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SUSTAINING A 1-TO-1 INITIATIVE REQUIRES A CULTURAL SHIFT
K–12 leaders reveal their keys to maintaining a digital transformation over time. By Dennis Pierce

HOME CONNECTIVITY AND THE HOMEWORK GAP
How Some Schools Are Helping to Connect Students in their Homes
A disparity in home Internet service has led to the “homework gap,” where economically disadvantaged students “go from a digital oasis to a digital desert when they go from school to home.” By Leila Meyer

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Nowhere is the cause-and-effect principle more apparent than when working with robots. Faced with three-dimensional movements (and sometimes audio vocalizations) of robots, students across the grade spectrum can see the direct results of their input.

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While badging and digital credentialing are gaining acceptance in the business world and, to some extent, higher education, K–12 educators — and even students — are slower to see the value.

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Today, students are interacting with content on large touchscreen flat panels. Soon, they could be using immersive head-mounted displays.
Technology and Equity

AT THE ASU GSV Summit in San Diego in April, I heard a former head of the U.S. Department of Education’s Office of Educational Technology slam BYOD as, among other things, potentially illegal. It was an off-the-cuff, frustrated response to a panel that was composed of education reformers whose main line of argument seemed to be that ED is obstructionist at worst and impotent at best. (Read: The department isn’t handing out public funds to private companies as freely as those companies might like.)

In a panel that was mostly blather punctuated by buzzwords, none of which was worth repeating, this little burst of straightforward, unguarded dissention is what stuck with me.

I happen to be a fan of BYOD. I’ve never been fond of being handed a device and told to use it for my job (and only my job, no tinkering!) whether it was the right tool for me or not. Presumably, IT staff and educators would know what the right tool should be for students; but then, if that were the case, every school would be using the same “right” device. They’re not.

Further, personal devices are already just about everywhere. And for that small percentage of people who don’t have a phone, tablet or laptop at home, the school can certainly step in and provide.

This does, however, raise issues of equity and privacy (and therefore legality). Devices issued to poor students may be inferior, which can certainly raise civil rights flags (although with smart phones, the playing field is pretty level as far as the technology is concerned, even if price points among brands are not). And for districts creepily monitoring students’ devices at home, bugging personal devices veers into blatant illegality, thus inequity: School-issued devices might be monitored, while students with means to provide their own get to avoid being watched in their bedrooms.

Further, in states like California, requiring students to pay for anything that’s part of their public education is a legal no-no.

But there’s a bigger equity issue, and it affects not just BYOD, but any program that involves the use of technology at home: access.

How do students without an Internet connection (or an adequate one) complete homework, participate in flipped classrooms or check for assignments?

Most do have access, and certainly we shouldn’t put the brakes on technological progress as we wait for the (substantial) remainder to catch up. But at the same time, education as a public institution must serve all equally to the best of everyone’s ability. And that means finding ways to accommodate students who don’t have access to the tools they are required to use.

We address this issue in some depth in our story on the homework gap on page 16 and look at what schools and — yes — government are doing about it. Some are providing mobile hotspots to families. Some are working with federal agencies or foundations to wire their communities. There’s real creativity involved in these efforts. It’s a decent start. I’d love to hear what your district is doing about it too. E-mail me at the link below!

In other matters, I would like to welcome two new staff members to our growing team here at THE Journal. Richard Chang joins us as associate editor, and Sri Ravipati as web producer. Check out their excellent work on thejournal.com!

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SUSTAINING A 1-TO-1 PROGRAM REQUIRES A CULTURE SHIFT

K–12 leaders reveal their keys to maintaining a digital transformation over time. By Dennis Pierce
WHEN TERRY GRIER announced last fall that he would be stepping down as superintendent of the Houston Independent School District March 1, during the third year of a digital transformation initiative called PowerUp that has supplied all 65,000 high school students with an HP 9470m EliteBook laptop to support their learning, it would have been natural to wonder about the program’s fate moving forward.

But Chief Information Officer Lenny Schad said he strongly believes the PowerUp initiative will continue without a hitch because it already has become part of the culture of this 215,000-student district.
FEATURE | 1-to-1 Success

Teachers are using a central digital platform powered by itslearning, called the HUB, to design lessons, give assessments and assign personalized content based on students’ needs — while students have 24/7 access to instructional materials, discussion forums and other learning tools.

“Our focus is not on providing kids with a laptop, but on changing our instructional delivery model to prepare students to be global learners,” Schad said. “That vision will not change. It’s something our entire community has embraced, and we’re very confident it will continue to grow.”

Changing a school system’s culture by getting everyone to embrace a new way of teaching and learning is the hardest part of any digital transformation initiative, said Marie Bjerede, founder of the ed tech consulting firm e-Mergents.

Mooresville Graded School District hasn’t bought a textbook in more than five years; instead, it uses an all-digital curriculum, and its technology conversion has led to more personalized and inquiry-based learning.

However, if you’re able to shift the entire culture so that learning truly becomes student-centered and inquiry-based, “what happens is that teachers say they could never go back to teaching the old way,” said Bjerede, who also leads the Consortium for School Networking’s Leadership for Mobile Learning initiative.

“They find they enjoy teaching more,” Bjerede said. “Students enjoy school more. And once you have that new culture, that new culture will resist being changed — so even if you have changes in leadership or direction, the new culture will tend to carry you through.”

Managing the Human Side of Change
Changing the culture of a school district is essential to sustaining a digital transformation over time, agreed Mark Edwards, superintendent of the Mooresville Graded School District in North Carolina. And a key requirement in transforming this culture is paying attention to the human aspects of the change.

“There is a natural proclivity to focus on the technological infrastructure that is needed,” he said. “Obviously, that’s important: You need the right kind of devices to support your pedagogy, and you need a robust network to keep up with users’ demands. But where a lot of districts err is overlooking the human infrastructure that is needed.”

Edwards knows a little something about sustaining a digital transformation: His district is in the ninth year of its move to an all-digital environment.

All Mooresville students in grades K–12 have access to a digital device for learning, and they can take their devices home beginning in the fourth grade. The district hasn’t bought a textbook in more than five years; instead, it uses an all-digital curriculum, and its technology conversion has led to more personalized and inquiry-based approaches to learning.

By starting with a clear vision for how instruction would change, and then communicating that vision to all stakeholders and earning their support, both Mooresville and Houston have built a solid foundation for success — which should sustain their initiatives even through hard times.

School districts that have followed these critical success factors in planning and establishing their digital transformations are much more likely to sustain their programs over time, said Leslie Wilson, founder and chief executive officer of the nonprofit One-to-One Institute.

Wilson, who likes to garden, compared this to a plant establishing strong roots. “If it doesn’t take root, it doesn’t get hardy, and it will wither and die,” she said. But once that foundation has been established, and the culture of a school district has begun to change, then “you would be hard-pressed to bring in somebody who
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would go in a different direction.”

In Houston, even before Grier left as superintendent March 1, the district faced a $107 million budget shortfall as a result of a state policy known as “recapture,” which forces Texas districts considered property-wealthy to send money back to the state.

Listening, Adapting and Learning from Mistakes
Changing the culture of a school system also requires strong executive sponsorship.

“The leadership and drive has to be visible, and it has to come directly from the superintendent,” Schad said. “Cultural changes are only successful if driven from the top.” Yet, district leaders also must be willing to listen to stakeholders and “course correct” as necessary, he added.

Being adaptive and learning from mistakes has helped North Carolina’s Guilford County Schools persist through big changes to its Personalized Achievement model, Curriculum and Environment (PACE) program, which aims to personalize learning by giving every middle school student a digital device.

Guilford County began distributing Amplify tablets to its middle school students in fall 2013. But just a few months into deployment, problems with the devices began to surface: Screens were cracking or chipping, and chargers were overheating. When a charger actually melted in a student’s home, Guilford County immediately suspended the program.

District leaders worked with Amplify to fix the problem. Amplify cut ties with its original tablet maker and chose

“A lot of people are looking for a quick fix, and this isn’t it. A digital conversion is a long-term investment for long-term success.”

Yet, as district leaders discussed how they would close this gap, “it was never brought up from the board or our community to stop spending money on the PowerUp program,” Schad said. “If anything, they wanted us to invest more money in professional development. That’s how I know we’re on the right track.”

THREE MORE KEYS TO SUSTAINING 1-TO-1 SUCCESS
Transforming the culture of a school system is critical to sustaining a digital conversion program over time. Here are three other keys to success.

Distributed leadership.
Having several key leadership groups involved is essential, said Leslie Wilson, founder and chief executive of the One-to-One Institute.

“Certainly the superintendent and his or her cabinet need to lead the initiative,” she said. But if you have a variety of leaders responsible for carrying it out and championing the program at all levels, “then you have built in a crucial infrastructure and foundation for success.”

The Houston Independent School District created a cross-functional leadership team with representation from the curriculum and IT departments, as well as all school principals, to move its digital transformation forward. “Your principals have to buy in and be driving this change at the campus level,” said Chief Information Officer Lenny Schad, “or it’s not going to happen.”

Adequate network infrastructure.
You need enough bandwidth to be able to grow the initiative and keep up with the demands on your network, said Marie Bjerede, who leads the Consortium for School Networking’s Leadership for Mobile Learning initiative.

“School districts are finding that, once they commit to digital transformation, their network demands become nonlinear: They have exponential demands on their bandwidth capacity,” Bjerede said. “It’s not uncommon for districts to see 60 percent year-over-year growth (in network demand), which means the capacity they need is doubling every 18 months or so.”

A school district’s bandwidth use will spike initially from adding more devices and having more students accessing the network simultaneously. But as districts also add more cloud-based digital curriculum services, “many of these require daily downloads and updates of specific information,” she said.

And as teaching and learning transforms, “you might go from using a few apps in class to having students do a lot of collaboration, where they are accessing shared files online at the same time, using interactive games, or streaming or producing video. All of that is fairly high-bandwidth work.”

A sustainable funding model.
To sustain a digital transformation, you also have to plan for how you’re going to pay for teacher development, network upgrades, device refreshes and digital curricula over the long term.

“You need a sustainable funding model, so that you’re not using 20-year bonds to buy devices that have a three-year life span,” Bjerede said.

The Mooresville Graded School District in North Carolina has built its digital conversion into its financial infrastructure, said Superintendent Mark Edwards. In addition, the district has found creative ways to supplement this funding.

For instance, Mooresville has formed partnerships with local businesses to help extend broadband service into students’ homes. The district hosts its own ed tech conference and uses the proceeds to help pay for its professional development efforts. And its digital conversion has saved money on curriculum materials, paper, toner and postage — money it has reinvested in technology.
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another manufacturer, and the company reimbursed the district more than $850,000 for lost staff time and other expenses. Then last year, as the district began rolling out new and improved Amplify devices to students, the company announced a giant layoff of employees — and there were rumors that it might fold.

“We were proactive so that we wouldn’t be caught unaware,” PACE Director Robin Britt said. “We began forming a backup plan. We put out an RFP for another manufacturer, and we talked with other districts so we knew the lay of the land.”

While this was going on, district leaders were in contact with Amplify executives, who confirmed the company would be leaving the ed-tech business at the end of the 2015–2016 school year. That gave Guilford County almost a full year to choose another device and plan for ver-

riculum directors and board members. We also asked vendors to leave some devices for us to test. We wanted to drop them to see how rugged they were, and we wanted to give them to our teacher and parent advisory groups to see what they thought as well.”

In the end, the district chose Lenovo ThinkPad Yoga 11e convertible devices that can serve as either a laptop or a tablet. Teachers will get their new devices at the end of the school year, and the district will start handing them out to students to replace the Amplify tablets this fall.

In addition, Guilford County began implementing the Canvas learning management system this year. “We wanted to have more of our content residing in the cloud, so it’s device-agnostic and available from wherever,” Britt said. “This way, we are no longer dependent on a single device — and there is no single point of failure for our PACE program.”

The openness of its device selection process has helped Guilford County win back trust among parents and teachers, Britt said. But support for the district’s vision of personalizing instruction never wavered, despite some initial missteps.

“Sustainability is so much about stakeholder confidence and buy-in,” he said. “We were caught in the weeds of the devices because we started too fast. We’re hoping that with this new go-round, the devices will fade into the background and we can focus exclusively on teaching and learning.”

**Earning Community Support**

As Guilford County’s example shows, community support is critical in sustaining a digital transformation.

“The community has to be part of the transformation,” Edwards said. “If not, then when you hit a roadblock, it would be very easy for the tide to turn against your initiative.”

Though Mooresville hasn’t had turnover in its leadership or major changes in the devices it has distributed, the district has had to deal with its own adversity.

“We had to work through huge budget cuts — we had to cut 10 percent of our staff after we were two years into our digital conversion — but the community stood up and supported our [initiative],” Edwards said.

District leaders must take a long-term view when planning for a digital transformation. “With any big investment of public dollars, people want to see evidence that it’s working,” he said. And often, the public wants to see immediate results.

Managing those expectations and communicating that it’s a long process is important — but it also helps to be able to demonstrate progress over time.

“You need to make public declarations of progress and identify markers of success,” Edwards said.

By paying attention to the human aspects of its digital conversion, being agile and involving the entire community, Mooresville has transformed the culture of its schools. “We see students driving their own learning, and now that’s just part of the culture here,” Edwards said. “Students come in and they don’t wait for their teachers to tell them what to do. They just get to work on their laptops.”

He concluded: “A lot of people are looking for a quick fix, and this isn’t it. A digital conversion is a long-term investment for long-term success.”

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**Dennis Pierce** is a freelance writer with 18 years of experience covering education and technology.
The trial-and-error ethos is infectious, and Edwards has seen it even in young students. During one after-school session, students worked for hours to perfect a robotics movement sequence.

“I said, ‘Guys, this is it. Parents want you home,’” Edwards said with a laugh. “They did some fixes. They know the word ‘debugging,’ and they know it’s OK to make mistakes. They fixed it, and they were successful. Parents loved the experience. One parent said, ‘My daughter didn’t believe at the beginning that she could code.’ This experience has given her the confidence to be successful and do more, and now she is trying to build her own robot in the fourth grade.”

Edwards’ district has recognized the value in the expanded robotics program. Additional funding through the Parkland Education Foundation will provide robotics maker spaces in every elementary school in the Parkland district next year.

The additional investment may make coding/programming second nature by the time high school rolls around. “People can’t believe I have kindergartners who can tell you what algorithms are and what debugging means,” enthused Edwards. “With Ozobots, for example, you can take markers...
and teach students coding and robotics. I had kindergarteners use the markers to draw a triangle, and then they took the robot and programmed it to travel around the shape of a triangle.”

**Dip Your Robotic Toe**

Administrators in rural districts who are looking to boost robotics throughout their schools need not despair. Stephanie Miller, superintendent and principal of Congress Elementary School District No. 17 in Congress, AZ, knows what it’s like to get started, and she has had success so far. “You just need to dip your toe in,” she said. “Begin with the fundamentals.”

Enlisting the aid of some key tools such as Defined STEM can help teachers apply robotics, particularly in the context of project-based learning and integration across the curriculum.

Using rubrics provided by Defined STEM, Suzanne Sims, technology specialist in the Congress Elementary School District, designed an open-ended unit on wind turbines. “They could use their robotics skills in this unit,” she said. “They could create a Lego wind turbine as their product. If they are not interested in robotics, they could create something out of other supplies.”

During a K–2 unit on animal habitats, students learned how to make robots, and, Sims explained, “They would make an animal [robot] of their choice, create the habitat and do a research presentation.”

Another addition to robotics at the school will be the usage of Wonder Workshop’s Dash and Dot. “Wonder Workshop has a curriculum subscription with lessons and examples where you program the robots, lay a map on the ground, and you program the robots to go to regions where they do something in particular — so the focus is on geography,” Sims said.

Yet another example is teaching geometry through robotics. This involves taping angles on the floor and programming robots to move in patterns. “This reinforces various concepts, while at the same time teaching concepts in robotics, but not being distracted by the robotics itself,” Miller said. “If you can integrate robotics as much as possible, that’s going to make learning robotics that much stronger, while at the same time reinforcing the regular curriculum.”

All districts quickly discover that there is no robot without programming/coding, so at least some emphasis on basic programming is essential. The Congress district used Code.org to help students hone basic coding skills, while also exploring their personal strengths. “Some students learned they had a strength in coding, or in actually building the robots — the mechanical side,” Sims explained. “Some showed talents on the electrical side, taking the robotics apart into components. Students come together and realize their strengths and career paths.”

“There are students who have gotten some robotics skills in the first two years, and these students were ready to move on,” Miller added. “So we introduced the Mind Storm, the EV3 and the First Lego League competition — and our students participated in that this year. It took three years to get there.”

Beth Harrison, a STEM teacher at Mount Lebanon Elementary School in Pendleton, SC, just finished her first year as a robotics coach. She echoed Miller’s sentiments, particularly when it comes to curriculum integration that uses robotics as a means to an end. One student in particular, she said, had struggled in the traditional classroom. His grades were not strong, especially in math, but he joined Harrison’s robotics team and embraced the coding/programming aspects.

“I explained to him that he was using math — measurement, logic and sequencing — to complete the missions,” mused Harrison. “He looked at me puzzled and said, ‘This is not math. This is fun.’ I explained how it was, in fact, math and how good he was at coding. His teacher said he had seen many changes in his demeanor and work ethic. His confidence had been built up by being successful in programming robots.”

With each student on a Chromebook, Harrison used Defined STEM with her third to sixth graders. “I selected grade-appropriate, standards-based tasks and walked them through the GRAS model,” she explained. “I gave them the student log-in, and they started doing research/notes taking — drawing their design, creating and finally improving. I use Defined STEM because it embeds all the materials you need in one place. I especially like the customize feature. The best part is I do not have to reinvent the wheel.”

Wherever robots end up in the school, they become what Frank DiMaria calls “kid magnets,” with students routinely unable to take their eyes off the little mechanical objects. As a computer teacher at Gold Hill Middle School in Fort Mill, SC, DiMaria saw the attraction firsthand when his district purchased two NAO robots from Aldebaran Robotics.

Thirteen teachers in the district share the robots for two to three weeks in the classroom each semester, and each teacher makes up his or her own curriculum. “I put together a two-week lesson plan [see DiMaria’s article on thejournal.com] where basically I had the robot do three things — walk a square, walk a triangle and walk a circle,” he explained. “Then I had them do two things in which the robot responded to voice. In one case, the robot initiated the conversation, and in another, students initiated the conversation. After that, I had them do a free choice.”

DiMaria said he agrees with the curriculum integration concept and sees applications for robots even in social studies and language arts classes. “We have a presidential election coming this November,” he said. “I can envision students programming two robots to debate a topic. For language arts teachers, I could see them using the robots to act out a scene from a book.”

“I encourage anybody who is going to start using these robots to get the robot during the summer if possible,” DiMaria added. “Go to your classroom, write code and send it to the robot. Learn as much as you can.”

**Greg Thompson** is a freelance writer based in Fort Collins, CO.
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IN 2013, PRESIDENT OBAMA launched the ConnectED initiative with the goal of connecting 99 percent of K–12 students in America with access to broadband Internet in the classroom by the year 2018. Since ConnectED was launched, 20 million more students have gained access to broadband at school, according to Joseph South, director of the Office of Educational Technology of the United States Department of Education. At the same time, more and more schools have implemented laptops, tablets and online educational resources. While initiatives such as ConnectED are helping to close the digital divide in the classroom, that divide reopens once the school day is over.
As of 2014, nearly one quarter of American households still did not have Internet access, according to a March 2016 Issue Brief from the Council of Economic Advisers. Low-income households are far less likely to have Internet, “with just under half of households in the bottom income quintile using the Internet at home, compared to 95 percent of households in the top quintile,” according to the report.

This disparity in home Internet service has lead to the “homework gap,” where economically disadvantaged students “go from a digital oasis to a digital desert when they go from school to home,” as Chike Aguh, CEO of EveryoneOn, described it. Some of these students are going to extraordinary lengths to complete their assignments, standing outside their schools at night trying to pick up WiFi signals through the wall, or going to the public library or local businesses to do their homework.

“I applaud those students, but that is not an acceptable solution, and it’s tremendously inequitable in providing them an education that’s similar to their peers,” South said.

Reasons for the Homework Gap

Some people have attributed the homework gap to the lack of Internet infrastructure in rural and remote areas. However, the majority of families that are not connected to the Internet live in urban areas that do have infrastructure. They simply can’t afford it.

“There are 64 million Americans who are not connected to the Internet. Only 16 million of those are offline because there’s not infrastructure,” Aguh said. “The other 48 million are living in big urban metro areas where they have offers available to them. It’s just that they cannot afford them. So we need to change our thinking and our mindset and our stereotype that this is a rural problem. It’s not. It is really an urban and suburban problem.”

But the homework gap can exist even in households that do have Internet service, according to Sarah Trimble-Oliver, the chief information officer for Cincinnati Public Schools. A couple of years ago, that district surveyed its students to ask if they had Internet at home, and 75 percent of students answered yes. However, Trimble-Oliver soon discovered that they hadn’t asked the right question.

“What we’re finding is that, even though they answered yes, there was a large percentage who only have access through a smartphone,” she said. “Or they have access, but it’s too slow. Or they have a computer in the home, but it’s shared amongst five or six family members, so actually getting time on that Internet-enabled computer is difficult in order to complete homework. And then we have families who may have Internet access one month but then the next month it’s interrupted because either the bill wasn’t paid, or the data plan on their phone ran out. It’s not a simple yes or no question.”

Fortunately, schools, government and other organizations are working to find ways to close the homework gap.

Dedicated Mobile Hotspots for Students

A few years ago, Cincinnati Public Schools adopted an Advanced Placement blended learning program to expand AP courses to students who previously did not have access to them. With the blended learning program, about half of the instruction occurs online through the district’s learning management system and the other half is face-to-face with the teacher. Since some of those students don’t have Internet access at home, the district purchased mobile hotspots for those students.

The Kajeet SmartSpot devices are portable 4G LTE mobile hotspots that provide broadband Internet connectivity for any WiFi enabled laptop, tablet, netbook or Chromebook. The devices have built-in content filtering, so students can’t use them to access inappropriate or non-educational content.

Trimble-Oliver has discovered that the students are using the Kajeet SmartSpots not just for their AP class, but for other homework and enrichment activities.

“They are saying that they are able to get more work done at home, and that they’re actually also able to get more informal learning,” Trimble-Oliver said. “So maybe it wasn’t even a homework assignment, but they’re able to do research on things that they’re interested in themselves, related to the subjects in school, because now they do have that hotspot.”

Mobile Hotspots for Checkout

Green Bay Area Public Schools in Wisconsin also adopted Kajeet SmartSpots to help close the homework gap for its students. Unlike Cincinnati Public Schools, which supplies students with a dedicated SmartSpot device, Green Bay Area PS makes SmartSpot devices and laptops available for students to borrow. Students can check them out from their school library, use them to complete their homework assignments and then return them.

“About 60 percent of our kids are on free and reduced lunch, so that tells us that there are going to be families who do not have means to have the Internet at their home. I would just hate for kids not to have the resources to complete their assignments and to learn because they don’t have technology at home,” said Diane W. Doersch, chief technology and information officer for Green Bay Area Public Schools.

“It’s not just the financial part, but we have instances where kids might go to grandma’s for the weekend, and she doesn’t have Internet at her house. Or we have instances where there are a couple of kids in the family, and a sibling is working on the family computer all night. So we felt that this was one way that we could address that issue.”

The district initially purchased 125 Kajeet SmartSpot devices two years ago. At the start of the 2015–2016 school year, it increased that number to 375 and plans to purchase more as needed. According to Doersch, the purchases have been worthwhile. “We know that more students are completing homework due to their use of the check-out devices,” she said. “The students who check these out are very grateful that they’re able to use them.”

Organizations Working to Close the Homework Gap

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FEATURE | Internet Accessibility

have access to a school-provided mobile hotspot, but there are other options available. Organizations such as the national nonprofit EveryoneOn are working to eliminate the homework gap by partnering with Internet service providers to make high-speed, low-cost Internet service and computers available to American households that can’t otherwise afford it. “We work with Internet service providers, like Sprint, like Comcast, like AT&T, like Google Fiber, to help them craft, refine and deploy offers that a family can actually afford, usually priced around $10 a month,” Aguh said.

EveryoneOn also strives to make it as easy as possible for eligible families to find out about these offers and sign up for them. “We create an easy access digital platform, where a family can text us, call us, e-mail us, go online through our website, if they have that opportunity, to go search for it and sign up for affordable Internet service, in a really easy, streamlined way,” Aguh said.

As part of the ConnectED program, Sprint has committed to offer 50,000 lines of service to families with a child in primary or secondary school. Through the program, the school designates a WiFi hotspot to each student. Students can take the hotspot home and use it until July of 2020 with no monthly bill. “We help increase awareness about that program and work with schools who want to sign up for that,” Aguh said. “Since the middle of last year when we started that partnership, we’ve been able to give away about 21,000 lines of service.”

To help make families aware of these low-cost services, EveryoneOn has people and partners “on the ground” in libraries, schools and public meeting places. “They’re meeting families where they are so that they can get them signed up directly and get them online,” Aguh said.

Since EveryoneOn launched four years ago, it has connected about 200,000 low-income families to the Internet.

**ConnectHome**

Building on the ConnectED initiative, in March 2015 President Obama announced the Broadband Opportunity Council, “which is an interagency group that spans more than 20 agencies and departments.” South said. “It’s been charged with finding ways that several offices can work together to bring connectivity to all spaces in America.”

The Broadband Opportunity Council is coordinating ConnectED and two related initiatives. In July 2015, President Obama announced the ConnectHome initiative, which aims to connect 275,000 low-income households with the support they need to access the Internet at home. And in March 2016, he announced the ConnectALL initiative, which aims to connect 20 million more Americans to broadband by the year 2020.

As part of ConnectHome, the United States Department of Housing and Urban Development (HUD) is working through existing programs and partnerships, including collaborations with EveryoneOn and ISPs, to connect families living in HUD-assisted housing in 28 communities with the low-cost Internet service. “Most of the research tells us that price is the biggest barrier, not just the price of an ongoing Internet subscription but also the cost of owning a tablet, laptop or desktop computer. So those are two things that ConnectHome is trying to address,” said Michael K. Liimatta, the ConnectHome manager for HUD.

“Just to give you a sense, the average family in public housing makes about $12,500 a year, or about $1,000 a month,” Aguh said. “These are literally the poorest of the poor and the most likely to be unconnected.”

“It’s the goal to make sure that within our HUD assisted housing, families with children K through 12 can get a decent Internet plan for $10 a month,” Liimatta said.

One of those low-cost plans is the Comcast Internet Essentials plan, which is available at a cost of $10 per month to families with schoolchildren who qualify for free or reduced lunch. “Internet Essentials is a program that Comcast has had for a very long time,” Liimatta said. “What we’re trying to do is make sign up easier by providing data that can be used to confirm eligibility.”

ConnectHome is still in the early stages. HUD spent six months in the planning phase and has begun implementing the service over the last few months. So far a few thousand families have been connected to the service, according to Liimatta. “ConnectHome is a four-year effort,” he said. “We hope it will eventually close the digital divide among the residents of HUD assisted housing. That’s over 10 million families in America.”

**FCC’s Lifeline Program**

In March 2016, the Federal Communications Commission (FCC) announced an update to its Lifeline program to help low-income households afford access to the Internet. “Basically, the FCC updated a Reagan-era phone subsidy program that was originally designed to make sure every American had a telephone,” South said. “They’ve now updated it to provide the lowest-income Americans with a subsidy that provides them broadband at home for an affordable price. So for less than $10 a month, they can get 10 Mbps, and that has essentially provided $1.5 billion per year to help address that gap.”

Although schools, government and other organizations are actively working to close the homework gap, low-cost Internet service has the potential to do more than help students complete their homework. Closing the homework gap isn’t just about preparing students for college and career.

“A lot of the way we communicate with each other, a lot of the way we collaborate, a lot of the way that we relate, the things that we understand about the world around us, the things that make an informed voter, those are all reliant on a digital infrastructure, and it’s so important that every American have access to that infrastructure, not just to be successful in school, but to be successful in life,” South said. “I think that’s why the administration feels like this issue is extremely urgent. And at this point, there’s really no reason why we shouldn’t have every American online. We’re doing our best to move that forward and really need the help and ideas of everyone involved to close this gap.”

Leila Meyer is a technology writer based in British Columbia.
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Badges: Not Quite the Next Big Thing?

While badging and digital credentialing are gaining acceptance in the business world and, to some extent, higher education, K–12 educators — and even students — are slower to see the value.

ARCH 2013 SEEMED to represent a turning point for badging, the practice of offering a digital validation of skills learned, content understood or goals accomplished.

That’s when the MacArthur Foundation highlighted the winning projects of its Badges for Lifelong Learning competition at the Digital Media and Learning Conference in Chicago. The competition, co-sponsored by the Bill & Melinda Gates Foundation and the Mozilla Foundation, had attracted nearly 100 competitors a year earlier. The winners shared $2 million worth of development grants.

When THE Journal contacted some of the grant award recipients three years later, progress toward wide proliferation of digital credentialing — or badging — seemed uneven at best. While there is growing acceptance of the practice among more nontraditional education providers, some of the K–12 projects recognized by the MacArthur Foundation have stalled. Nevertheless, there seems to be firm conviction that, as we begin to visualize education in new terms, badging is an obvious answer to the question of how to provide evidence of competency across a wide variety of disciplines and scenarios.

Evidence of Lifelong Learning

A digital badge or credential is a validation, via technology, that a person has earned an accomplishment, learned a skill or gained command of specific content. Typically, it is an interactive image posted on a web page and connected to a certain body of information that communicates the badge earner’s competency.

Credly is a company that offers off-the-shelf credentialing and badging for organizations, companies and educational institutions. One of its projects, BadgeStack, which has since been renamed BadgeOS, was a winner in the 2013 MacArthur competition. Virtually any individual or organization can use its platform to determine criteria for digital credentials and then award them, often taking advantage of an open-source tool like WordPress. The credential recipient can then use the BadgeOS platform to manage the use of the credential, choosing to display badges on social media profiles or uploading achievements to a digital resume, for instance.

Credly obviously has a lot invested in the success of digital credentialing, so perhaps it is no surprise that its founder and CEO, Jonathan Finkelstein, sees great strides in the three years since the MacArthur Foundation competition.

“For us, the use has grown tenfold in the last three years,” Finkelstein said. “Thousands of organizations are issuing credentials today on our platform.”

Credly has a lot invested in the success of digital credentialing, so perhaps it is no surprise that its founder and CEO, Jonathan Finkelstein, sees great strides in the three years since the MacArthur Foundation competition.

Finkelstein and others see, with the persis-
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DIGITAL CREDENTIALING

tently growing interest in competency-based education (CBE), that badging is a way to assess and document competency.

Kevin Byers, a competency-based system coordinator and math teacher at Westminster High School in suburban Denver, said, “If we acknowledge that learning can take place anywhere, badges are an indicator that learning has taken place.”

His school is in the Adams County School District 50, which seven years ago shifted its focus to competency-based education for the entire district — all 10,000 students. That is in line with the Colorado Education Initiative, which is working to make CBE a part of all educational efforts throughout the state, from kindergarten to the university level.

The statewide goal is to prepare students for tomorrow’s workplace, identifying potential careers in industries that will be part of Colorado’s future economy, determining the skills that will be required to fulfill those careers and teaching those skills to students today. The hope is that, in conjunction with the skills that will be required to fulfill those careers and teaching those skills to students today, the statewide goal is to prepare students for tomorrow’s workplace, identifying potential careers in industries that will be part of Colorado’s future economy, determining the skills that will be required to fulfill those careers and teaching those skills to students today.

The experiment was not entirely successful, Byers said, and development on the project in conjunction with EffectiveSC and Intrific has been suspended for the time being. There are primarily two reasons, one involving teachers and the other students.

Teachers at Westminster had a hard time accepting the value of credentials is gaining momentum faster in non-traditional educational arenas than in traditional K–12 classrooms. He pointed to the example of Educause, which started its badging program with its own existing professional development programs and has since expanded to almost every part of its organization, now offering badges for everything from subject expertise to leadership skills and contribution to the community.

Byers is equally confident that his K–12 district and others like it eventually will catch on to the trend too. He attributes the slow acceptance rate to the growing pains that have come with the introduction of CBE into the curriculum.

“We are in a unique situation to leverage those badges,” he said. “We aren’t doing that now, and, honestly, it’s because we’re still trying to figure things out with our competency-based system. If we juggle too many balls, they all drop.”

In March, Credly received $2.5 million in new funding from private equity firms, indicating the investment community is beginning to see some value in badges. The March SXSWedu conference in Austin, TX, had several sessions on the subject of badging, and traditional universities are beginning to experiment with it as well. Among them are the University of Central Florida, the University of Notre Dame and Arizona State University with its Global Freshman Academy, which offers first-year students a number of alternatives to a conventional academic program.

“Transferable credentials that allow people to add credentials throughout their life is something new and important,” said Adrian Sannier, chief academic technology officer for Arizona State University Online.

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For instance, BenQ announced two new Android-based IFPs during the Texas Computer Education Association (TCEA) conference in February. The 79-inch RP790 features 4K resolution and 10-point multitouch technology, while the 75-inch RP750 features HD resolution, 20-point multitouch technology and a bacteria-resistant coating to help reduce the spread of germs.

**4K resolution.** Ultra high-definition displays — also called UHD 4K or just 4K displays — offer four times the number of pixels of standard high-definition (1080p) displays and are becoming increasingly common as well. While 4K video screens might be too expensive for many schools, their clarity could help with certain specialized applications, such as research where fine detail is needed.

“When you hit 84-inch panels, all of them are 4K, and a majority of 75-inch panels are now 4K as well,” Colson said. For example, all of Smart Technologies’ larger displays (65 inches and up) are offered at 4K resolution, he noted. “For 65-inch and 70-inch displays, we’re seeing that 1080p is adequate,” he added, “but some schools are looking ahead and are starting to buy 4K displays because they know the source resolution will continue to expand.”

**Videoconferencing.** InFocus has added videoconferencing capabilities to its latest IFP, the Mondopad. The interactive display blends video calling, whiteboarding and more in one giant touchscreen PC for face-to-face collaboration, either among students in the room or from remote locations. The Mondopad is available in 57-inch, 70-inch and 80-inch versions.

**Other uses.** A growing trend among schools and colleges is to create “huddle spaces” for small group activities by adding a second or third display to a room, Colson said. Plus, tabletop-based interactive displays are starting to become more common, especially for elementary and special-education classrooms: “IFPs today are much more durable than they were in the past, and so some schools are taking IFPs and turning them horizontally,” he explained.

**Interactive Flat Panels**

Interactive flat panels are finding favor in schools nationwide, said Ken Colson, senior vice president of sales and marketing for Unified AV, a Southeast-based audiovisual systems integrator headquartered in Atlanta.

The resolution, brightness and longevity of IFPs have been key selling points, according to Colson. IFPs don’t require replacement lamps, and many models support an onboard computer using the Intel-developed open pluggable specification (OPS) slot, so they don’t have to be connected to an external device.

**Android models.** The lion’s share of interactive displays for education have been powered by software from companies such as Smart Technologies or Promethean, Colson said — but a growing number of IFPs are now taking advantage of the Android operating system. They operate like a giant Android tablet, turning on instantly and providing all the interactivity of a tablet computer.
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Head-Mounted Displays

Students might be interacting with large flat panels today, but next year, they could be interacting with small head-mounted displays too.

For years, futurists have been predicting the use of virtual reality (VR) headsets as an instructional tool. Now, that future is finally arriving, as several manufacturers — including Google, Microsoft, LG, Oculus and Samsung — have brought HMDs to market in the last few months.

Google Cardboard is a simple, affordable 3D viewer that turns an Android phone into a panoramic display. The Google for Education team has designed Expeditions: virtual field trips that take advantage of the technology to provide immersive, interactive experiences — such as exploring the bottom of the sea or the ruins at Machu Picchu — that bring lessons to life for students.

On March 30, Microsoft released a developer version of its HoloLens technology, which it calls the “first fully untethered, holographic computer,” enabling users to interact with high-definition 3D holograms. Microsoft has partnered with Case Western Reserve University and the Cleveland Clinic to develop anatomical 3D images that medical students can explore, manipulate and examine from every angle.

“We’ve been teaching human anatomy the same way for a hundred years,” said Case Western President Barbara Snyder in a video about the technology. “Students get a cadaver, then they look at medical illustrations — and it’s completely two-dimensional. But the human body isn’t.” The HoloLens technology will allow students to interact with 3D content in ways they couldn’t before.

The Oculus Rift, a $599 head-mounted VR display, is now shipping. And Samsung has developed the Gear VR headset, which is based on Oculus technology but costs $99 and works with a Galaxy phone. Samsung’s Education division said it’s looking for schools and colleges to pilot the technology. LG also entered the market in May with the $199 360 VR Headset, a complement to its recently launched 360 degree VR camera.

Market growth. HMDs, which sold about 140,000 units in 2015, are expected to sell about 1.43 million units in 2016 and 6.31 million units in 2017, according to a forecast from research firm Gartner.

Brian Blau, the analyst who wrote the report, said he doesn’t know how many of these sales will be for education. But he sees many possible uses for the technology in schools and colleges — from occupational training to investigative learning.

“I’m a big believer in giving kids immersive technologies such as VR,” said Blau, research vice president for Gartner’s Personal Technologies: Innovation division. “It’s such a powerful platform, and it will bring the world to kids wherever they are. Because it’s immersive and 3D, their experiences have a real potential to be much more personal and meaningful.”

Education applications. The 2016 Horizon Report from the New Media Consortium (NMC) predicted that VR technology will be adopted by at least 20 percent of universities in the next two to three years.

At Penn State, the report noted, engineering students tasked with virtually assembling an object completed the project more efficiently when using the Oculus Rift VR headset and a haptic glove, compared to students who used a mouse, keyboard and computer. And at Boise State, nursing students use Oculus Rift to learn proper procedures for inserting catheters. The virtual reality method is less expensive and requires less space than using traditional mannequins, the report said, and it provides better real-time feedback for students.

It’s still unclear what all the pedagogical implications will be once the “wow factor” wears off for VR. But those involved in the field are still quite optimistic.

“The compelling aspect of virtual reality is its ability to transport learners into environments and situations that they otherwise may never have access to,” said Samantha Adams Becker, senior director of publications and communications for the NMC. “Being able to walk among dinosaurs in a fifth grade history class, being able to simulate surgeries for medical students — the potential applications are as unlimited as one’s imagination.”

Dennis Pierce is a freelance writer with 18 years of experience covering ed tech.
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The Sublime and the Mundane of School Transformation: 10 Success Factors

Thomas Edison, “Success is 1 percent inspiration and 99 percent perspiration.” This insight holds true when it comes to transforming schools by taking the digital leap. Many of the elements of a successful leap involve traditional program management and change management fundamentals that, without inspiration, will lead to the same old results, not realizing the promise of technology. Similarly, the small part that is inspiration can often be aspirational but fail in the execution without the supporting framework that constitutes the 90 percent “perspiration.” A successful leap requires both.

There are many ways to describe all the elements of a successful digital leap, but a comprehensive framework needs to identify the layers where standardization is necessary in order to provide the stable structures that enable innovation the next layer up; to characterize the block-and-tackle day-to-day work of developing and implementing policies and procedures; and to highlight the inspirational, aspirational practices that make the transformation a meaningful and impactful one.

One such new framework that CoSN, the Consortium for School Networking, has developed arises from addressing the fundamental conditions for success in the following 10 areas: leadership and vision, strategic planning, ethics and policies, instructional focus and professional development, team building and staffing, stakeholder focus, infrastructure, information and data management, communications management and business management. CoSN is calling this the “Framework of Environmental Conditions for Success.”

Leadership and vision: This component sets the tone for the entire transformation. On the inspirational side, the vision that is developed becomes the “true north” that all policies and procedures and operationalized innovation are guided by. If this vision gets to the heart of improving outcomes for students, the transformation will be pointed in the right direction. If the vision is limited to bringing in technology solely for engagement or to connect with the digital generation, the transformation will likely go astray. In addition to vision, there are many programmatic necessities, such as distributed collaborative leadership, data-informed decision making, continual improvement processes and equity practices.

Strategic planning: The principles of program management apply to the process of strategic planning, including setting goals and identifying success metrics, aligning resources and planning for technology implementation. Key is ensuring that instructional goals precede technological goals.

Ethics and policies: Policies operationalize the vision. They will either help or hinder innovation and transformation and must be crafted with care. They include everything from legal compliance to responsible use policies to student data privacy policies and much more.

Instructional focus and professional development: Supported by standardized processes, infrastructure and policies, this area is one where ongoing innovation and improvement is core. On the “inspiration” side, instructional practice is evolved by adapting (not adopting) successful practices from the field, engaging in thoughtful action research and focusing on practices that support students taking ownership of their learning and environments that support the activation of intrinsic motivation. On the “perspiration” side, using data to inform teaching and personalize learning as well as having a formal ongoing improvement process support the development of innovative practices. In addition, there is a need to address the “elephant in the room” of teaching to the test. Systems theory says that when one subsystem (test scores) is optimized, the system as a whole becomes suboptimal. To keep a focus on test scores from driving out other important learning outcomes, it is important to intentionally focus on success.
skills such as creativity, critical thinking, collaboration and communication and content knowledge simultaneously.

**Team building and staffing:** New processes require cross-functional organizational structures where obsolete functions are no longer supported. A transformational environment also requires that teachers and staff model the behaviors and skills that they are asking students to learn. As one desired outcome is for students to take ownership of their learning, teachers must demonstrate taking ownership of their teaching (and administrators of their work and so on). This calls for an environment that supports intrinsic motivation: one that offers autonomy, mastery and purpose, as opposed to one with a top-down command-and-control structure. Intrinsic motivation teams are at the heart of transformed schools — they are the ones who say, “I could never go back to the old way of teaching.”

**Stakeholder focus:** Transformation doesn’t happen in a vacuum — it is critical to nurture community partnerships as well as to seek and act on feedback from parents, students, teachers and other stakeholders.

**Infrastructure:** Transformed teaching requires robust, scalable, reliable networks based on open industry standards. It is not unusual for transformed environments to see 60 percent year-over-year growth in bandwidth capacity demand and a network that can’t keep up with that escalation in demand can cripple the transformation in teaching that can occur with the digital leap.

**Information management:** The district needs to implement and maintain high-quality data systems for data integration, security, privacy protection, data reporting, standardized assessments and IT management.

**Communications management:** Modern districts use web technologies and social networks as part of communicating both internally and externally, and these need to be thoughtfully managed to set the correct tone and send a consistent message. In fact, transforming districts need to explicitly market themselves to their communities, naming and branding their initiative and providing a compelling rationale.

**Business management:** All business functions need to be maintained as part of the block-and-tackle of managing a transformed district, from roadmapping technology evolution to aligning resources to sustainable funding to developing and measuring key performance indicators.

For more information on CoSN’s Framework of Environmental Conditions for Success, please see: cosn.org/EnvironmentalConditions.

Marie Bjerede is Principal, Mobile Learning and Infrastructure, at CoSN – Consortium for School Networking.
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In two years on the job as deputy superintendent of educational services for the Santa Ana Unified School District, David Haglund has helped usher in a new era of “anytime, anywhere access to learning.” The high-poverty district, in which more than 90 percent of students are eligible for free and reduced lunch, is embracing BYOD as it emphasizes competency-based, project-based and blended learning. The centerpiece is the Advanced Learning Academy, a dependent charter school for elementary and middle school students that opened last fall with a focus on a high-tech, project-based and STEM curriculum.

**THE Journal:** How is technology a conduit to goals for your district?
David Haglund: To me it’s about the access the technology enables for students and teachers. Technology in and of itself is not enough. Many years ago, when PowerPoints first came out, people would get really impressed by the presentations kids put together, but there wasn’t a whole lot of deep thinking going into them. They were pretty and had great pictures, but that was about it....

**THE Journal:** How do you see technology improving access in a high-poverty district like Santa Ana?
David Haglund: In today’s world, you can continue to learn if you have the resources at home 24 hours a day, seven days a week, but kids in poverty don’t always have that opportunity. And if we don’t ensure that all of our students have access to the same learning opportunities ... the academic achievement gap continues to grow no matter what we are doing in the classroom.

**THE Journal:** What’s been your strategy to guarantee that access?
David Haglund: The first step was to rewrite policies to ensure that we are supporting open access and BYOD. Then we went about identifying those students with technology that they could bring with them, constructing the network in a secure way that allows personal devices to be used in classrooms and then allocating our scarce resources to assist students who didn’t have access at home. We also went out and met with 1,700 different high school students, talking with them about what works and what they would like to do differently. We learned about the devices they liked to use so that we could make sure students have access to tools at home and at school....

**THE Journal:** How does Advanced Learning Academy fit in?
David Haglund: In the Advanced Learning Academy, the students have multiple teachers, and they move between rooms based on the academic goal they have for that particular day. Following playlists the teachers built for them based on their performance the day before. Students move forward when they master the objectives in the learning pathway, with no arbitrary barriers that would keep them from moving at their own pace. It’s project-based learning, and the subjects are integrated, so that when the project requires a skill that's dependent on the science concept, only then is the science concept introduced.

**THE Journal:** In your meetings with students, what have you learned that has surprised you?
It’s hard to say that I’ve been surprised by much of what I heard. I was a high school dropout; school didn’t do it for me. So I know what it’s like to be a student when the learning environment isn’t in alignment with your passions. When we went out to the high schoolers in Santa Ana, these kids were saying, “Let us learn in the way that’s meaningful to us.” We asked them who [or] where they go when they get stuck on something — a counselor, a teacher, a friend or Google. I wasn’t surprised that Google won.

**THE Journal:** Have you found that students use technology outside of school?
As much as I’d love to hear them say they go to one of their teachers, they can’t always get to their teacher. So they’ve learned that they can quickly turn on their phone, Google something and get an answer for it. And yet, in the past the teacher might see them whip out the phone and tell them to put it away. As a deputy superintendent, it would be easy for me to become far removed from the activities in the classroom and the concerns of the students. My own negative experiences with school keep me constantly aware of the importance of never losing contact with students. I can never assume that I know what the right answer is. So I spend a lot of time walking campuses, attending events and trying to stay connected with the kids. I give them my cell phone number and tell them if there’s a problem, let me know. I don’t get calls or texts, but they remember my name; and the next time I’m on campus, students will walk across the quad and tell me what’s going on. 😊
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