Personal, portable education today

A white paper from One-to-One institute

By Leslie Wilson
January 2017

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Introduction

It has been a long-standing belief that the personalization of learning is paramount to students’ achievements. In education today digital tools help realize this ideal. John Dewey, in his “Democracy and Education”, 1916, championed the child being the center of the education system. He taught us that children’s learning experiences needed to be meaningful and engaging and not regurgitation of information from textbooks and lectures. His leadership emphasized the necessity of “knowing” and “caring” about each learner in order to create a culture of self-directed motivation to reach full potential.

The genesis of personalization was in special education/special needs and gifted classrooms. Teachers needed to deeply understand each learner’s abilities, learning styles and other unique qualities. They created and implemented strategies outside traditional norms to ensure meeting each child’s needs for progress. These approaches were captured in Individualized Education Plans. Today, the ideal is that each and every learner has a Personalized Learning Plan (PLP) (Bray, McClaskey, "Make Learning Personal", 2015, (http://www.personalizelearning.com/p/make-learning-personal.html). Applying the Universal Design for Learning® (UDL) (http://www.udlcenter.org/), also with roots serving special populations of learners, enhances the ability to create personal learning plans.

A shift from an adult to a learner-centered ecosystem is fundamental to this process. Today’s digital sandbox, network and infrastructure help navigate the needed changes. With personalized learning at the core the discourse becomes “how” to effectively use new learning models and modalities to meet each learner’s needs while on his/her personal learning journey.

New and developing digital resources are abundant. School leaders are deliberating how best to make the transition to a digital learning environment. Schools are providing mobile devices to initiate a one-to-one environment. Some allow students to bring their own device (BYOD). There are numerous blended approaches being enacted.

The percentage of children that have a mobile device has rapidly increased. The graphics below give a snapshot of this expansion between 2012 and 2015. In 2014, Project Tomorrow’s, “The New Digital Playbook: Understanding the Spectrum of Students’ Activities and Aspirations” showed, effectively, that all middle and high school learners have access and are using personal, mobile devices for schoolwork. Close to a third of the mobile devices are school-issued. See the graphics below from Project Tomorrow’s Speak Up surveys (http://www.tomorrow.org/speakup/).

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Tell us about the mobile devices that you use. These can be devices that are your own (or provided to you by your family) or provided to you by your school. Select the choices that are true for you.

<table>
<thead>
<tr>
<th>Mobile Device Type</th>
<th>2013 (G6 - 8)</th>
<th>2012 (G6 - 8)</th>
<th>2013 (9 - 12)</th>
<th>2012 (9 - 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart phone with Internet access, Self or family provided - used at school</td>
<td>22%</td>
<td>17%</td>
<td>50%</td>
<td>40%</td>
</tr>
<tr>
<td>Smart phone with Internet access, School provided</td>
<td>5%</td>
<td>5%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Laptop, Self or family provided - used at school</td>
<td>11%</td>
<td>11%</td>
<td>16%</td>
<td>15%</td>
</tr>
<tr>
<td>Laptop, School provided</td>
<td>31%</td>
<td>20%</td>
<td>32%</td>
<td>28%</td>
</tr>
<tr>
<td>Netbook, Self or family provided - used at school</td>
<td>18%</td>
<td>19%</td>
<td>17%</td>
<td>18%</td>
</tr>
<tr>
<td>Netbook, School provided</td>
<td>21%</td>
<td>20%</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>Tablet computer (like an iPad), Self or family provided - used at school</td>
<td>49%</td>
<td>42%</td>
<td>37%</td>
<td>35%</td>
</tr>
<tr>
<td>Tablet computer (like an iPad), School provided</td>
<td>24%</td>
<td>22%</td>
<td>20%</td>
<td>17%</td>
</tr>
<tr>
<td>Digital reader (like a Kindle or Nook), Self or family provided - used at school</td>
<td>36%</td>
<td>33%</td>
<td>29%</td>
<td>28%</td>
</tr>
<tr>
<td>Digital reader (like a Kindle or Nook), School provided</td>
<td>16%</td>
<td>17%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>MP3 player (like an iPod or iPod Touch), Self or family provided - used at school</td>
<td>58%</td>
<td>64%</td>
<td>44%</td>
<td>51%</td>
</tr>
<tr>
<td>MP3 player (like an iPod or iPod Touch), School provided</td>
<td>24%</td>
<td>23%</td>
<td>35%</td>
<td>40%</td>
</tr>
</tbody>
</table>

© Project Tomorrow 2013

Which of these are true for you most of the time when you are at school? (Check all that apply)

<table>
<thead>
<tr>
<th>Mobile Device Activity and Location</th>
<th>2015 (G6 - 8)</th>
<th>2014 (G6 - 8)</th>
<th>2015 (9 - 12)</th>
<th>2014 (9 - 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use my own mobile device (smartphone, tablet, laptop) to help with schoolwork</td>
<td>30%</td>
<td>23%</td>
<td>64%</td>
<td>58%</td>
</tr>
<tr>
<td>I use a laptop in class that my school gives me to use</td>
<td>36%</td>
<td>34%</td>
<td>39%</td>
<td>32%</td>
</tr>
<tr>
<td>I use a tablet in class that my school gives me to use</td>
<td>21%</td>
<td>21%</td>
<td>12%</td>
<td>14%</td>
</tr>
<tr>
<td>I use a Chromebook in class that my school gives me to use</td>
<td>33%</td>
<td>21%</td>
<td>21%</td>
<td>16%</td>
</tr>
<tr>
<td>I use computers in the computer lab, library, or media center to help with schoolwork</td>
<td>43%</td>
<td>50%</td>
<td>37%</td>
<td>44%</td>
</tr>
<tr>
<td>I do not regularly use technology when I am at school</td>
<td>18%</td>
<td>21%</td>
<td>10%</td>
<td>13%</td>
</tr>
</tbody>
</table>

© Project Tomorrow 2015

Classrooms are experiencing the digital conversion – whether or not the school is providing mobile tools. There are numerous blended models that ensure learning happens all the time and from anywhere. Textbooks are being replaced by curated digital resources, in digital formats, including tools to annotate, collaborate and share information.

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“America’s Digital Schools” (Hayes & Greaves 2008), showed education technology trends and predictions. One discovery was that national one-to-one programs were emerging at a rate of 4% a year. One-to-One Institute (OTO) researched the national landscape in 2011 and found approximately 2000 “authentic” one-to-one sites and that the number was increasing quickly. There was an obvious uptick in one-to-one teaching and learning models – though there was variance in how each site defined and implemented their programs.

The proliferation of netbooks, notebooks and tablets blurred the identification of authentic one-to-one learning models with the “spray and pray” approach. That is, with the latter, schools became more beholden to the notion of providing mobile devices with little to no attention to effective vision, planning and successful implementation. Numerous one-to-one program debacles peppered the landscape. These districts spent millions or billions of dollars on devices with little or no attention to the seven systems necessary for successful education technologies implementation. These purchases resulted in lack of return on investment and enormous challenges that, in some cases, could not be resolved without dismantling programs.
The ideal one-to-one solution is highly personalized through a learner-centric model. This can be most expeditiously and productively accomplished through the use of personal, portable technologies. Teachers become partners with their learners as their role dramatically shifts. We’ve learned that teachers’ high quality, ongoing, job embedded professional development is crucial to successfully implementing technologies with a focus on learners’ achievement. The teacher is crucial to ongoing student progress, feedback, guidance, resource alignment and support.

The notion that today’s learners are digital natives who can well navigate technology tools is true to some degree. But meaningfully integrated, curated digital tools are most powerful in the learning process when teachers have deep knowledge and skills in their use. Within the teacher/learner partnership there is a lot of ongoing communication and collaboration where the learner has voice and choice in the process.

Students must be considered up front when planning for one-to-one scenarios. Some are adept at independently powering up and driving their learning and progress through online or standalone instructional delivery programs. Some are not. The heart of well implemented programs is knowing each participant and to organize teaching and learning that helps students achieve their full potential. That is true personalization. There is no one-size-fits-all approach.
Integrating resources

For best results, the personal, portable device solution must be integrated and aligned with other big picture programs and initiatives in the school/district. There is danger in layering the education technologies delivery model on top of all else. Fidelity to achieving outcomes will be in peril unless there is clear understanding and a keen focus on how multiple programs fit together. Skillful professional developers can help stakeholders make these connections and weave together implementations. Mobile learning combined and aligned with a guaranteed curriculum is also key to success. In developing and planning one-to-one teaching and learning, the curriculum is the foundation. Teachers and administrators need development time, support and organization to determine effective strategies for powering up the curriculum through the use of technologies. Textbook publishers are responding to the cry for digital resources and are still challenged to ideally figure out the best end game. A static textbook gone digital is simply that. Publishers are trying to figure out costs and return on investment as they migrate to this kind of resource. For one-to-one classrooms, what matters is the dynamic nature of resources – no longer does the static textbook – either in digital or hard copy format satisfy the needs for today’s learner.

Second, today’s resources must be up-to-date and interactive. Digital texts that are dynamic incorporate tools to create content, add notes, edit and collaborate. “Sit and get; read, digest and regurgitate” are 18th and 19th century teaching strategies. Today teaching and learning must be learner centered, current and focused on inquiry based techniques that require student outputs and creations as demonstrations of learning.  

1FCC & USDOE, “Digital Textbook Playbook”, 2012; FCC & USDOE Publication
The Project RED (2010) study of 997 schools, 23 percent of which were one-to-one solutions, found the following statistics regarding the type of devices deployed in this cross section of robust, ubiquitous technology sites.

Chart 5.2 Please enter an approximate number for each computing device used in the classroom (Q5)

Source: Project RED (2010)
The Project RED study was released at a time when “tablets” such as iPads came quickly and widely onto the education scene. There is no question that the penetration of tablets in schools would be much greater than two percent today. Project Tomorrow (2012), for example, found that personal tablet access for middle and high school students doubled from 2010 to 2011. The attraction is that tablet devices extend the “personalization” initiated by smartphones. This personalization allows students to be “always on” with 3G/4G connections. It provides multiple features that support the communication and collaboration students’ desire and entertains them through a vast array of applications that complement their lifestyle.

According to Project Tomorrow’s 2012 survey, students had begun using an increasing variety of mobile devices. And devices are used for different purposes as demonstrated in the Project Tomorrow graphic below. Because so many students now have access to disparate devices, the conversation about the appropriate device for schools needs to be broadened to include students bringing their own device (BYOD). This subject will be later addressed.
Segue to 2016. Futuresource Consulting Ltd, a UK based firm, found that Chromebook purchases in K-12 education grew 58% between 2015 and 2016. See the chart below for the big picture of US device choices.

**USA summary**

**USA shipments of personal computers**

<table>
<thead>
<tr>
<th>Table</th>
<th>Netbook</th>
<th>Chromebook</th>
<th>Tablet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2 2015</td>
<td>1,500,000</td>
<td>2,500,000</td>
<td>4,000,000</td>
</tr>
<tr>
<td>Q2 2016</td>
<td>1,500,000</td>
<td>2,500,000</td>
<td>4,000,000</td>
</tr>
</tbody>
</table>

Different academic tasks demand different devices

<table>
<thead>
<tr>
<th>Schoolwork Tasks</th>
<th>First Choice</th>
<th>Second Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a presentation</td>
<td>Laptop (69%)</td>
<td>Tablet (31%)</td>
</tr>
<tr>
<td>Communicate with classmates</td>
<td>Smartphone (68%)</td>
<td>Laptop (38%)</td>
</tr>
<tr>
<td>Collaborate on a school project</td>
<td>Laptop (59%)</td>
<td>Tablet (38%)</td>
</tr>
<tr>
<td>Follow experts on Twitter</td>
<td>Smartphone (54%)</td>
<td>Laptop (42%)</td>
</tr>
<tr>
<td>Create a video</td>
<td>Laptop (50%)</td>
<td>Smartphone (40%)</td>
</tr>
<tr>
<td>Take notes in class</td>
<td>Laptop (46%)</td>
<td>Tablet (45%)</td>
</tr>
<tr>
<td>Read a book or article</td>
<td>Digital reader (44%)</td>
<td>Tablet (41%)</td>
</tr>
</tbody>
</table>

Speak Up 2012 National Findings From Chalkboards to Tablets

From Chalkboards to Tablets

Schoolwork Tasks

<table>
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<tr>
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<tr>
<td>Create a presentation</td>
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<tr>
<td>Read a book or article</td>
<td>Digital reader (44%)</td>
</tr>
</tbody>
</table>

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Regardless of device, the focus for the decision must be based on device functionalities needed to achieve the desired learning outcomes. Robust foundational laptops are still widely used in grades 6-12 because of the ability to multi-task, use learning media and create rich content. Tablets are enticing for some and are commonly seen in lower grades. They are still limited in most of the noted functionalities listed above. They do, however, allow for immediate access to the internet, have a long battery life and provide access to a multitude of applications that have been successfully used for skill development. Other benefits of tablets are that they can be used effectively as e-readers, are extremely portable and can cost considerably less than a robust laptop.

Districts may look to use a variety of these technology options when moving to a digitally converted environment. Some districts with tablet programs still utilize computer labs or shared laptops so that students have the functionalities of both. In a perfect world and perhaps the one to which we are moving, students will have uninterrupted access to three to five personal, portable technologies in their learning worlds, with bandwidth and connectivity to accommodate “peak” usage. They would be able to seamlessly weave digital resources among devices for supercharged learning experiences.
Kent School is a private, co-educational college preparatory school located in Kent, Connecticut. The 1,200-acre campus currently serves 570 students, 30 percent of which represent 38 countries from around the world.

For more than 20 years, Kent School has pioneered the use of integrated digital technology in the classroom. They have worked with multiple device partners and experimented with a one-to-one program, equipping each pupil with their own device. “The most important criteria when selecting a device is the processing power; specifically, how can it handle the demands of engineering and art applications?” explains Michael Siepmann, Helpdesk Manager at the school. “We also need it to last a full day on a single charge.” After a lengthy search of computing devices, the school decided to use several models of the Fujitsu LIFEBOOK® and STYLISTIC® product lines.

Kent School is enjoying the flexibility and durability of their fleet of Fujitsu devices. Teachers are no longer tethered to a blackboard or a projector and can use the tablets to make the educational experience more engaging and interactive. “By using the machines to wirelessly project, we avoided having to install smartboards in the classroom – that’s a huge saving for us,” adds Siepmann.
Efficient, seamless connectivity is a prerequisite to implementing mobile technology education solutions. It is important to accurately estimate the current and future demand requirements to ensure that there is uninterrupted connection capacity. Without it there will be countless instruction and learning interruptions. These can potentially lead to teachers’ and students’ infrequent attempts to integrate digital tools.

High speed broadband is vital for K-16 education. It is a standard infrastructure just as are heating/cooling, plumbing and electricity. Districts must consider the range and mixture of activities and applications that will be used on the network to calculate connectivity needs. Multimedia streaming, internet research, online assessments and interactive digital resources can require high levels of transmission capacity. It is important to understand the volume and timing of these activities to ensure appropriate bandwidth.

“Peak” demand is an important consideration. This is the level of bandwidth required to meet maximum simultaneous access for students, faculty and other staff. Schools will require different levels for “peak” demand. An assessment is important. Coverage is different from capacity. More access points will be required for classroom Wi-Fi than a “coverage” plan for addressing load density connectivity and multimedia-based applications. It is always important to work with content and application providers to be sure to accurately estimate bandwidth needs with chosen content/solutions.

“For example, if a school or district is implementing a digital learning platform that relies heavily on video delivered to a student
The Federal Communications Commission adopted the new E-rate administration rules in 2014. They streamlined the program focusing on cost-effectiveness of all E-rate spending through increased pricing transparency, encouraging consortia/bulk purchasing and enhanced scrutiny of existing rules. The modernized version migrated E-rate support from traditional non-broadband services to focus on external broadband connections and Wi-Fi connectivity for learners, faculty and staff.

The goal was to ensure 99% of US learners had internet connection via high speed broadband and high speed wireless systems within five years. This mandated the Federal Communications Commission (FCC) to upgrade the E-rate program and leverage it to meet the new goal.

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Funding and sustainability

Funding is part of the short and long term planning for one-to-one programs. It must be part of the vision. Thoughtful, focused funding planning with a collaborative leadership team is imperative. First, a careful look at current technology expenditures and their return on investment is important. As in any other industry, it is crucial that districts identify funding streams as part of their technology and IT plans. This often will require recapturing resources from other areas of less importance, cost avoidance and funding reallocation. There is no silver bullet.

Reliance on soft money, i.e. grants and one-time gifts, will not result in long term sustainability. Many districts will seek a one or two time bond issue to jumpstart the initial education technologies investment. However, a long term plan for growing, sustaining, refreshing and replacing the technology must accompany initial expenditures. Reliance on repeated bond issues provides no guarantee for continued funding.
One of the things St. Joseph’s Academy is doing to enrich their students’ learning experience is the integration of pen and touch computing. Fujitsu stepped in to provide every student with a pen and touch convertible tablet PC while they are enrolled at St. Joseph’s Academy.

Teachers and Administrators appreciate the durability and quality of Fujitsu devices, given that students can be particularly hard on equipment. “[Fujitsu] machines are very sturdy, which is critical when you have more than 1,000 girls!” notes teacher Dawn Burton. Fujitsu products easily integrate with other technology and programs, such as PowerPoint®, DyKnow™, Lync®, activeboards, e-beams and Moodle™ (the school’s online learning management system) to facilitate a more interactive classroom experience.

St. Joseph’s has a student supported help desk, providing those same students with the opportunity to understand the inner-workings of a computer, while problem solving. Students managing the tablet PC maintenance get involved in systems issues such as: logging in equipment with issues, diagnosis, changing parts and quality-assurance testing. Students working the help desk at St. Joseph’s are professionally trained and work alongside the Fujitsu team to ensure they can effectively troubleshoot issues and provide timely support for their peers.

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Strategic planning for education technology must be a systemic solution integrated with curriculum, teaching, instruction and learning. In education environments transformed by technology, there are a variety of measures of education success and financial variables. Here are a few types of financial impact:

Cost avoidance that leads to savings

- Establishing more efficient non-instructional “business” processes for human-resources, finance and operations.

- Creating single-point student data input site to facilitate data acquisition, archiving, analysis and distribution. This would also expedite the adoption of robust response to intervention (RTI), special education, classroom, student and media-management information systems that interface directly or through the use of middleware.

- Adoption of free web-based digital content to replace purchased materials.

Cost savings

- Using technologies that provide less expensive ways to perform tasks, e.g., using cloud based services to reduce expenses associated with storage and data back-up.
The growth in popularity of bring your own device (BYOD) programs hastens the need for a broader discussion about the appropriate computing device for the one-to-one classroom. Many schools are now deciding that it no longer makes sense to continue banning cell phones and other computing devices brought from home. Instead of continuing to fight an unending battle, district leaders are beginning to embrace the fact that many students have access to computing devices that could enhance learning in the classroom.

Currently, most BYOD programs do not create a site-wide 1:1 learning environment and are not being used to transform teaching and learning. Many BYOD programs simply allow students to bring their own device to school, without much consideration as to how it can most effectively be used to enhance learning. A BYOD program can provide a tremendous opportunity to a school district to engage learners in new ways and to improve student outcomes. In order to reap these benefits, however, BYOD programs should focus on how student-owned technology can personalize instruction and engage creative and innovative thinking in a systemic way that meets the needs of all students.

With this new perspective comes the need for new policies to address the unique issues of BYOD programs. Two districts that have successfully made the shift to BYOD are Hanover Public Schools in Pennsylvania and Forsyth County Schools in Georgia. Examples of their BYOD policies as well as other valuable information can be found on their websites at http://byod.hanoverpublic.org/ and http://www.forsyth.k12.ga.us/site/Default.aspx?PageID=825.
BYOD is not automatically an education technology panacea. There are numerous challenges to be addressed prior to implementing. Although it is seen as a cost effective option to achieve one-to-one, there are still many expenses associated with a BYOD program. It is necessary to provide a secure network, bandwidth and/or wireless infrastructure and mobile device management tools. Teachers will need professional development in order to effectively integrate the technology into instruction. Supplemental devices will be needed in order to provide an equitable learning environment for all students.

The cost of a BYOD program will be unique to each setting. There is currently not a benchmark figure from which we can extrapolate costs. Each setting will be implemented and supported differently. When students bring their own technologies to school, in lieu of having the district purchase them, cost savings will likely occur. To determine overall costs, the district must:

- Assess current technology expenditures to see where costs will be defrayed, reallocated or eliminated due to a BYOD implementation
- Determine the kinds of devices, platforms that will be supported by current infrastructure/network or plan for the necessary changes to support network bandwidth/connectivity enhancements
- Determine kinds of services, support and related costs to be provided in the BYOD setting
- Plan for educators’ professional development for BYOD implementation
- Plan for parents'/caregivers’ education and engagement of the BYOD
Student safety – BYOD and all technologies

Student safety and compliance with the Children’s Internet Protection Act (CIPA) are also very important considerations for school administrators. In 2000, Congress enacted CIPA that directs for three types of technology funding: 1) aid to elementary and secondary schools; 2) Library Services and Technology ACT (LSTA) grants to states for public libraries; and 3) the E-Rate program which provides technology discounts to schools and public libraries. The law requires public libraries participating in LSTA and E-Rate programs to verify they are using computer-filtering software to prevent on-screen depiction of resources harmful to minors.

The same safety rules and expectations apply to BYOD sites as they do to other one-to-one iterations. Security software for school and student-owned devices is essential to protect student information and other sensitive data. School/district leaders should standardize the security software for all devices that access the school network. Mobile device management is one approach schools look to in order to address security concerns.

Using a mobile device management solution, the district can extend content filtering policies to these mobile devices to help ensure safety. Schools can effectively do this by pushing a VPN client to the student’s device to allow the student to authenticate into a school server, thereby providing a means to filter out inappropriate websites. The district can also remotely disable cameras, messaging applications and other applications during designated times that teachers deem inappropriate. Each district will have unique policies and protocols – but they must be aimed at

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There is another continuing national debate regarding the return on investment of educational technology. Many one-to-one programs over the past decade have not seen the anticipated return on investment or academic benefits anticipated by educators. There is a growing body of evidence, however, that one-to-one computing programs can impact student achievement in a number of positive ways. Bebell and Kay (2010) in their study of the Berkshire Laptop Learning Initiative, for example, reported a significant increase in student engagement and motivation.

In a BYOD and any one-to-one environment, districts may also employ classroom management strategies that provide for scanning of students’ site access, either via software or physical presence. Districts should recognize that students need consistent reminders and reinforcement about online safety. Some teachers present mini-lessons on digital safety. “Cybersmart” (www.cybersmart.org) is one website that is used to develop these lessons. Educators need to be consistently “teaching” students and parents/caregivers about protection, safe measures, etc., for engaging in online creations, collaborations and communications. We are definitely in the era of personal responsibility and accountability for using technologies.

**Research says**

There is another continuing national debate regarding the return on investment of educational technology. Many one-to-one programs over the past decade have not seen the anticipated return on investment or academic benefits anticipated by educators. There is a growing body of evidence, however, that one-to-one computing programs can impact student achievement in a number of positive ways. Bebell and Kay (2010) in their study of the Berkshire Laptop Learning Initiative, for example, reported a significant increase in student engagement and motivation.
Although the researchers were not able to build a direct link between student engagement and higher academic achievement, the importance of motivation and engagement to student success has been clearly documented (Christenson et al., 2008).

In Texas, Dr. Kelley Shapley and her colleagues at the Texas Center for Educational Research (TCER) examined factors such as student engagement, as well as achievement. They studied 22 schools in a Texas one-to-one program, the Technology Immersion Pilot (TIP). In their first year evaluation, teachers reported that student engagement and motivation had increased, while student disciplinary actions decreased. By the third year evaluation, TCER was also able to begin tracking achievement trends on the Texas Assessment of Knowledge and Skills (TAKS) tests. They found that technology immersion had a statistically significant effect on TAKS mathematics achievement. They also found that students who used laptops more extensively for learning had significantly higher TAKS reading and mathematics scores (Shapley, et al., 2008).

Lowther, Ross and Morrison (2003) also found an increase in writing scores and problem-solving skills for students in the one-to-one program in their study of middle school students in the Anytime, Anywhere Laptop Program in Walled Lake Consolidated Schools. Likewise, Silvernail and Gritter saw significant improvement in writing scores on statewide tests for students in Maine’s laptop program.

Two common themes surface from these research findings. First, students need to use technology on a regular basis for it to have an effect. Secondly, it needs to be used effectively in order to realize the desired academic benefits. These factors are strongly supported by Project RED’s research (2010).
The Project RED research team found that very few schools in America have implemented technology in effective ways. Their 2010 report, The Technology Factor: Nine Keys to Student Achievement and Cost Effectiveness was the first national research focusing on academic results and the financial implication of education technology. The research shows that very few schools were using technology in all academic classes on a daily basis. If implemented properly, however, one-to-one programs can lead to improved student achievement and a significant return on investment.
In 2007, Mooresville Graded School District launched a one-to-one program called “Digital Conversion”. Laptops were provided to every 4th through 12th grade student and all licensed staff across the district for their use at school and at home during the school year. Although technology was seen as the tool, the driving force was a desire to provide more relevant content and tools to engage students.

Results from the program quickly showed improvements in student engagement. By the 2009 school year, Mooresville was one of only six districts that made all of its Adequate Yearly Progress (AYP) targets and also had the highest number of targets met. All schools in the district were recognized in 2009-2010 as Schools of Distinction. Out-of-school suspensions have decreased by 64 percent since 2006-2007 and the go-to-college rate has increased from 74 percent to 75 percent since 2006-2007. Furthermore, Mooresville had the highest 2010 graduation rate when compared with other districts in the Charlotte region and the three largest districts in North Carolina. The graduation rate was highest for every subset, including ethnicity, low income, disabled and limited English proficient.

Case study: Mooresville Graded School District

Mooresville is a blue-collar former mill town in suburban Charlotte.
There are four key findings the Project RED research reveals about using technology in schools to improve learning performance and financial outcomes:

1. **Personalize learning for all students through frequent, appropriate use of technology integrated with curriculum and instruction in all classrooms and other learning places.** Technology cannot be viewed as a supplement. It must be an integral part of students’ lives in the classroom and must be integrated in meaningful ways into the core curriculum. In Kent Technology Academy, for example, students use technology in creative ways to do things that wouldn’t be feasible through traditional means. Students in Kent are using simulations in their learning, are creating professional level multi-media productions, are collaborating in dynamic ways within and outside the classroom and are connecting in meaningful ways to the world outside the school.

2. **Make professional learning and effective use of technology high priorities for administrators and teachers.** High-quality professional learning for teachers is key to using technology to its fullest potential. To truly personalize learning and create student-centered learning environments, educators must overcome their own insecurities regarding technology and be able to confidently integrate the technology into every aspect of their instruction.

Transformation of this kind can be a slow and difficult process for some teachers and administrators must facilitate the learning. It is important, for example, that administrators provide a non-threatening environment in which teachers feel free to try new instructional strategies, debrief the experience with colleagues and make the necessary adjustments to improve their effectiveness. This type of professional learning and growth does not happen through a periodic workshop for teachers. The process must be ongoing and built into teachers’ job expectations and regular work day. Online communities of practice, such as edweb.net, provide continuing education and opportunities for peer dialogue to help teachers and administrators learn from one another.

3. **Use technologies such as social media, games and simulations to engage students and encourage collaboration.** Today’s students have been learning, communicating and collaborating through technology their entire lives. It is essential to leverage the extraordinary power of technology to connect with students, excite them about learning and empower them to lead their own learning.

4. **Use weekly online assessments to gauge student learning and then tailor instruction for personalized learning experiences.** Technology can assess each student’s learning on an ongoing basis and provide valuable information to the student and teacher. Teachers need to learn to use this data to guide instruction, remediation and to accelerate learning when appropriate.

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Many educators today recognize the moral imperative for the integration of education technology in schools—and many value the concept of one-to-one teaching and learning. There is much to be said for having reached that “attitudinal” tipping point. The road work to bring this to fruition is the hard part. Careful planning, developing shared vision, goals and strategic plans, allocating short and long term resources and developing human and infrastructure capacities is on the short list of what districts must do to be successful implementers of a one-to-one education solution.

Conclusion
Ms. Wilson is a CEO and founding member of One-to-One Institute, a non-profit serving organizations in successful implementation of 1:1 programs. She earlier co-directed Michigan’s 1:1 initiative, Freedom to Learn.

Prior to the Institute, Ms. Wilson served public education for 31 years as change agent, teacher and administrator. An Education Policy/Program Fellow with the Institute for Educational Leadership, Ms. Wilson created an advanced fellowship program for educational technology leaders. She completed her undergraduate and doctoral coursework at the University of Michigan, has an MA in Instructional Technology from Wayne State University and special education administrator certification from Eastern Michigan University. She is currently Board President of Nexus Academy, Lansing, Michigan, a blended learning high school and a mentor for Intel’s Education Accelerator Project.

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