



Innovating to Transform Teaching for 21st-Century Learning

Convening 2: Modernizing Teaching Tools and Processes By Katherine Prince, KnowledgeWorks Foundation

Teenagers are the producers. Children are the leaders for the world, not tomorrow but now and yesterday. Whether it's a gaming or mentoring project, audio, video, they're the ones who get a say in what comes out and they're the ones who have a say in what happens to the world with these projects. – Tabitha Tsai, Global Kids, Inc.

Introduction

This paper explores participants' perspectives from a convening hosted by KnowledgeWorks Foundation, a Cincinnati, Ohio, based operating foundation whose mission is to solve national education problems innovatively and with others, on the topic of "Modernizing Teaching Tools and Processes." In hosting this convening, KnowledgeWorks Foundation hoped to:

- Examine how a variety of technologies are being used to meet the needs of today's learners
- Examine how technology can transform teaching and learning
- Identify the types of learning experiences our students need today and into the future
- Identify programs, projects, and policies that can support learning experiences of the future.

Fifteen education professionals came together at WestEd in San Francisco, California, to explore how teaching is incorporating emergent instructional technologies to meet the needs of all learners. The people around the table were:

- [Richard Beach](#), Classroom of the Future: TIME Initiative
- [Rosalind Chivis](#), School of the Future, Philadelphia
- [Kevin Clark](#), George Mason University
- [Robert Clegg](#), Tabula Digita
- [Karl Fisch](#), Arapahoe High School
- [Lucy Gray](#), University of Chicago Center for Urban School Improvement
- [Cammy Huang](#), Stanford University
- [Coy Ison](#), Workedge
- [Gerri Maglia](#), Texas Education Service Center Region XI

- [Alice Petty](#), Stanford University
- [Kit Rich](#), Natomas Charter School
- [Christopher Shearer](#), North Carolina Department of Instruction
- [Bernice Stafford](#), founder of Lightspan
- [Tabitha Tsai](#), Global Kids Inc.
- [Chris Walsh](#), WestEd Interactive

Facilitated by Jim Kohlmoos of Knowledge Alliance, this exploratory conversation was the second in a series of four addressing innovations in teaching. A paper from the first convening on the topic of creating transformative professional learning communities is available at <http://www.kwfdn.org/map>. Future conversations will cover re-imagining teaching careers and preparing highly effective teachers.

The conversation made use of the *Map of Future Forces Affecting Education* to prompt participants' thinking about how education might change over the next ten years. (For more information on this map, which KnowledgeWorks Foundation commissioned from the Institute for the Future, see <http://www.kwfdn.org/map>.) Introduced by Monica Martinez of KnowledgeWorks Foundation, the *Map of Future Forces* describes several key drivers that can be expected to change the landscape in which teaching occurs:

- The emergence of **grassroots economics**, leading to a more participatory culture
- The enabling of multiple spheres of connection through **smart networking**
- Individuals' increasing affiliation with subcultures that support their **strong opinions, strongly held**
- An increasingly **sick herd**, with students needing support to manage chronic illness
- Communities marked by **urban wilderness**, wherein some infrastructures increasingly break down while others thrive
- The **end of cyberspace** in favor of more pervasive technologies.

Participants explored how technology can improve teaching and learning, examined barriers to effective implementation, imagined what teaching and learning might look like in 2020, and discussed what it would take not only to manage change toward a new vision for education, but to move beyond the tendency to focus on individual efforts and instead to effect systemic change.

Improving Teaching and Learning through Technology

We have to delve into what is it for the teacher that's going to make this meaningful, and what is it for the student that is going to make this useful? – Bernice Stafford, Lightspan

The whole notion of teaching and learning becomes confused when you introduce this change agent called technology. It's certainly going to change teaching and learning. But how do we know whether we're making something better or worse, and if it's worse, what are the consequences and how do you avoid those? – Rick Beach, Classroom of the Future

Participants' work incorporated social networking, games, mobile devices, immersive environments, and research. While some participants focused on students' creating content themselves and others focused on creating content for delivery to students, most were aiming for "high touch and student motivation" (Bernice Stafford), with an emphasis on "kids constructing their knowledge" (Karl Fisch). They also emphasized collaboration.

Participants saw their technologies, and technology in general, as supporting teaching and learning by:

- Engaging students and helping them explore their interests
- Shifting to a student-centric form of learning that includes experiential learning and any time and anywhere access
- Allowing for individual pacing through activities such as basic drills while supporting new habits of mind and making space for students to learn through failure
- Providing students and teachers access to experts and resources
- Encouraging the creation and exchange of content
- Broadening the audience for student work
- Encouraging collaboration among teachers and students
- De-personalizing the situation away from the student's relationship with the teacher
- Supporting teacher professional development
- Helping teachers serve as facilitators while helping students take ownership of their learning
- Encouraging feedback-based reflection among students, teachers, departments, and schools.

Although there was some feeling that technology must be part of education because it is part of kids' lives, participants saw it as being secondary to learning. "Technology amplifies the good and bad. In and of itself, it never does anything" (Chris Shearer). Instead, good teaching and learning should be the starting point. "We need to start with how is [any given technology] relevant and how is it taking really good teaching to the next level" (Kevin Clark).

By involving students, technology can provide the kind of experiential learning that leads to lifetime understanding (Ros Chivis). Because some students “are really expert at manipulating it, but not so good at guiding their own learning” (Rick Beach), teachers can help focus their efforts. They can also use technology to help make space for risk-taking, as “students nowadays are so afraid to step out of the box” (Kit Rich).

Whatever the goal, technology has to take second place. It “has to work for us and not the other way around. Technology is only useful when it’s paired up with a purpose like learning about science, social issues, geology, or math” (Tabitha Tsai). That purpose must be authentic, as “the kids know if it’s helping or not” (Kit Rich).

In the end, students might not “necessarily learn better with technology, but we might be able to learn faster or in a different way that we didn’t have before” (Chris Shearer). Indeed, proving that technology improves teaching and learning can be frustrating. “Can you show that it improves test scores from Texas? But we have kids who are now turned on to astronomy” (Gerri Maglia). That enthusiasm can be hard to quantify. “We get positive evaluations, but how do you then transform that into an assessment piece?” (Lucy Gray).

We may not yet know how to measure the full benefits of supporting teaching and learning with technology:

If you try to assess this stuff using 20th-century metrics, then it’s not going to show much improvement. How do you measure creativity? How do you measure being able to take in this vast amount? Folks learn when they have to construct their own understanding. Technology facilitates and supports and changes the role of the teacher and learner in the classroom. They are learning and they are teaching each other. They’re teaching the world (Karl Fisch).

For Tabitha Tsai, success lies in shifting students’ sense of possibility about their futures. “I work with urban youth all the time. I have kids from rich families who don’t really care about anything. No matter the upbringing, it’s his or her desire to learn to do better.” Learning must remain central, as research into technology’s efficacy is at best split and could be said to show that “there is no sustained benefit when you divorce it from teaching or from an individual’s own processes of learning” (Chris Shearer).

Negotiating Implementation Barriers

When we look back on history, people will talk about the angst that the technology caused and the angst over changing the world because we wanted to move so quickly. – Chris Walsh, WestEd

Participants saw major constraints to technology implementations in education as being time, culture, funding, training, and the state of the technology itself. Despite all the innovations in the room, “there is a whole sea of students who are not benefiting” (Ros Chivis). In many cases, if the proponent of the innovation left tomorrow, “it wouldn’t be self-sustainable” (Cammy Huang). The challenge, then, is “to figure out from a systemic point of view how we can make change. The map may be a way of creating some systemic ground to guide the work that needs to be done” (Kevin Clark).

Overarching these barriers are the ways in which social class and geography limit access to social capital. As Chris Walsh noted, “The real creative class is being built today in wealthy communities where parents can provide all the real education that happens after school and on weekends and in the summer.”

At the same time that the learning economy is expanding, many schools are still “living in an age of censorship” (Lucy Gray), blocking blogs and other technologies that could support teachers and students in collaborating. It will take conversations to get past a tendency to ban such technologies and instead educate students in digital citizenship. Work is also needed to change “the mindset of parents so that they feel safe sending their students to this new school” (Kit Rich).

More basic than debating how best to use technology is the question of getting equipment into schools. Some participants advocated for providing laptops for every student, while others thought that laptops will soon be outdated. Whatever the device, “nuts and bolts deployments are not the hard part. The hard part is the pedagogy” (Lucy Gray).

Although starting with the learning need can help guide appropriate implementation of technology and subsequently ensure its use, the level of decision making varies. Participants identified a tension between having a common, shared vision and giving teachers the freedom to explore. While any shared vision needs teacher buy-in, it can be difficult for individual teachers to sift through the many options proffered by our increasingly grassroots economics. “There is a disconnect between what’s out there and what teachers know and have the time to find out” (Tabitha Tsai).

Fear of failure can play a part in making it difficult to experiment. “It doesn’t work and then what? That’s a big risk for a lot of teachers, who feel it’s somebody else’s job to lead that” (Tabitha Tsai).

Consequently, leaving technology choices entirely up to teachers can restrict the learning experiences available to students. “You have influenced 120 kids that the teacher is responsible for with his or her preference. How do you go directly to the student?” (Rob Clegg). While new technologies and new market opportunities may make such direct delivery increasingly

possible, students can also advocate for their own learning. At Arapahoe High School, “The kids who are in with those teachers who are going for it are now demanding it from the other teachers” (Karl Fisch).

Working with mentors and observing colleagues can help smooth the road, as can asking students to serve as technology guides. Individuals advocating for technology adoption would be well placed to work with early adopters, to help teachers solve real problems, and to provide them ongoing support. Stepping slowly can also help: “Maybe just try one small thing and then get them comfortable before you do a little bit more” (Cammy Huang).

That process can take patience. For example, “I had to work really hard at convincing museums that they can have a positive effect on education without the kids being physically present in the museum. I met with one museum eight times in four or five years before they finally took that step, and then I made it small, try this, do a pilot program” (Gerri Maglia).

Despite such tactics, people with strong opinions, strongly held can squash projects and people within the system tend to focus on why things cannot work differently. But even such nay saying has potential: “When someone says ‘no,’ that gives me a clue as to what they would say ‘yes’ to. If I can turn that around and deliver something that they want, all of a sudden new possibilities happen” (Rick Beach).

Imagining Teaching and Learning for 2020

The imagination economy has to happen in the United States, because we are no longer the knowledge economy. We are no longer able to compete against China, India, and other countries that are learning the dates and formulas. The imagination economy needs to create learners who are imaginative and creative and thinking. – Robert Clegg, Tabula Digita

We need to move beyond the world-is-flat mindset. It’s not about being globally competitive. It’s about making students intellectual, thoughtful learners. This world is not about us any more; it’s about us all acting together collectively. I’d like to see technology serve as a mechanism for bringing people together across nations and cultures. – Lucy Gray, University of Chicago Center for Urban School Improvement

If we need to reroute the delivery of teaching and learning to support students in being ready for the future, what should the new direction be? In imagining what learning experiences students who are starting school today will need by the time they graduate in 2020, participants saw technology not as a driver of change but as a tool supporting greater flexibility and a more humanistic approach.

They assumed that, in 2020, technology will “be even more ubiquitous and prevalent” (Karl Fisch) than it is today. Although we cannot know its particulars, we can hope that “learning will be connected, continuous, relevant, and adaptive. Programs, pedagogy, technology, and infrastructure will speak to individual achievement for the betterment of the global community” (Chris Walsh).

We can also expect that students will have personal networks across which they will make connections and engage actively as learners, with support and scaffolding from school. Network participants could be “a teacher in the classroom, their parent, someone in the community, a blogger in Colorado, or a farmer in Nigeria” (Karl Fisch).

Connections could extend to industry as educators partnered with business people to develop content and could also include global student and teacher exchange. Mentors, including older students, could help students navigate this web of connections and the constant availability of learning experiences, many of which would be project based to encourage experimentation.

In what could be termed “passion-based learning” (Karl Fisch), students would have the opportunity to focus their learning earlier by, for example, focusing in high school on math, science, engineering, or arts. They would also be able to choose how they wanted to approach any given area of study. In addition to being able to earn dual credit, students could participate in practicums and internships to explore their interests further.

School experiences would provide points of connection as students pursued electronic learning plans reflecting such preferences, with ephemeral learning groups forming to support projects and with students having the flexibility to step in and out for reflection or play as they learned side-by-side. Even as they became more flexible, schools would serve as transparent centers of community to help support both student learning and other kinds of learning and exchange.

Physical infrastructure would be well designed to support a variety of activities, including play and access to green space, and to acknowledge the increasing mobility of learners. As part of that, schools’ technical infrastructure would be agile and smart, enabling connections among all devices and having capacity to link to other schools globally.

However, schools would not provide technological devices for students. Tools such as laptops would go the way of notebooks and calculators, with parents providing them, as is already beginning to happen in some private schools. Each student would choose the best device to meet his or her needs and then simply plug into the network when needed to support learning.

The flexibility in focus and access would lead to students having greater flexibility about when and where they learned. For example, high school

students could start later if they wanted to, but learning would also be “a continuous project because you are always connected” (Chris Walsh). Schools would become learning spaces where “learning is going on for all of us all the time” (Karl Fish), including for the adults.

They would focus less on producing employees or achieving grades and more on supporting students in being “good people, productive citizens, and happy” (Karl Fish). Standardized tests could still serve a useful diagnostic role, but assessment would focus on learning as demonstrated by a body of evidence that reflected individualized learning plans as well as specific support for individual strengths and weaknesses.

In providing such deep personalization, teachers and administrators would be empowered to act as problem-solving entrepreneurs, but teachers might not be present locally. Accepting that “this generation changes jobs every four or five years” (Chris Walsh), teacher training would be improved to the point where “anybody could come in and teach for three years and leave” (Chris Walsh). One avenue of improvement would be for pre-service teachers to work with master teachers throughout their formal education so as to help reduce turnover and provide better support to students from the start.

Not every adult contributing to a student’s learning would be a certified teacher, though. The explosion of learning agents would be supported by a micro payment system that would allow someone to consult or teach for a day, leading to “a teacher network with an amalgamation of full-time people, community experts, and consultants” (Chris Walsh). Further support would be provided by teams of other professionals, including nutritionists, doctors, and social workers, who could help students with medical needs, learning plans, and even individualized commuting plans.

Because we cannot know what technologies we will have in 2020, we need to focus on what skills students will need in a world of easy access to factual information. Key skills include imagination, creativity, thoughtfulness, and collaboration. “It goes back to good teaching and learning, with technology being a facilitator” (Karl Fisch).

Indeed, we might usefully hold open the possibility that the above kinds of activities could happen outside what we currently think of as public education. One scenario is that, by 2020, there will be no K-12 public education institutions as we know them today because they, along with higher education institutions, will have gone “bankrupt financially and philosophically” or because some kind of “positive Sputnik event” (Coy Ison) will have shifted our perspective.

If that did happen, “we would start with the needs of the neighborhood” (Robert Clegg) in putting something new in place. As parents came together to “be the propellers of what grew out of nothing” (Robert Clegg), we would be “blurring the lines between schools, communities, and families” (Kevin

Clark) while adapting and incorporating the best of what exists today. We would aim to get past a system “that already chooses winners and losers every day” (Tabitha Tsai) so that we could begin having the conversations about everything else.

Managing the Change Process

People want what’s best for kids. If you involve them in the conversation, I don’t think they’re going to turn a blind eye. It may be hard. It may take time. That’s what we’re here for. If we can’t do it, then who else is going to? – Karl Fisch, Arapahoe High School

In an earlier time, there were those who were intellectually gifted and financially rewarded who did believe that I am my brother’s keeper. We don’t believe that any more. – Bernice Stafford

As participants considered what it would take to move toward their ideal visions for teaching and learning in 2020, they indicated that most stakeholders in education would need time and support in understanding and embracing something new. They saw the process in terms of managing change but struggled to get past the individual heroism exemplified by so many educational reform efforts.

For starters, stakeholders would need room to make the vision their own. “When that teacher walks back into the classroom and closes the door, if he or she has not bought into it, all bets are off” (Ros Chivis). Because having time to build “a great team that’s all marching to the same tune” (Ros Chivis) can be critical in establishing shared vision, leadership development could be useful in giving people tools for bringing others along.

For Rick Beach, taking an innovative blueprint as a starting point can give others the opportunity to shape and own it. “Your task is to enroll those people whom you feel need to be part of it. That process may cause the vision or blueprint to be different. Then you have created an opportunity for another group to contribute as a stakeholder to something that was created by others.”

Re-scripting how we view teaching may also make it easier to offer students a range of personalized learning experiences. Teachers’ efforts and expertise can be supplemented by relying on the knowledge and skills of the whole community and by deploying decentralized educational strategies, such as virtual schooling. “Virtual schooling is not the answer, but those are interesting, scalable models that are addressing some of the individualized needs of kids, and we are seeing them flow into traditional settings” (Chris Walsh).

Technical infrastructure and support also need to be improved, both at school and in students’ homes so that schools can “have physical presence

throughout the community” (Karl Fisch). As the boundary between school and the rest of life blurs with the end of cyberspace and learning happens at more times and through more experiences and places, adaptable learning spaces and mobility will be critical. But, whether fixed or mobile, technology comes at a cost.

Incorporating technology into teaching and learning effectively and at scale depends upon a web of collaboration among nonprofits, government, schools, and parents. “All these players are factors in what we are doing. I can’t do what I’m doing without the buy-in of the parents and somebody else can’t do what they’re doing without the funding of the school” (Tabitha Tsai).

Recognizing how much is at stake, participants worried about the time it can take to bring such players together to change the school system. “Sometimes I think by the time it gets there, it’s going to be outdated” (Kit Rich). Part of the turnaround could involve heart change. “The majority of teachers will tell you that they’re coming for the job. When we change that mindset, we can start moving education forward” (Ros Chivis).

We may, however, have lost the societal bedrock of communal values that makes it “scalable or sustainable to create that passion in leaders” (Robert Clegg). Even if we have not, the urgency of the situation means that we need to find a way to get past models of success that “require heroes” (Chris Walsh) and individual persuasion to try something more profoundly new. Supporting social entrepreneurship could help speed up change, “because the market is the thing that can shape us the quickest in this country” (Chris Walsh).

Moving from Heroes to Systemic Change

We can see these trends coming, but we know that they are going to impact other arenas before they impact education. – Alice Petty

When you talk about adaptive systems on networks, you have to have something that knows what to adapt to. Sometimes that is the linchpin. – Kevin Clark

What would it take to change teaching and learning on a larger scale? Participants saw a tension between needing to get past the limitations of the current system while continuing to support students and staying realistic about what type of learning experiences U.S. society needs and can support.

Simplifying policy would represent one area of improvement. “Learning is very natural and easy to do, but we put so many constraints around it. Sixty or seventy percent of the California Ed Code has nothing to do with kids. If you could throw that out completely, you would be somewhere better off than you are today” (Chris Walsh).

Changing the basis for funding would be another, as our current system may be too large to fund effectively. "At some point public money is aggregated for the greater good, and the second you do that, some institution somewhere wants to put parameters on what they feel is for the greater good. Would it be different if it were entirely locally funded?" (Chris Walsh). While we are used to thinking of systemic work as happening at the national and state levels, the neighborhood level might be more appropriate for system adaptability.

Looking at current alternatives to traditional public education, charter schools have somewhat more independence because of their different funding models, where "we don't have to jump through those hoops" but where there can be less "working at something as a whole school" (Lucy Gray). In some other charter schools that have to compete for students instead of admitting them on a lottery basis, relative independence can encourage innovation. "I am always trying to go out and market my school. A lot of other educators don't have to do that. They know they have kids, no matter what" (Kit Rich).

Even with more learning economy players emerging and even though throwing out the education code or starting from scratch has some appeal, "there are some people who need schooling. The system isn't working, but if you decide to kill it, then a lot of people are going to suffer. So you have to create a net to sustain the people who depend on that system" (Kevin Clark).

What can we do to mobilize system change while holding that net? Participants compared the situation facing education today to the large-scale mobilization that it took to prepare for World War II. "How would that level [of leadership] mobilize to bring better education? I am not sure there's anybody at that level who is willing to do that" (Lucy Gray).

Indeed, we may be so individually focused that we could not mobilize on such a large scale even with stellar leadership. "We are in the me generation. If you play that out, the answer is not to go back to the collective. The answer is to go to a market system that is focused on the me choice" (Robert Clegg). Such an approach might be not only more practical but also more affordable: "If a market solution arises, it would be a small amount of money relative to what's propping up the education system" (Chris Walsh). It could also happen relatively quickly. We might find that some innovation driven by technology transforms the education market in the way that YouTube, Amazon, and eBay have transformed other sectors.

However we move forward and whatever leads the change, the solutions might be well within reach. "We already have all the curriculum that works. We have all the approaches. The problem is, there is not a brand" (Chris Walsh). If we could create one, it might be possible to effect significant improvement without abandoning much of what we have learned about learning or taking the system back to the neighborhood level.

To propel teaching and learning into the 21st century, we need to get past the concept of school toward a broader concept of learning experiences enabled by the permeability that media-rich pervasive learning can provide. “The word ‘school’ conjures up a building. We have to get rid of the idea of ‘school’ simply as a building. I don’t know that school is so much in the building any more” (Karl Fisch).

Along with structural and cultural adjustments, this shift in our mental models about what education can be in the future might represent the most profound adjustment, laying fertile ground for blue sky visions to take root and blossom, whether they originate from collective action, market forces, or a combination of future forces.