THE CENTER FOR DIGITAL EDUCATION SPECIAL REPORT is a one-of-a-kind publication that provides education leaders with research-rich content that includes perspectives from industry experts and public sector peers. It consolidates current thinking, best practices, tips for successful implementation, professional development guidance and more — all within a single source. We hope you enjoy this current Special Report on Classroom Technology. Don’t miss the next Special Report on Building an Infrastructure for the Future coming out this spring! www.centerdigitaled.com/reports

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TECHNOLOGIES FOR THE 21ST-CENTURY CLASSROOM

Tablets. Smartphones. Social media. 3-D printers. Immersive environments. The long list of classroom technologies available to support K-20 educators is impressive, especially considering most of these didn’t exist just 10 years ago.

While many of these technologies are no longer new to the education market, what’s novel are the creative and innovative ways education institutions are using them to raise the bar on student learning. After all, it’s not the tool itself that matters as much as how the tool is used. A “phablet” — a mobile device that combines features of a smartphone and tablet — may be new and shiny, but if instructors don’t see how it can enhance student learning and meet educational goals, then it’s unlikely they will use it. Similarly, if bandwidth and IT staff can’t support the tools educators are using, instructors will shelve them and turn to another solution.

That’s why institutions need to determine “purpose before purchase.” In other words, evaluating what goals they wish to achieve, then identifying which technologies will help them meet those goals. All aspects of technology — goals; cost; use; efficiency; interoperability with legacy systems; and educational, community and workforce impact — need to be considered before moving forward with a new initiative.

Only once these steps are taken and stakeholder feedback is considered can education institutions realize the promise that today’s (and tomorrow’s) classroom technologies offer, and start tackling questions such as: How can instructional tools be used to help students become creative and critical thinkers? How can education institutions use classroom technologies to ensure students are ready for the workplace of the future and remain enthusiastic about lifelong learning?

This Center for Digital Education Special Report serves as a guide for education decision-makers on how to effectively implement, integrate and support familiar and new classroom technologies to achieve 21st-century learning goals. It provides potential solutions to the challenges institutions encounter when implementing classroom technology on a large scale by highlighting best practices and success stories. Along the way, it reveals recent CDE research results gleaned from surveys distributed to K-20 education decision-makers specifically for this report.

K-20 education leaders deem classroom and instructional technologies:

- Extremely important: 48%
- Very important: 46%
- Neither important nor unimportant: 5%
- Very unimportant: 1%

Source: CDE Classroom Technology Survey, December 2014
WHAT DOES THE OPTIMAL CLASSROOM HELP ACHIEVE?

Forty-seven percent of students at New Franklin R-1 School District in New Franklin, Mo., receive free or reduced lunch. Though some students have limited access to technology and Internet at home, thanks to the district’s emphasis on inquiry-based learning, technology has become an integral part of the learning landscape for every student.

Students use tablets, Chromebooks, laptops and desktops to achieve 1:1 instruction; classrooms are also equipped with interactive whiteboards. While textbooks are still assigned, instructors often use their own lessons created from Internet-based resources. Students are challenged with project-based learning, collaborative group work and relevant tasks touching on current issues. And they use technology — even at the lower grade levels — to videoconference with experts and take virtual field trips.

Since the district integrated technology into every grade, student scores (for testing, attendance, college and career readiness, and graduation rates) have stayed steadily in the 88th percentile in the state.

“Technology allows students to learn the way that works best way for them,” says Jacqueline Starke, the district’s instructional technology director. “Not all students learn the same way and we can really individualize instruction using technology. When our students get into college and beyond, they are much more experienced with a variety of different technologies and how to use them. We really do think we are building 21st-century learners.”

This is just one example of the way instructional technologies can be used to enhance learning — and it’s far from a unique one. Both K-12 schools and higher education institutions increasingly find technology is changing the learning landscape.

Online and blended learning, for example, is much more common today in higher education due to technology. The CDE survey conducted for this report revealed 84 percent of higher education institutions and 41 percent of K-12 schools now offer blended and virtual learning classes. K-20 decision-makers surveyed said they support project-based learning, personalized learning and flipped classrooms at their institutions due to the implementation of classroom technology. And 88 percent of K-20 education leaders either agree or strongly agree that classroom and instructional technologies have greatly increased at their institution over the past 5 years.

However, before considering specific instructional technologies, it’s important to first view the big picture. How do you want devices, software and other elements of technology to change your educational environment? What are your goals

“Not all students learn the same way and we can really individualize instruction using technology. When our students get into college and beyond, they are much more experienced with a variety of different technologies and how to use them. We really do think we are building 21st-century learners.”

Jacqueline Starke, Instructional Technology Director, New Franklin R-1 School District
and objectives for student learning? It’s helpful to start by considering what an optimal, 21st-century classroom enables.

ání An Engaging and Motivating Environment

According to a recent Gallup survey of students in grades 5 through 12, only 53 percent say they are engaged, 28 percent say they aren’t and 19 percent report being actively disengaged at school.\(^3\) When disengagement starts in K-12, it increases the chance students will not achieve their full potential and puts them at risk of dropping out.

The Dangers of Disengagement

A recent survey of students in grades 5 through 12 found:

- Only 53% are engaged at school
- 28% aren’t engaged
- 19% are actively disengaged

Disengagement can lead to higher dropout rates:

- Nationally, only 80% of students graduate high school
- Only 55% of first-time undergraduates who matriculated in fall 2008 finished a degree within 6 years

ání Personalized Learning

Rather than one-size-fits-all education, personalization lets instructors and students work with material best suited to individual student needs and abilities. Students can work through course material at their own pace and from where they are most comfortable, whether that be at home, in a classroom, at the library or anywhere else.

A RAND Corporation report commissioned by the Bill & Melinda Gates Foundation reported K-12 schools that emphasized personalized learning made gains in math and reading, which were significantly greater than a comparison group of schools without such an emphasis.\(^7\)

ání Student-Centered Learning

In the traditional education model, an instructor lectures, students sit passively and take in the
information, and then repeat that information in tests or papers. This model is shifting to a more active process. Ideally, educators in the 21st century are more Socratic, assuming roles as guides and facilitators who show students how to learn, think, read and write critically. Projects are more relevant to the real world, individualized and hands on, with the instructor serving as a support and guide in the learning process. In this model, students take a much more active role in their own education journey.

**Collaborative and Project-Based Learning**

Employers expect employees to work in teams and to collaborate effectively. The 21st-century classroom values group work, but not of the rote, questions-in-the-textbook variety; instead, students work on real-world problems affecting their campuses or communities. Projects might include blogs, Web videos and websites that are available to a wider, more authentic audience than just the instructor. Working on tangible issues where efforts are reviewed by the public eye gives students extra motivation to achieve.

**Blended or Online Options**

Approximately 5 million college students take at least one online course, according to recent Babson Survey Research Group data. The Evergreen Education Group estimates 5 percent of K-12 students take an online or blended course, and 75 percent of all districts offer some type of online or blended option.

Online options extend education outside the classroom, allowing students to be anytime, anywhere learners. At the college level, where students may have jobs or family obligations, online learning is a popular choice to help students obtain degrees that otherwise would not be able to.

A 2009 U.S. Department of Education meta-analysis found that blended learning, where students have some face-to-face and some online learning experiences, is the most effective learning model.

**Lifelong Learning**

In today’s rapidly changing technological world, job duties change, new careers emerge, old jobs disappear and often the only way to be prepared for these changes is by continuing education. Whether it’s through massive open online courses (MOOCs), employer-based training or more traditional courses, students are likely to continue to be students in some capacity throughout their entire lives if it’s instilled early on in their education.

To prepare students for this role as lifelong learners, education institutions need to inspire intrinsic motivation so students appreciate the value for ongoing learning throughout their lives. This not only serves students entering the job market but it inspires them personally as well.

**Focus on STEM/STEAM**

A successful 21st-century classroom sparks interest in science, technology, engineering and math (STEM) — for both genders and all races (women and minorities are under-represented in these often lucrative career fields). Additionally, arts (adding the “A” in STEAM) are also celebrated — often, arts and sciences spin off of each other and work together, as both types of disciplines celebrate and nurture creativity and innovation.

**Specialized Instruction**

Students with learning disabilities and other physical limitations, English language learners, at-risk students and others with special needs must have their educational needs met with care while instructors provide guidance to ensure they reach their highest achievement levels.
Strategically leveraged technologies can significantly impact student achievement and help institutions reach the educational goals outlined. The recent CDE survey found educational goals such as increased student engagement are the driving force behind classroom technology adoption. However, other considerations come into play as well, and these sometimes differ between K-12 and higher education.

Among higher education respondents, 65 percent cited student demand and expectation as the primary factor. Other significant factors included instructor demand, improving student engagement, preparing students for the future and increasing student achievement.

These results point to the increasingly integral role technology plays in student recruitment and brand differentiation. Colleges that forgo technology do so at a risk — for many potential students and faculty, lack of technology integration can be a deal-breaker.

In the K-12 environment, student demand is not the key driver; rather, 70 percent of respondents noted the need to prepare students for the future workforce as a primary force for classroom technology. Other significant drivers included instructor demand and the need to improve student engagement and achievement.

Additionally, K-12 leaders reported statewide and nationwide assessments as another
classroom technology driver. Schools and districts must continue to increase infrastructure and technology capabilities to handle simultaneous testing by hundreds or thousands of students at once, including 1:1 implementation of devices.

Despite the differences, K-12 and higher education decision-makers understand the importance of using technology to change the learning environment. While impossible to cover every tool, app or new approach, this section highlights some of the most impactful classroom technologies and some of the successful ways they are being used across K-20 education.

### Continuing the Mobile March

Tablets, smartphones, netbooks, e-readers and other small, portable online devices have increasingly been adopted by students and educators over the past several years. They are more engaging than paper and pencil, more relevant for students, and can be used with software that personalizes learning and provides instantaneous feedback. Instructors can use smartphones for instant polls, quizzes and other formative assessment measures, quickly determining which students need additional information or help. Multimedia capabilities allow students to use the devices in diverse ways, such as to collaborate on video projects or participate in virtual discussions while away from the classroom.

However, some K-12 institutions are still struggling over whether or how to allow devices in classrooms. Only 32 percent of K-12 CDE survey respondents indicated their institutions allow students to bring their own devices while 74 percent of higher education leaders reported having a bring your own device (BYOD) initiative. Recent research from the Pew Research Center finds 91 percent of students between ages 16 and 17 have phones (68 percent of which are smartphones).  

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#### Classroom Technology Drivers

<table>
<thead>
<tr>
<th>Category</th>
<th>K-12%</th>
<th>Higher Education%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student demand and expectations</td>
<td>65%</td>
<td>41%</td>
</tr>
<tr>
<td>Instructor demand</td>
<td>59%</td>
<td>44%</td>
</tr>
<tr>
<td>Need to improve student achievement (scores, retention and graduation rates)</td>
<td>47%</td>
<td>63%</td>
</tr>
<tr>
<td>Need to improve student engagement</td>
<td>55%</td>
<td>67%</td>
</tr>
<tr>
<td>Need to attract new students</td>
<td>36%</td>
<td>14%</td>
</tr>
<tr>
<td>Need to prepare students for the future workforce</td>
<td>53%</td>
<td>70%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>None of the above, we are not adopting technologies</td>
<td>1%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Source: CDE Classroom Technology Survey, December 2014

Increasingly, school districts are recognizing this trend and allowing students to bring devices to school. For example, in January 2015, the New York City public school system lifted its ban on cellphones, per an order from Mayor Bill de Blasio. Some instructors let students bring devices into class for instructional purposes, but use a “red light/green light” system to flag when the devices are to be on and when they are to be put away. Still, concerns remain among some educators and administrators about the potential for distraction.

As indicated by the recent CDE survey, BYOD is a much more accepted practice in higher education. However, one survey in 2013 found 92 percent of college students admitted to using devices for non-class reasons such as checking email, texting or Web browsing during class, with some turning to their devices more than 30 times per day. This raises the question: Are devices, and in particular social media sites such as Facebook, Twitter and Instagram, valuable tools or classroom distractions?

If distractions can be avoided or minimized, smartphones can be useful educational tools. Students and educators can connect with each other as well as with subject-matter experts.

For example, Iowa State University Associate Professor Reynol Junco has his students use Twitter and Facebook for discussions and found this type of social media use can improve retention, noting students who are required to use Twitter for class are more likely to stay for a second year than students who do not. If students talk about their discussions in class become more rich,” he says.

Breaking Down Borders with Video

Whether via mobile devices or desktop computers, students can use video capabilities to connect outside of the classroom. At New Franklin R-1 School District., students use video chats throughout their K-12 education. High school anatomy and physiology students have used video chat to connect with a university and observe a cadaver dissection. Students have also virtually visited the Holocaust Museum, videoconferenced with other students in Argentina and connected with a former student studying in Costa Rica. Even students in first grade have participated in video chats, says Instructional Technology Director Starke. “The students are very excited. It engages them more and it takes learning outside of the classroom.”

At Auburn University in Alabama, pharmacy students attend live classes on satellite campuses around the state using videoconferencing (a change from the past, where students had to commute hundreds of miles to attend class). Professors also record their lectures and other customized content, which students can access on computers and mobile devices. Video chats between instructors and students help create a more personalized learning environment.
Videoconferencing enables education institutions to offer classes they’ve been unable to provide in the past due to lack of resources or sparse enrollment. At Central Arizona College, five campuses are connected with videoconferencing, allowing the English department to consolidate students and offer more literature classes. “We have enough students to populate classes that we could not have run before,” says English Professor Karen Hindhede.17

Similarly, Randolph County Schools in rural Alabama offers foreign language, Advanced Placement and elective courses to students via videoconferencing.18

Livening Up the Classroom with Lecture Capture

Lecture or lesson capture ensures students aren’t missing out when they are absent from class. It enables students to catch up on their own time, without disrupting a lesson plan and causing the instructor to re-teach missed material. It also allows students to revisit material at any time if they are struggling with concepts or need to prepare for a test.

Some lecture capture systems save remote student annotations on slides or other lecture materials so all students can see and benefit from them. A student could be in his or her residential hall but via tablet can join students who are in the classroom; they all participate at the same time. This lecture or lesson is recorded and saved for later review.

Students access the saved content via laptops, smartphones or tablets, typically using a learning management system (LMS). Depending on the system, lessons and lectures can be searched by keyword and replayed at different speeds.

Lecture capture, along with videoconferencing and mobile devices, facilitate online learning, making it a richer, more engaging and effective process. Lecture capture also helps support the flipped classroom model where students can review lectures outside of class and instead use class time for more in-depth discussions, homework, group projects or one-on-one time with instructors.

Creating an Alternate World with Immersive Environments and Augmented Reality

Virtual reality environments, such as Second Life, have been used for at least a decade in education, allowing students to participate in virtual classrooms and
training scenarios and interact with each other. Students access the virtual realm via a computer, laptop or mobile device, but don’t wear special headgear or glasses.

Immersive environments are another type of augmented reality where a participant typically wears stereoscopic or 3-D goggles and enters a specially outfitted room, set up with video walls and stereo sounds so the user feels as though he or she is in the midst of another experience entirely.

For example, students and researchers at Villanova University in Pennsylvania may soon be able to take virtual trips to the Grand Canyon or St. Peter’s Basilica — just two possible destinations — using the university’s $1.2 million CAVE (Cave Automatic Virtual Environment). The CAVE, spearheaded by computer science Professor Dr. Frank Klassner, is one of the largest such virtual environments in the U.S. It consists of a room with three walls on which images can be projected. Images can also be displayed on the floor or a retractable ceiling, depending on the environment to be created, and stereo audio can be played to create the full experience of being in another location.

CAVE visitors will see video environments captured by Villanova University staff using special 3-D cameras. “We will be taking the video, then either projecting it live in the CAVE or storing the video in HD to play it back later,” says Klassner.

Additionally, other computer-generated immersive videos can be played in the CAVE — perhaps a solar system students can walk through to get a better sense of planets’ relationships to each other, or a cross-section of a part of the human anatomy that medical students can view up close.

The CAVE is housed at the university library and is intended to be available to all departments, which have been suggesting uses as varied as studying carbon sequestration during wetlands flooding, traffic safety and insect behavior. The project, funded by a $1.67 million grant from the National Science Foundation (NSF), will also be open to the public on select weekends during the year with structured tours. Eventually, Klassner hopes to have a system set up where people can request particular immersive experiences, similar to checking out a book.

Klassner says immersive environments like CAVE will become increasingly commonplace in schools and libraries in the next 10 to 20 years. “Studies have shown immersive displays can be very helpful to students when they are learning concepts that involve multiple reference frames, like the environmental relationships between locations on a planet, or the changes in a city over the course of history,” he says. Additionally, he says increasing travel costs will drive institutions to implement immersive environments to save money without compromising the student experience.

While Villanova’s CAVE cost more than $1 million due to its ceiling, built-in networking and other features, Klassner says other institutions could build structures of similar size for as low as $200,000. While these costs sound steep, Klassner notes that CAVE is a classroom for many purposes. Depending on what’s displayed, the room can become a simulated bio lab, a planetarium, an Exploratorium with archeology digs or art displays — the sky’s the limit.
Learning the FUNdamentals through Gamification

Game-based learning was cited by 31 percent of CDE’s survey respondents as a technology they most hoped to acquire in the near future. Game-based learning platforms at both the university and K-12 level can take advantage of adaptive capabilities to provide personalized learning. Students are directed in the game depending on their performance and receive instant feedback, which helps them better understand the lessons.

Built-in rewards as students move from level to level increase student engagement and motivation. Because lessons feel like games, oftentimes students don’t even realize they’re taking in and retaining new information.

Sometimes, educational game software can be incorporated with augmented reality or immersive experiences. For instance, as part of an immersive education initiative, the historic Bent’s Old Fort in Colorado will be reconstructed virtually in the game Minecraft — as a fully functional virtual reality environment. The project is a joint venture involving the U.S. Department of the Interior, the National Park Service, the city of La Junta, Colo., a nearby community college and a local school district. Free curriculum materials that enable virtual exploration of the site will be developed for students worldwide — including the general public.20

Preparing Students for the Future with Manufacturing Technologies

In the CDE survey, 3-D printing was identified as one of the top new technologies respondents want to implement in the near future. However, while 3-D printers have gained a lot of the education spotlight, they represent just one type of advanced manufacturing technology that can help students learn, says University of Virginia Professor Glen Bull.21

Other manufacturing technologies may offer faster, cheaper ways to achieve similar

Lab School Trains Students and Educators in Advanced Manufacturing

It’s the first school like it in the country — a program dedicated to teaching students how to use 3-D printers and other advanced manufacturing tools, coupled with an emphasis on teaching public school instructors how to communicate engineering concepts.

The Laboratory School for Advanced Manufacturing Technologies (Lab School) is in place at two middle school sites in Virginia, where about 500 eighth-graders are learning engineering processes through the use of fabrication tools.

The Lab School is a multimillion-dollar joint venture between the Charlottesville and Albemarle school systems and the University of Virginia, with financial support from NSF, the U.S. Department of Education,22 and state and local governments. One of its goals is to develop curricula based on advanced manufacturing that public school educators can take back to their classrooms.

Classes began initially for eighth-graders at the start of the 2013-2014 school year; ninth-graders who had been part of the middle school project are now working with the high school lab’s engineering instructor. All facilities are connected via videoconferencing to lab researchers at the University of Virginia.

There is one 3-D printer for every four students, as well as other fabrication technologies, such as computer-controlled die cutters, microelectronic components, sensors, motors and laser cutters. Students work on a variety of projects incorporating engineering design and science using these technologies. The Smithsonian Institution is also collaborating with the Lab School to identify early inventions from the collection for 3-D digitization and to develop a suite of education resources around them.

Recently, students recreated the sound made by chimes in London’s Big Ben by inventing an electromechanical sequencer using telegraphic relays, solenoid engines and linear motors. It’s just one example of the creativity, collaboration and critical thinking nurtured at the Lab School.23
objectives. With a 3-D printer, students often have to wait many hours — sometimes overnight — to see the results of what they’ve sent to be printed. But processes such as laser-cutting metal or plastic sheets, or die-cutting paper stock can make things much more quickly at a lower price point.

For example, a die cutter costs approximately $100 versus $1,000 for a 3-D printer, says Bull. According to Bull, a reconstruction of a Morse-Vail telegraph system would take hours to 3-D print and use $10 worth of plastic; the same item created by a die cutter could be done in less than 15 minutes for less than $1 (although a plastic model created by a 3-D printer would be more durable than a model created with cardstock via a die cutter).

That’s not to say there isn’t a role for the 3-D printer — far from it — but other economical tools shouldn’t be overlooked. “What you want to look at is the full range of manufacturing technologies available in the classroom,” says Bull. “Pedagogically, each of these tools has its own use.”

Advanced manufacturing technologies can be used in many disciplines, not just STEM. For example, social studies students can work with 3-D scans of Abraham Lincoln life masks, available online through the Smithsonian Institution (3d.si.edu), or create replicas of historic buildings. The Smithsonian’s 3-D viewer enables students to view objects virtually and up close, examining angles and other features. Bull’s students work with the Smithsonian to scan objects, analyze them in computer-aided design (CAD) programs, create designs and then print them out, which Bull says helps them learn engineering principles.

3-D printing is also being deployed extensively in higher education environments. From printing body organs such as artificial kidneys, as done by students at the University of Connecticut,24 to creating prototypes for chairs and car parts,25 manufacturing tools are being used by

How Has Technology Changed the Learning Landscape?

<table>
<thead>
<tr>
<th>Description</th>
<th>Higher Education</th>
<th>K-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>We offer blended and virtual learning classes</td>
<td>84%</td>
<td></td>
</tr>
<tr>
<td>We support project-based learning</td>
<td>46%</td>
<td>65%</td>
</tr>
<tr>
<td>We provide personalized learning</td>
<td>32%</td>
<td>55%</td>
</tr>
<tr>
<td>We follow a flipped classroom model</td>
<td>35%</td>
<td>21%</td>
</tr>
<tr>
<td>We offer additional or advanced classes through partnerships with other institutions</td>
<td>21%</td>
<td>35%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>None of the above, technology has not changed the learning landscape at my institution</td>
<td>3%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: CDE Classroom Technology Survey, December 2014
students in fields as diverse as architecture, medicine, art and engineering.

Unfortunately, many instructors don’t know how to teach with 3-D printing, though the printers are becoming commonplace as the technology becomes more affordable. Most educators are not trained in engineering principles — less than 4 percent of science teachers have taken an engineering course, says Bull. Too often, students just download an object, send it to the printer and watch their replica pop out.

“That’s not educationally useful,” says Bull. Instead, he says, students need to learn to think through problems and discover relevant knowledge they can use outside the classroom.

Bull is helping train future science instructors to teach with this technology and develop lesson plans. Students and educators can get ideas through maketolearn.org, established by the Society for Information Technology & Teacher Education. It’s just one of many resources that help instructors integrate this type of technology in the classroom.

**Turning Up Learning with Sound Amplification**

Classroom sound systems can be an inexpensive technology that creates big benefits in student achievement. Instructors wear easy-to-use, voice-activated, lightweight microphones that amplify sound throughout the classroom; a handheld mic can also be used by students during discussions. It’s a need that is often overlooked, however, studies show sound amplification can make a difference in performance. This helps not just students with hearing problems, but all students, as well as educators who have more energy at the end of the day when they haven’t overtaxed their voices.

Having proper amplification allows better communication of subtleties of meaning and fosters a more intimate, collaborative environment. At New Franklin R-1 School District, a grant helped the 450-student district implement
sound enhancement in classrooms used by middle school language arts students and high school foreign language students.

“Comprehension is enhanced when students can hear better. And they communicate better with one another, especially when they are giving presentations and using an appropriate volume is challenging for them,” says Starke.

District Superintendent David Haggard says he’d like to expand the technology to other district classrooms.26

Promoting Active Learning with Standing Desks

Standing desks are a low-tech technology that can help increase student learning by using the health benefits produced by a more energetic posture — that is, either standing or moving back and forth from standing to sitting rather than spending class time at a seated desk.

Evidence shows student engagement and physical health are enhanced by standing desks. A recent study by researchers from Texas A&M University looked at 374 students at an elementary school in College Station, Texas. The students who used standing desks not only were more active and burned more calories, but were also more engaged in classroom content. Overweight students in particular showed improvements in attention.27

At Montera Middle School in Oakland, Calif., math students use standing desks, which can be raised or lowered to each students’ preference for height. Because they are on casters, they can be easily moved around to create collaborative groupings or split off individually when needed, such as for exams.

“Overall, with most students, it does help with the fidgeting issues and I think it does help with engagement, for some students more than others,” says Krishna Feeney, a Montera Middle School math teacher.28

Supporting Technology with Technology

Supportive classroom technologies are necessary to ensure everyday tools are as functional as possible. For instance, attachable keyboards for tablets enhance their use and rugged cases can help prevent damage. Another tablet accessory is a table-top stand that elevates the device to a more ergonomic height, positioning it so it can be viewed by several students at once. Add headphones that come with splitters and material viewed on tablets can be heard by more than one student at once as well.

The charging and storage of devices is another important concern. Many institutions do not allow students to take devices home and instead store them as classroom sets in locked, wheeled carts. These carts often have charging capabilities so while the devices rest in slots they can be easily plugged in. Carts or wall-mounted charging cabinets can be locked, but also have airflow around devices so they don’t overheat. And at the university level, classrooms can be outfitted with charging stations to ensure every student’s device is ready for use regardless of battery status.

A recent study by researchers from Texas A&M University looked at 374 students at an elementary school in College Station, Texas. The students who used standing desks not only were more active and burned more calories, but were also more engaged in classroom content.
Funding was the most cited challenge by both K-12 and higher education CDE survey respondents, dwarfing other concerns. After funding, K-20 respondents cited IT infrastructure capacity, security and privacy concerns, and professional development as top challenges.

Finding a Way to Pay

Money is a perennial concern when it comes to costly technology enhancements. This can be exacerbated by some state laws that prevent the fluid, common-sense use of funds.

However, there are sources available to help alleviate some of the funding pain points. For example, Wi-Fi and broadband funding is included in the federal government’s E-rate program, which in 2014 increased the amount of money available to qualifying schools from $2.3 billion annually to $3.9 billion. E-rate discounts can range from 20 percent to 85 percent of the cost for equipment and services. Beyond E-rate, a host of other grants exist offered by governmental agencies, nonprofit organizations and technology vendors.

Another common way education technology is funded is through bonds. On Nov. 4, 2014, New York voters approved the Smart Schools Bond Act — an unprecedented statewide investment of $2 billion for technology and school improvements. K-12 schools in the state can use the funding to purchase new equipment such as servers, security solutions, tablets or interactive whiteboards; install high-speed broadband and wireless connectivity; expand pre-K programs; and replace classroom trailers with more permanent spaces.

One alternative strategy for affording technology is to join or form a consortia or cooperative of
other education institutions to gain buying power and the ability to leverage discounts. In Boston, for example, 11 local colleges and universities formed The Boston Consortium, which focuses on the development and practical implementation of cost-saving improvements.30

Training Educators in Technology Use

Educators may find it challenging to learn how to use new technologies, deploy new pedagogies and follow new processes after years of doing things a particular way. Faculty or educator support and buy-in is critical to the successful use of technology in the classroom. This means not only training instructors in how to use a tool and showing how it can improve instruction, but also including them in the decision-making process as early as possible.

Additionally, to maximize the innovative use of technology, professional development should be ongoing, not a one-and-done workshop. If resistance is an issue, recruit “tech evangelists” among faculty and instructors to spark enthusiasm. Have tech-savvy instructors act as mentors and lead informal workshops that include demonstrations of how to use new technologies. Some institutions have had success with a tech mentor showing an instructor during class how a tool works, then having the instructor gradually take over more of the tool usage until he or she feels comfortable using it alone. Educators should also be encouraged to use online professional networks found on Twitter and other social media sites where they can find — and share — technology applications that work.

Almost all New Franklin R-1 School District teachers have had extensive training in a two-year professional development program that includes observing instructors in other classrooms, including in other school districts. Educators are trained to create “community in their classrooms,” says Cynthia Gardner, training coordinator and teacher. Other skills taught include standards-based lessons, “But, the authentic learning part is very critical: Real-life problem solving, a lot of inquiry and teaching students to create their own questions using the technology as a tool,” she says.31

Teachers are taught by trained instructors like herself. They also have informal professional learning communities to support and reinforce what they’ve learned. In addition, the district gives educators time for cross-disciplinary, cross-age-level collaboration.

Protecting Students and Data

Student data privacy is a major concern for education institutions, especially as more data is collected from apps and assessments and stored in the cloud or on devices. Breaches of data and the sale of student data to outside companies must be avoided. Institutions need to stay abreast of FERPA (Family Educational Rights and Privacy Act), COPPA (Children’s Online Privacy Protection Act), CIPA (Children’s Internet Protection Act) and HIPAA (Health Insurance Portability and Accountability Act), as well as any state laws governing student privacy or new national laws.

Students using social media for educational purposes can also be vulnerable to hackers, cyber bullying and criminals. Sometimes, students need to be protected from other students — or from themselves. For example, Los Angeles Unified School District (LAUSD) high school students breached a tablet security measure within just a week of receiving their devices in 2013.32

For more funding and professional development ideas, download a complimentary copy of the Classroom Technology Supplemental Report at www.centerdigitaled.com/paper.
“Right at the beginning of the deployment, high school students figured out a way to delete the profile — the mobile device management (MDM) piece — that allowed access to different sites,” says LAUSD’s Deputy Chief Information Officer Marvin Cruz. “Students couldn’t access data they weren’t supposed to see, but without the MDM profile they could potentially access sites that may have been blocked so we had to fix that.”

Through digital citizenship training, students learn the appropriate ways to interact with digital devices and tools, which outlines privacy and behavior policies. Some districts have even hired outside firms to monitor students’ online activity in an effort to protect student privacy.33

President Obama recently proposed the Student Digital Privacy Act, which would enhance privacy for K-12 students, preventing the sale of student data to third parties. While the Student Digital Privacy Act doesn’t mention college students, if passed, the measure is likely to impact higher education nonetheless, since data collection policies in elementary and secondary schools influence those in higher education, according to Michael Abbiatti, executive director of the nonprofit WICHE Cooperative for Education Technologies.34

Keeping it Equitable

Not all students have Internet access outside of campus, either due to financial circumstances or geography. Some students may have Internet access, but not broadband. Or, they may not have easy access to devices to continue learning outside of the classroom. Institutions can even the playing field in varying ways, including:

• Providing MyFi cards or working with local providers and corporate sponsors to make low-cost Internet options available to families that can’t otherwise afford them
• Providing off-line materials, such as lessons saved on a DVD

Classroom Technology Implementation Challenges

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Higher Education</th>
<th>K-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding</td>
<td>87%</td>
<td>83%</td>
</tr>
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<td>Policy</td>
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<td>7%</td>
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<tr>
<td>None of the above</td>
<td>2%</td>
<td>1%</td>
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Source: CDE Classroom Technology Survey, December 2014
• Limiting homework done outside of school and providing time in class to complete work that requires online access
• Extending Wi-Fi range outside campus and allowing students to access it 24/7
• Providing maps of nearby Wi-Fi hotspots available in the community

Trying to provide at-home devices for students who may be transient is a challenge in some K-12 districts. “A lot of students move from school to school, which makes it difficult to assign a tablet to a student for home use,” says LAUSD’s Cruz. At present, LAUSD hasn’t sent tablets home, though it hopes to be able to do this soon. “Our intent is for them to work outside the classroom — it’s something we need to figure out,” says Cruz.

Some colleges and universities equip students with mobile devices they can use outside of class. While tuition typically covers these costs, some institutions offer scholarships to students to help alleviate the cost of a mobile device. Indiana State University, for example, has a laptop scholarship program open to incoming freshmen. Other colleges, such as Wake Forest University in North Carolina, issue devices for students to use during their course of study, but require them to be returned afterward.

Building a Strong IT Foundation
Institutions need a robust Internet connection for Wi-Fi-enabled devices to be effective. Colleges and universities expect students to have approximately three to five devices each, which will likely increase in the future. Today’s students arrive on campus with all manner of Wi-Fi-demanding items — everything from laptops, tablets, smartphones, wireless printers, e-readers and gaming machines to fitness bands and other wearable tools.

Multimedia content, such as video streaming and videoconferencing in classrooms, also demand significant capabilities. Online testing and other standards-based assessments require a signal strong enough to serve many students taking an exam at once — thousands in some districts.

Institutions can prepare by upgrading network architecture; adding more wireless access points to extend signal reach; and using solutions such as software-defined networking, cloud-based management and desktop virtualization. Many institutions have moved to managed services providers to help support increased demand and provide the technical expertise necessary for modern education networks.

Before launching any new technology or mobile device initiative, it is imperative institutions ensure their network infrastructure can handle the increase in usage without affecting the user experience.

Keeping Policies Current
Old, outdated policies don’t reflect new technological realities. One example is “seat time” standards that require students to be in classrooms a certain amount of time to earn degrees, as opposed to mastery-based or competency-based standards that recognize achievement when a student has mastered material, no matter how many hours he or she sits in a class.

Some states are moving to this model, either by offering waivers or changing statutes. For example, the Alabama State Department of Education’s Innovation Zone/Flexibility Initiative lets schools apply for waivers in order to move to a mastery approach.

Higher education is also moving toward a competency model, with students taking more online, self-paced courses (including MOOCs) and receiving credit for job training and skills. However, the transferability of credits can be an issue, depending on the institutions’ policies. As online courses and MOOCs become more pervasive, institutions will need to determine how to tackle transferring credits without causing students to take duplicative courses.
Overcoming Institutional Silos

Sometimes, the impediment to advancement is institutional — a structure that doesn’t allow for a shared vision to emerge among disparate stakeholders, such as the community, students, parents, educators and administrators. Decisions to buy new technology, for instance, might be made by the IT department without consultation and, a year later, replaced.

In its initial fast-track, multimillion-dollar deployment, the district didn’t pilot the tablets and gave only a brief training period to school staff. In its new agreement with its tablet vendor, the district has moved to a slower, staggered roll out, with an initial pilot program to test devices and expanded training for staff.

A district official said that it had previously had fast roll outs of technology without problems, so the district was “perhaps overconfident” in being able to do so again.

How can you avoid similar obstacles when adding new technology to your institution? Here are just a few initial steps to take when starting a technology implementation.

Go slow. As Guilford County School District discovered, even a successful track record doesn’t make you immune to future troubles, so it’s best to take a slow, steady approach to tech implementation. Change should be instituted incrementally, with pilot programs to find any glitches before they turn into major complications.

For example, if you’re considering moving from print textbooks to a digital curriculum, there are steps to take to make sure the transition goes smoothly. “You’re not going to convert your whole curriculum to a digital curriculum overnight,” says New Franklin’s Starke. “It’s going to take one project at a time. Try it, see what works and what doesn’t work, collaborate with other schools that are doing the same type of instruction — maybe try sharing lesson plans.”

Plan carefully and focus on objectives. Prepare by researching your needs and seeing what will fulfill them. Don’t start with a tool and then work your way backward to determine how the tool can help. Keep a clear eye on potential benefits and challenges that will need to be addressed.

In the recent CDE research survey, K-20 decision-makers indicated their institutions don’t decide technology implementations on the fly. In higher education, 21 percent of respondents took more than a year in the planning phase before launching a new technology. This planning phase is similarly reflected at the K-12 level.

Look to the successes of others. Call or visit other institutions with similar technology initiatives — see what worked for them and what didn’t. Seek multiple viewpoints within the institution and from individuals within various departments so you can address your implementation holistically.

Some Lessons Learned for Tech Implementation

Guilford County School District in North Carolina learned the hard way what not to do when it acquired and deployed approximately 15,000 tablets to middle school students in 2013 — only to have the tablets suffer a variety of hardware issues, requiring them to be recalled and, a year later, replaced.

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LOOKING AHEAD

When asked which technology tools they expected to be future game-changers, CDE survey respondents had a lot of suggestions. Among them: wearable technology, brain/technology interfaces, artificial intelligence, virtual cadavers for anatomy and physiology students, and BYOA (bring your own app) movements.

Educators should be looking to technology to enhance education at all levels, taking into consideration how technology will be used outside of the classroom as students enter the workforce.

Already, some higher-tech devices are coming to market that may have a transformative impact in coming years. For example, vendors are beginning to offer classroom robots to help teach foreign languages or to serve as aides for students with special needs. Lifelike and life-sized, the robots can respond to students’ facial expressions. They also have built-in interactive tablets for further student communication. Science and engineering students can practice coding and programming these types of robots. Other robots enable students to attend classes or meetings virtually by “seeing” what’s happening through a tablet’s forward-facing camera and participating in discussions through the device’s speakers. Rock Valley College recently adopted this type of robot for classroom use, becoming the first education institution in the state of Illinois to do so.39

More immediately though, educators should be looking to technology to enhance education at all levels, taking into consideration how technology will be used outside of the classroom as students enter the workforce. It should be used to develop students into independent, creative thinkers rather than just another form of memorization.

More attention needs to be paid to the education of future instructors, administrators, curriculum designers and IT personnel, so from the beginning they are aware of technology’s promise, along with practical steps that can be taken in the classroom to further learning.

Community involvement can enhance the use of technology in education. Inviting government officials into schools and classrooms that are successfully implementing technology enables decision-makers to see what’s at stake in budget decisions, and perhaps become proponents for innovation. Including leaders from other education institutions can help establish win-win projects, where everyone benefits from a focus on technology-enhanced instruction.

It’s easy to jump on the bandwagon of a sleek new gadget, but truly effective education comes from careful, strategic implementation of classroom technology that takes into consideration the impact to all areas of a college or district.
Some higher-tech devices are already coming to market that may have a transformative impact on education in coming years. For instance, vendors are beginning to offer classroom robots to help teach foreign languages or to serve as aides for students with special needs.
“Educators have to weave technology into their everyday lessons to accommodate student needs. And not every student uses technology the same way — we have to think about how we’re going to fill the gap for students who have not grown up with technology.”

Elaine Shuck, Director of Education, North America, Polycom

“Studies have shown immersive displays can be very helpful to students when they are learning concepts that involve multiple reference frames, like the environmental relationships between locations on a planet, or the changes in a city over the course of history.”

Dr. Frank Klassner, Computer Science Professor, Villanova University, Pa.

“The authentic learning part [of professional development] is very critical: Real-life problem solving, a lot of inquiry and teaching students to create their own questions using the technology as a tool.”

Cynthia Gardner, High School Spanish Teacher, eMINTS, Curriculum Director, New Franklin R-1 School District, Mo.

“In today’s ever changing digital world, it is more important now than ever for students to have a printer within their classroom. Having the ability to create crafts and school projects to further develop their skills and showcase their work for all to see will create a sense of pride and accomplishment.”

Rita Dubey, Senior Manager, Marketing Canon U.S.A., Inc. ITCG Printer/Consumer Prod Mkt Division

“Educators and technologists are just now able to build ‘classrooms’ that aren’t necessarily fixed in one place or time, but that maximize the constructive interaction of teachers and students in higher-order learning. Technology is vital to this new environment, but it should always be enabling a human interaction, not the other way around. The right choices will focus on teaching and learning, and keep all the different means of delivery fluid, natural and unobtrusive.”

John Merline, Vice President, Marketing, FrontRow

“Standardization is one of the biggest challenges in a BYOD environment. If a student doesn’t have a particular app or the proper permissions to download the app, teaching is disrupted. And, lack of teacher familiarity with many different mobile devices can create challenges when a student requires additional assistance.”

Brian Kutchma, Vice President of Sales, Black Box

“The physical classroom itself plays a significant role in realizing the promise of 1:1 devices and personalized learning tools. Classroom furniture must keep pace with technology and students’ varied learning styles. Student desks need to promote better metabolic learnstyles, greater student engagement and natural collaboration.”

Bob Hill, Education Industry Manager, Ergotron

“With the list of new education technologies growing daily, equipping our teachers with the tools and training they need to successfully incorporate these 21st-century learning tools into their day-to-day lessons will enable real learning and impact for students. But the benefits don’t end in the classroom. Students can translate those skills into future successes, ultimately preparing them to be competitive in the evolving global workforce.”

Margo L. Day, Vice President, US Education, Microsoft Corporation
Education technology isn’t a “nice to have” anymore — it’s critical to the success of students throughout their education and in the global economy. After years of students and staff using various technologies in their individual classrooms, education decision-makers are looking at how to create a more holistic learning environment and raise the bar on student engagement and achievement. How can education institutions create the “classroom of the future” today and ensure it will continue to meet students’ needs down the road?

A leading provider of education technology, Polycom’s solutions help create a technology-rich environment that improves collaboration across all areas of a district or campus, expands learning opportunities outside the classroom and prepares students for the future workforce. Polycom can help institutions create the classroom of the future that includes:

- **Lecture capture:** With lecture capture, students are no longer limited to in-class experiences. They can view recorded lessons anytime, anywhere from the convenience of their mobile device. This allows educators to spend more one-on-one time with students working on group projects, completing homework and participating in more in-depth discussions — all during class time.

- **Online training and resources:** Using online training and resources, educators can exchange ideas and information, participate in communities of practice and enhance curriculum. And by leveraging Polycom’s programs and resources, including CAPspace, a content provider database, special events, academic and instructional training, and an educational social networking tool, instructors can connect with tech coordinators and educators around the globe.

- **Interactive learning:** Videoconferencing breaks down the barriers of the physical classroom and enables students to collaborate with their peers and subject matter experts from around the world.

- **Voice in education:** Voice conferencing helps connect remote students and institutions, even when videoconferencing isn’t available. Students and educators alike can utilize HD voice to engage multiple institutions and communities in an effort to enhance educational opportunities.

To learn more, visit: [www.polycom.com/education](http://www.polycom.com/education)
Maximizing Printers for the Digital Classroom

As education becomes more digital — with advances such as e-textbooks, mobile devices, big data and more — the need for efficient and secure printers increases. Schools and districts are finding that enabling access to printers for all students, teachers and faculty supports their digital strategies and enhances learning. In order to maximize the use of printers, however, schools and districts need cost-effective solutions that allow them to improve back-office efficiencies. Canon is a leading provider of innovative digital imaging solutions, including top-of-the-line inkjet printers. When schools and districts purchase Canon printers, they can expect the following advantages.

Ease of Use

- **Intelligent Touch System**: Intelligent Touch provides for the intuitive navigation of all printer menus and functions. The light will guide your fingers, so only the buttons you need at any given moment are illuminated.

Cost Savings and Eco Friendly

- **Auto Duplex Automatic Document Feeder**: Work with multi-page documents and copy/scan/fax two-sided originals without having to turn the pages over.
- **Two-Sided Printing**: Save up to 50 percent of plain paper.
- **Individual Ink Replacement**: Reduce waste by replacing each color as it runs out.

Connectivity

- **AirPrint**: Easily print from iPads, iPhones and iPod Touches without installing any drivers.
- **PIXMA Printing Solutions (PPS)**: PPS makes it easy to print and scan photos or documents directly from your compatible mobile device. With the cloud printing function you can print directly from select online cloud services, such as Facebook, Twitter, Dropbox®, OneDrive™, Google Drive™ and more, either right at the printer itself or from just about anywhere with your mobile device and the free PPS app.
- **Google Cloud Print**: Print from anywhere using everyday applications. Print attachments from Gmail and Google Docs.
- **Wireless PictBridge**: Print photos without cables from Wi-Fi-enabled cameras.

Service and Support

Canon offers award-winning U.S.-based customer service and support.

Visit: [http://usa.canon.com/cusa/consumer/standard_display/cso_home](http://usa.canon.com/cusa/consumer/standard_display/cso_home) for more information.

To learn more about the critical role of printers in today’s digital classroom, download the Center for Digital Education’s white paper, “Printer Access in a Digital World,” at [www.centerdigitaled.com/paper](http://www.centerdigitaled.com/paper).

For more information, contact the Canon Education Department at [educationsales@cusa.canon.com](mailto:educationsales@cusa.canon.com) or visit us at [usa.canon.com/educationsales](http://usa.canon.com/educationsales).
Leveraging Video for the Flipped Classroom

As the demands on educators continue to increase and classroom time seems to decrease, many instructors are asking themselves, “What is the best use of the face-to-face time I have with students?” For many, the answer is the flipped classroom — where students learn about a subject prior to attending class and class time is spent answering questions, participating in activities and completing homework.

While moving to a flipped classroom model requires several changes, the use of video can make the transition easier. By recording lessons that would have traditionally been presented during class time and then making those videos available online, students are able to access lessons anytime, anywhere. This allows students to learn at their own pace and on their own time. By using video, educators can often cover more subject matter and move through topics quickly as they do not have to slow down to check for understanding. Additionally, it empowers students to take control of their own learning — they can speed up, slow down or re-watch each lesson as needed.

Students can also use video in a flipped classroom model to work collaboratively on group projects during class time. They can record their own labs, speeches and other class-time activities, allowing them to review and critique their own work outside of school.

Canon is committed to improving the learning experience for students. Canon's line of EOS Digital SLR Cameras VIXIA Camcorders capture stunning HD video and are an ideal choice for educators wanting to flip their classroom model and boost student achievement.

Recent research shows the move to the flipped classroom is proving to be a positive experience for instructors and students alike. Consider the following:

- 96% of educators who have flipped a classroom or lesson would recommend it to their colleagues
- 71% of educators saw improved grades after moving to the flipped classroom model
- 52% of instructors share videos created by other educators with students


To learn more about using video in the flipped classroom, contact us at educationsales@cusa.canon.com or visit us at usa.canon.com/educationsales
Finally a cart and locker solution that checks off all the items on your wish list. The lifetime-guaranteed Black Box carts and lockers support numerous combinations of e-learning devices—Chromebooks, iPads, laptops, and other tablets.

The smart design of each model is highly configurable to accommodate today’s and tomorrow’s technology. No need to replace your cart or locker. Ever. Even better, the safety-first design protects your students from potential injuries and the rapid-wiring technology makes wiring the devices a breeze.
Many schools seek to empower instructors by adding lecture capture systems and easy online playback by students. In theory, the technology can help learners catch up quicker at home, while also reducing the time instructors spend updating them on missed coursework.

Unfortunately, the tasks around recording, processing and posting those lessons often add more hours for already busy instructors.

Today, a new generation of classroom amplification and lecture capture solutions helps schools move beyond these challenges as they adopt blended learning or flipped classroom models. Advanced systems support greater student achievement, and encourage teacher buy-in with improved ease of use.

**Crystal-Clear Sound for Greater Comprehension**

Teachers and students can benefit from adopting a single speaker tower system that broadcasts the highest-quality sound evenly throughout the classroom to improve comprehension. A single speaker setup can eliminate complicated, expensive installations that require adding speakers in walls and ceilings. And lightweight, cordless microphones passed around during a discussion allow inclusion of student contributions and questions in the recording. The latest technology also gives teachers the freedom to roam the classroom naturally without creating noisy electronic feedback.

**Simplified Operation for Effortless Lecture Capture**

When searching for a new or updated amplification and lecture capture system, schools should also seek these key features to improve learning and make teachers’ jobs easier:

- Teacher-controlled microphone that manages lesson capture with a few simple voice commands
- Ability to automatically build a video or “screencast” based on material shared via the teacher’s interactive whiteboard or computer
- Automatic processing, editing, file naming and uploading of a captured lesson to Google Drive, Dropbox or other cloud or online space
- Easy student access to lessons from Windows® and Mac® computers, as well as tablets and smartphones

**Juno Changes the Game**

FrontRow’s Juno® system is among the world’s most advanced classroom communication tools, combining the convenience of portable audio with the sound quality of installed systems. By simply saying “begin” and “finish,” the system records screencasts and automatically posts them for instant access by students on all of their devices.

FrontRow’s extensive acoustic and audiological products and experience have helped teachers bring learning to life since 1963.

For more information, visit gofrontrow.com/juno
COLLABORATION IN THE CLASSROOM STARTS WITH THE RIGHT BUILDING BLOCKS

Improving Collaboration, Promoting Active Learning

Educators increasingly strive for and embrace collaboration in the classroom. To deliver fully on the potential and promise of digital classroom technology and personalized learning tools, schools must choose the building blocks that help them lay a supportive foundation.

Ergotron helps provide the building blocks with its LearnFit Adjustable Standing Desk for students. The LearnFit’s mobile, lightweight design can transform classrooms into active learning environments, allowing students to easily adjust the desk surface for their height, or a specific class project. Students can also move effortlessly in and out of work groups as teachers break classrooms into smaller teams.

The LearnFit desk is designed to foster a more natural collaboration. Equally important, it introduces low-level physical activity — standing — into the classroom, which has shown positive health effects that can boost student focus and attention. According to a study published in the American Journal of Public Health in 2011, adding activity — such as standing — increases blood circulation and oxygenation, leading to more alert, engaged students.1

Montera Middle School, in Oakland, Calif., uses LearnFit desks in its 8th-grade algebra compression class. Teachers and administrators say they instantly noticed kids seemed more energized and engaged, and more excited about group efforts. “When students are up and moving, they are less likely to feel drowsy or disengaged,” says Montera Principal Ashanti Branch, noting the adjustable standing desks also benefit students who struggle with sitting for long periods.

Supporting Uninterrupted Learning

To further support group collaboration, Ergotron helps schools manage their 1:1 initiatives and other tablet or computer learning. Ergotron’s device charging products can charge an entire classroom’s tablets, Chromebooks or other laptops faster and more safely to ensure learning is uninterrupted. The Ergotron Zip40 Charging Cart and Zip12 Charging Desktop Cabinet are rugged, universal and easily adjust as schools add devices or change technology. They provide districts with long-term solutions that easily adapt to future needs.


For more information or a product demonstration: www.cdwg.com/ergotron
For grant information: http://GetEdFunding.com
With all the educational vendors out there, schools often wrestle with a grab bag of fractured classroom technology solutions. But what if it all just worked ... seamlessly?

Consider a day in the life of a Microsoft-enabled classroom:

A 6th-grade science teacher arrives before school starts. She flips open her Microsoft Surface Pro 3 tablet, and opens her OneNote Class Notebook. The powerful software provides a single, tabbed interface where she organizes her classes, lessons and student information, then assigns and grades homework, makes lessons and notes available, and exchanges real-time feedback with students privately or publicly.

Today, she also wants to post a new tutorial she completed using Office Mix, a free PowerPoint add-in to easily create interactive online videos. She narrated a short lesson on controlling static electricity, and added photos, graphs and audio — all with simple editing skills. With a few clicks, she posts a link to the tutorial in the OneNote Class Notebook.

She directs arriving students to view the lesson using their Windows 8 tablets, which allows them to interact with her in real time. Afterward, she projects more photos and media from her Surface Pro 3 to an interactive whiteboard. The lively discussion that follows clearly engages her students. She minimizes disruptions and deters Web surfing by using ClassPolicy to lock down browsers and other apps, and TestPolicy to deter cheating on a quiz that follows.

Her next class hears a physics lecture. OneNote empowers them to jot notes, draw, record audio, and drag in video and Web clippings. Later, she assigns group projects to class members who do the work in small groups in the Class Notebook collaboration space. Later in the day, she checks in with colleagues via the OneNote Staff Notebook where she can look at staff meeting notes, work on school committees, track professional development or receive private lesson plan feedback.

That night, the teacher grades the students’ quizzes on her Surface Pro 3 in OneNote, and writes and speaks verbal comments using the built-in “ink” and audio capabilities. For students struggling with the topic, she also suggests additional resources better suited to their learning style by attaching relevant hyperlinks, Word, PowerPoint or Excel files in each student’s OneNote section.

Meanwhile, students are busy completing their homework and diving into more in-depth projects. The school already provides Microsoft Office to faculty and staff, so students qualify for free access to both online and offline versions of Word, PowerPoint, Excel and OneNote through Office 365 Education, to create reports and presentations and then share and collaborate with fellow students and teachers.

The next day, students check their quiz scores in OneNote on their phones and access other documents with Office Mobile on the bus. And a new, interactive, seamless day of learning begins.

Microsoft is committed to making Windows devices affordable for the classroom, with education devices starting as low as $199. Schools qualify for free Office 365 Education and may be eligible for Office 365 ProPlus benefits where students and teachers can install Office on up to 5 PCs and Macs and up to 5 tablets and phones at no cost.

OneNote can be downloaded for free on most devices.

Learn more at www.microsoft.com/education
Sponsors:

**THE CENTER FOR DIGITAL EDUCATION**

is a national research and advisory institute specializing in K-12 and higher education technology trends, policy and funding. CDE advises the industry, conducts relevant research, issues white papers, and produces premier annual surveys and awards programs. CDE also hosts events for the education community.

CDE's media platform includes the Center for Digital Education Special Reports, an online resource site, email newsletters, and custom publications.

www.centerdigitaled.com

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**JOHN HALPIN** is Vice President of Education Strategic Programs for the Center for Digital Education. As a veteran K-12 teacher, college professor and IT consultant, Halpin has been active in promoting the use of technology in education for over 25 years. He has led sales and marketing efforts for some of the largest technology companies and has written for various media outlets. In addition, Halpin is a frequent speaker on public sector technology issues for national professional associations, various state leadership councils and technology companies.

**LORNA COLLIER** has written about education and technology for the Chicago Tribune, THE Journal, Learning Solutions, the National Council of Teachers of English Chronicle, MSN Encarta, ATT.net, and many others. She is the former online editor for GetEducated.com, a website focused on distance learning.