of nodes in a network, the number and variety of links, and the number and type of interactions (Waldrop, 1992). If you start with not just a hammer but also a saw and a chisel, more can be seen in the field of vision, more actions become possible but outcomes become less predictable. Throw together an architect, builders, the clients and their lawyers and psychiatrists, and things get “complex.” Maybe amazing things will happen; or just chaotic disorder, or simply nothing.

In a network all of the nodes can potentially be linked. In the Internet the possible combinations are limitless. Wael Ghonim could light a revolutionary spark by posting on Facebook, but he could neither predict nor control what would happen next. This complexity, to reiterate, makes it very hard for top-down organizations to integrate networked action.

II. Hierarchies

Unlike networks, where all links are possible, hierarchies tightly restrict links. *Directive* links flow downward through levels of control to those at the bottom. *Report* links flow from the bottom back up to the top. There are no direct cross-level links. Few links affect behavior among nodes at the same level because authoritative directives have already been handed down from above.

Top management establishes a comprehensive plan and sends directives down to functional division heads that establish the sub-directives for their functions and send them down to middle managers, etc., until specific operational directives reach the bottom rung of operatives, whose performance outputs are then reported back up the chain.

In an automobile firm top management establishes the overall shape of the model line, sends directives to design, marketing, engineering and manufacturing. When their various teams have completed their functional tasks they report back to top management, which pulls the model year together. In a high school the district board and superintendent establish overall direction; the principal interprets them for his/her school and sends directives to department heads who convey them down to teachers operating directly on students. Data is gathered on student achievement and reported back up the line to the superintendent (and state and federal officials).

The hierarchical organization embodies a distinct model of rational action, which we may call “means-ends reasoning.” Aims are established first. Plans to achieve these ends follow; means are selected and tightly controlled to achieve ends. Efficiency means the highest yield of ends per input cost - the most widgets (or student learning objectives) per dollar. Other costs and outcomes are written off as “externalities” and ignored.

Efficiency in this narrow sense is increased as operations are scaled up and economies of scale realized. It is increased by standardization, because each unit of standard output requires fewer inputs than a unit of customized output.

Problems with Hierarchy

The problems with hierarchical organization are familiar. Here are five of them:

a. Repetition and boredom. Work tasks in standardized production below the top levels of management are repetitious. They rarely demand creative effort. They do not express the unique personalities of the workers. Passion, and even engaged attention fade over time. Burn-out is common. Costly errors and injuries result from inattention. Alienation and cynicism are high, and in extreme cases workers even sabotage production.

b. Siloing. Because mass production hierarchies operate in functional divisions they tend to form “silos” – multiple clusters of people and skills who are connected to one another but not connected to those in other clusters. There is little “cross-fertilization” of ideas or “interim coordination” of plans and results. Studies show that the best ideas frequently arise from “bridge” workers, those who are well connected with multiple clusters. They are able to “fill structural holes,” that is, to make significant connecting ideas and communicate them where needed. Hierarchies “silo” and have no roles for bridging capabilities. Will math teachers pay much attention to a literature teacher with an idea about how to teach math?

c. Narrowness and Inflexibility. Because mass production hierarchies hire workers as regular employees the organizations tend to be poorly informed about outside talents. Unless they seek to hire them away from the competition they are unlikely to know them. When their standard products are selling they can keep producing them. When market demand weakens they can't rapidly draw from the outside talent pool. But that is precisely when "the smartest people work somewhere else." The organizations need people with different mind sets but are slow to notice this, then can't find them, and when they finally locate them insiders resist them. The organization can go under before it turns around.

d. Cognitive Surpluses and Deficits. Everyone is unique, with latent capabilities not channeled in their roles. The math teacher is a theatre buff; the "average" student is a master at Irish folkdance. This has two consequences for hierarchies.

First, because in hierarchies people are not broadly linked, their capabilities can't be found nor assessed. ("Who knew she could dance like that?") If the only tool the organization has is a middle manager, the only thing it can do is direct, and report on, narrowly defined behaviors. Thus the organization is blind to the full range of actualized and potential capabilities of its participants, and as a result possesses an ever-growing but invisible cognitive surplus – capabilities it has but cannot use.⁴

Second, group members with latent capabilities that cannot be channeled into their roles may simply fail to develop them. Instead of spending evenings and weekends reading, working on hobbies, participating in politics or developing small businesses, they sit in front of the TV and get stupefied. Studies show that routine workers pre-maturely lose cognitive powers. So the organization also has a growing cognitive deficit. It wastes its resources in both cases.

e. Professional Blinders. Professionals are slow to grasp the capabilities of those without professional credentials and access to expensive infrastructure.

⁴ Robert Dreeben (1968) used the term "universalism" to designate this feature of hierarchical organization; participants show adherence to the norm of universalism when they treat other participants as members of organizational categories rather than holistically as unique individual people.

Newspapermen and women were slow to take blogs seriously. They were blindsided by Craigslist, the Huffington Post, and Google-based online advertising. Before the smoke cleared they had lost their monopoly over classified and display ads and journalistic authority.

After Gutenberg, scribes tried to protect their book-production monopoly by arguing that hand writing imparted special qualities to books that could never be added by “machines.” Teachers make similar arguments. But to anticipate the next section: how many hand-written books have *you* read lately? The schools face a more serious challenge because they are still a protected monopoly, with compulsory attendance and standardized tests for the all-important high school diploma. Schools still can’t imagine threats from beyond the system. But Sal Kahn, the Craig Newhouse of education, lies in waiting with his academy offering superior, free online courses in just about every school and college subject.⁵ Kahn wants to be the teacher to the world! How many principals and teachers lie in bed worrying at night about him? Not many! They may be in for a big surprise!

Hierarchies and Networked Action

Managers in hierarchies don’t want subordinates casting nets. Workers casting nets to discover new and better ways of doing things are by definition deviating from managerial directives and standard operating procedures - introducing uncertainty and undermining control. Workers “casting nets” to organize collective action outside the control of unions pose an enormous threat to management. Imagine little Gael Ghonim Jr. casting nets and standing by as his high school morphs into “little Egypt.” If you think this is farfetched consider the recent wave of nasty youth flashmobs.⁶

Hierarchies reduce complexity by reducing or eliminating links to maintain predictability and control. Schools reduce complexity radically. Teachers work in isolation; they don’t interact with one another. Students can’t “talk to their neighbors.” If an interesting point comes up in a classroom interaction that moves the lesson in an unexpected direction the teacher says “now, children, we have to move on.” Teachers don’t meet across departments to coordinate lessons.

⁵ Khan currently offers more than 3200 videos, and his website says that he has now delivered more than 192 million video lessons (as at September 2012). <http://www.khanacademy.org/>

⁶ See Timpane (2011): “From Minneapolis, Chicago, and Cleveland to Washington and New York, people have used social media to organize robberies, fights, and mayhem. Margaret Rock, editor at Multimedia.com in Chicago, stated ‘I don’t know why, but what started out as something used for good has shown its dark side.’”

III. Networked Organization

The Shift from Hierarchies to Networks

In the global network era there has been a shift away from large scale bureaucracies to smaller networked organizations. These organizations have competitive advantages. They already out-compete hierarchies and eventually will eliminate them in many fields. To take two extreme cases: Linux and Apache open-source software, created entirely by volunteer labor, dominate their fields and crush commercial alternatives. Wikipedia, also created by a network of volunteers, killed off Encarta and marginalized Britannica. Commercial networked firms like Cisco also out-compete their competitors. They find materials, information, high level capabilities and labor power online, assess them in real time at low cost, put them to their best uses, and coordinate their outputs - often without human intervention - sharply reducing costs.

Large industrial firms have been hollowed out, retaining command and control functions but shifting other operations to external “partners” on a global scale. This allows them to adjust rapidly and flexibly to shifting market demands. They increase efficiency by using contract workers with just the right skills, at just the right price, just-in-time for just the right tasks. By contrast a full time employee must be paid his salary and benefits whether or not his most efficient task, or indeed any task, is at hand. The extreme case is the “Rubber Room” recently featured in a New Yorker expose (Brill, 2009), where deeply disturbed unionized teachers were ware-housed at full pay because they were unable to work but couldn’t be fired.

Outsourcing is a self-augmenting process: as more employees are laid off and functions out-sourced, more free-lance contractors and small start-up firms emerge. Intense competition among them drives the price of contract work down and further accelerates out-sourcing.

As a side-note, the factors driving this self-augmenting process are not merely economic but also political. Without question our captains of industry have gained enormous political power. They control legislators. They push policies that facilitate down-sizing and out-sourcing and block those that slow it down or alleviate its negative consequences. Fortunately the Internet also facilitates mass political action, as we saw in Egypt and now see in the “Occupy” protests. This is a complex process; no one knows exactly how it will play out.

Human Advantages of Network Organizations

Network organizations also have advantages in terms of human satisfactions. We all simply *loathed* bureaucracies until they laid us off and outsourced our functions. Whatever “Occupy” protesters want, it is not a return to hierarchical organization. We will appreciate network organizations more when we figure out how they can

adequately compensate their workers here and abroad. Here are some of their advantages:

a. Repetition v. Creative Values. Members of the net-generation have those net values: speed, creativity, growth, openness, trust, collaboration. These are stifled in hierarchies but welcomed in networks. Young people gravitate to networks for satisfying work.

b. Siloing v. Cross-functional Experiences and Capabilities. Freelancers and *ad hoc* work group members gain broader experience than those filling bureaucratic pigeon holes. Though work identities continue to be built loosely around professions or areas of expertise, networked workers are expected to perform diverse tasks requiring broad and flexible skills. They also form better ideas because they are positioned to fill structural holes. They productively reinvest their cognitive surpluses by putting them to new, unpredicted uses.

c. Flexibility and growth. Knowing that work assignments can end at any time, network workers actively keep their peers informed of their achievements and growing capabilities. Lacking *employment* security, they seek *employability* security through state of the art skills. Knowing people in their fields and being known by them are the keys to the next assignment. This upward pressure for growth and visibility cannot be all bad.

d. Non-remunerative Motivations. Networked organizations offer non-monetary rewards that engender low cost or free contributions. People work not just for money, but to express capabilities, to grow their knowledge and skill, to gain recognition, to defeat something they hate, to make a positive difference (Goodman, 2010). The bureaucratic man in the “grey flannel suit” is “selling sugar water, not making a difference,” as Steve Jobs reminded John Scully. Giving broad masses better chances to learn and grow and make a difference represents a giant step for humanity.

Harnessing Complexity

Network organizations operate by casting nets. Linus Torvalds, a grad student in Finland, founded Linux by casting a net; he posted a short message on a computer bulletin board, saying in part:

Hello everybody out there... I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu). I'd like any feedback on things people like/dislike in minix, as my OS resembles it somewhat... I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them :-)

Like Gael Ghonim in Egypt, Torvalds was no hero; he was “just sitting at his keyboard typing on the Internet.” And then amazing and unpredictable things happened.

Networked organization puts into play a new conception of efficiency (we might call it “efficiency 2.0”), as “the most field-related value per unit input” (not the most pre-set measurable objectives). A rough consensus on the value of outputs can often be achieved even if they are not specified in advance or measurable. Or the organization can “release in beta” and let its community bring out the latent values in a process of “ready, fire, aim.” This form of efficiency grows out of networked complexity, where you can’t plan by objectives or control means, but you can coordinate outcomes to realize powerful but unanticipated values.

IV. The Learningweb Revolution and Education 2.0

Schools are hammers. If the only tool you have is a conventional school, young people all look like *students* needing to have knowledge pounded into them, by being subjected to a pre-set curriculum. So far schools have tried to block networked action (confiscating cell phones, blocking web sites) or channel it into its old, hierarchical routines (on-line versions of conventional courses).

This has to change. The contemporary challenge for education is leveraging the extraordinary power of the Internet to extend learning power and the intellectual and practical capabilities of young people. This can only happen when every learner and teacher become “netcasters.”

Networked Educational Organizations

What then might schools look like? Don Tapscott and Anthony Williams (2006) distinguish several kinds of networked organizations. Four are directly relevant for education, and provide starting points for discussion.

a. Peer production: organizations like Linux and Wikipedia offer innovative, large scale products comparable to those of commercial hierarchies like Microsoft, drawing only on contributions from volunteers.

Curricki, a platform for free open source multi-media learning materials, is a good example in education. The materials are produced

by teachers for online distribution using low cost digital tools. Video lectures, text materials, and learning software of near-commercial quality can now be produced even for the “long tail” of users, e.g. instruction on languages with few remaining native speakers.

The Open Courseware Foundation gathers courses from leading universities and puts them online for free. 500 universities contribute; MIT offers all of its courses. MIT’s costs are low but sustain its reputation as the world’s leading technical university.

Sal Kahn is almost single-handedly producing courseware for every school and college subject. The goal of his academy: “we hope to empower everyone, everywhere with a free, world-class education.” This is an idea worth contemplating.

b. Idea and Knowledge Work Marketplaces. Firms like *Innocentive* provide a market for ideas, inventions, and uniquely qualified contract workers to fill needs not met by firms’ patents and employees. Firms buy or sell their cognitive surpluses, e.g. unused patents, even unused employee time. If the smartest people work elsewhere, this is where you find them.

Teacher marketplaces already exist. American schools find licensed teachers in other states or overseas. If a school does not have enough students to field a physics or calculus class it can buy an online course for even one student.

An important opportunity lies in areas where demand can arise though no courses or credentialed teachers even exist (e.g., hip hop, complexity studies). Unexpected but valuable subject areas emerge as possible topics for education as soon as teachers and learners “cast nets.” Good materials and competent providers can be found and assessed online. Not every competent provider will be a credentialed teacher.

c. Prosumer Communities. Communities of innovative “hackers” emerge as more people acquire professional-level digital skills. Such *prosumers* have existed forever; remember hotrodders? Today, users “hack” their smart phones and software programs. Most firms worry about losing control of intellectual property, design against hacking and sue hackers. The problem: this creates ill will among your smartest and best-connected customers. The alternative is to design for and encourage hacking, and draw on prosumer communities to improve products.

In education open source text books provide a good example. Many teachers resent being locked in to information-poor text books. Now *Flatworld Publishers* offers free open source text books. Teachers hack these at will, eliminating, editing, augmenting or adding their own chapters using copyright-free materials from the web. They change the textbook on the fly in response to classroom complexity, to create unexpected but powerful learning opportunities.

The next stage of development will be open source learningware designed for hacking by learners. Today students can cast a net and pull down everything needed to explore any topic, especially with the help of the friendly person at the online university library help desk. They can prepare units or write blog posts about what they learned. With students as a community of prosumers, schools can become genuine learning communities.

d. Platforms for participation. Amazon, e-bay, and the Android market are platforms; they invite others to build business operations on their infrastructure.

School districts are now migrating to “portfolio management” – coordinating diverse kinds of schools and providers. It is not a large step from portfolio to “platform management” - districts making their APIs public and inviting outsiders to provide no-or-low cost lessons, units, and courseware. Some cyber charter schools already out-source all instruction; in the age of hip hop and re-mix is the school as platform that farfetched?

It Takes a Global Village

If it takes a village to raise a child, it will take the global village to raise young people and bring them into society in the age of global networks. Platforms for participation can make this possible. Amazon provides a global platform for user-generated commentary and reading lists. Yahoo Answers provides a global forum for raising and answering questions on all topics. A non-governmental educational network can serve as a global platform for community involvement in all forms of learning.

The Internet is a platform for exchange, collaboration, and collective action on a global scale. Today, the web is breeding a participatory culture, and leading websites are built on “user-generated content.” Craig Shirky (2011, p. 10) notes that citizens of industrial democracies have had considerable free time since the 40 hour work week was established. Most of that time has been absorbed by passive entertainments, especially TV. Americans watch about 200 billion hours of television each year. By contrast, the creation of Wikipedia in its current state

represents 100 million hours of invested human effort. One hundred million hours is a lot of time, but Americans spend that much time each year just watching TV *commercials*. We have, as Shirky puts it, a huge “cognitive surplus” - we have plenty of time to create “content” (2011).

But why do we bother? Shirky answers that human motivations are reasonably constant: to work autonomously, to grow in competence, to belong and to share (2008). The Internet simply provides new opportunities to do what we have always wanted to do, and on a grander scale. We can now treat the free time of educated citizens globally as a “general social asset that can be harnessed for large, communally created projects, rather than a set of individual minutes to be whiled away one person at a time” (Shirky, 2008, p. 10).

We want the media not merely to entertain but also to connect us - to help us to feel less lonely, to feel more competent and creative. The Internet does this job so much better than TV. When users generate the content themselves, even if the production values are modest, they are channeling very basic motivations. Shirky estimates that our global cognitive surplus of educated citizens exceeds one *trillion* hours a year. That is a cool million Wikipedias every year. We can channel that into activities serving individuals, communities, and broad publics. Wikipedia, for example, is an unparalleled public good, serving not only the Wikipedians who create it but the rest of us as well. And through collective action, Internet users like Egyptian Wael Ghonim can even transform society.

There are few motivations more inherent in human than nurturing young people and bringing them into life in society by educating them. It is an accident of twentieth century life that we have assigned this role exclusively to professional teachers in large bureaucratic organizations. It takes a village to raise a child, and it may take the entire global village to raise its young. That village now has adequate means, but it still lacks institutional channels for directing the cognitive surplus to the educational task. Creating these channels is one chief task of the learningweb revolution.

From Hierarchies to Networks in Education

The huge obstacle is the dominant hierarchical paradigm, with its means-ends reasoning, its narrow conception of efficiency as production of pre-determined objectives, its tight control of teaching and learning, its compulsory curricula and standardized learning objectives and tests.

For education to embrace the Internet and networked action all this must be given up in favor of a network paradigm of education, a network model of rational action as the harnessing of complexity, a network conception of efficiency as cost-effective production of field-relevant value, and openness to external, non-credentialed education providers, including learners.

Can this happen? No guarantees, but I think this is possible. We no longer read hand-written books; Gutenberg's movable type out-competed them. Network servers no longer use commercial software programs; Apache out-competed them. We no longer use Britannica or Encarta; Wikipedia crushed them. IBM and Proctor and Gamble, two of the most networked industrial firms, dominate their industries.

Some will say that these comparisons are irrelevant. Education, they will say, is not like a business. Well, there is something to this. But schools still need resources to operate. Good schools attract residents to neighborhoods, pumping up real estate values but also increasing local taxes. Tax payers have been in open revolt since California's Proposition 13. Legislators are on the war path; two states have already wiped out collective bargaining rights of teachers.

As people migrate from hierarchies to networks and become adept netcasters, their conception of rational action and of effective schools are changing. They will want to know how their districts are leveraging the Internet to improve learning and to control costs. They will not remain hung up on what a "real school looks like" or satisfied by claims about the ineffable educational qualities of classroom instruction.

Meanwhile Curricli, Open Courseware, open source textbooks, multitudes of low and no-cost professional quality providers, and Sal Kahn, teacher to the world, wait in the wings.

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Author Details

Leonard J. Waks is Professor Emeritus of Educational Leadership at Temple University. Contact address: Temple University, 1801 North Broad Street, Philadelphia, PA 19122, United States. E-mail: lwaks@temple.edu

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