Taking learning online

Leveraging online resources to support
students' learning and teacher effectiveness

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As a 6th grader in the fall of 2015, this young student from Maryland provided an interesting glimpse into the future with her vision for what school might look like in 2020. At that time, she predicted that learning in school would be defined by the greater use of online resources such as videos, games and communications tools, all facilitated through increased access to personalized devices and ubiquitous Internet connectivity. Most importantly, she envisioned that students would learn more as a result of this greater access to digital learning tools.

In 2015, many school and district leaders were excited about implementing new digital learning initiatives. District technology budgets had improved after the recession and district administrators were expecting high growth in new blended learning classroom models, the use of digital content and online textbooks to support personalized learning, and greater implementations of 1:1 programs where every student was assigned a tablet, laptop or Chromebook. But despite that district level enthusiasm, the view from our 6th grade prognosticator was still very aspirational.

Middle school students reported relatively little access to online learning tools in 2015 with only one-third using a laptop or Chromebook in class and only 19 percent saying that their class times include any online discussions. So, where are our schools today, almost 5 years later, in meeting the promise of technology to enhance student learning? What barriers stand in the way of schools realizing the benefits of digital learning today, especially relative to the development of student skills and learning potential? What does school look like for our 6th-grade student as she enters 10th grade this year?

The classroom learning environment does look different today than it did in 2015 in terms of student access to technology and online resources to support instruction. Two-thirds of teachers (66 percent) now report regularly using online and digital games in support of their teaching. In 80 percent of classrooms, students have regular access to mobile devices to use for schoolwork. Yet, when asked about the digital learning experiences that they are having in school, 54 percent of high school students and 37 percent of middle school students identify slow or inconsistent Internet connectivity in their classroom as the primary obstacle they face using technology at school. Teachers note the quality of Internet connectivity is an issue for them today as well. When asked what they need to leverage digital tools

more effectively with their students, 46 percent of classroom teachers say Internet access that is consistent, reliable, and can support high bandwidth digital resources. While having greater teacher and student access to digital or online tools to support learning is a laudable step toward transforming the classroom environment, it is insufficient if high-quality, high-speed bandwidth is not part of that environment.

For the past 15 years, Project Tomorrow, a national education nonprofit organization, has been investigating the role of digital tools, content and resources within schools and classrooms through our Speak Up Research Project. Since 2003, over 5.7 million K-12 students, parents, teachers and administrators have shared their firsthand perspectives and ideas on the role of technology in education. Reflecting the priorities and concerns of school and district leaders for more tangible outcomes from their technology investments, the research also focuses on the ways students and teachers are leveraging digital tools today to transform the learning experience in the classroom. This glimpse into current practices and the ways that students and teachers value those experiences sets the context for exploring what is on the horizon for the school of the future. In a perfect world, every school would have the bandwidth

> In 2020 there will be many more educational videos, online class discussions, online games, texting from teachers or other ways for students and teachers to communicate online, and everyone will have their own tablet or laptop. That is what the school of the future looks like in my head. Everything will be online and everyone would learn more.
>
> 6th-grade girl from Maryland – in 2015

capacity they need, and the students' learning experiences would be rich with digital content and resources to support academic outcomes. If that was the case, how would schools use those enhanced capacities to create new learning environments that address the needs of every student?

Project Tomorrow and Spectrum Enterprise have developed a series of focused reports for education leaders leveraging the Speak Up Research findings. This report is one in a series of research-based reports to enlighten education leaders about current trends in digital learning and to provide leaders with targeted insights to support new initiatives in their district. This report contains new insights about student and teacher use of digital tools and how enhanced bandwidth would impact student learning. Key findings include:

1   **Teachers and students value the use of technology within learning differently, and this impacts their expectations for effective usage and the criticality of Internet connectivity to support their divergent goals.**

Example: Four in 10 students report that they regularly research online videos to help them better understand what they are learning in school, and often will self-remediate by watching the videos multiple times. Most teachers, however, identify engagement as the primary outcome from students' use of technology and shortchange the academic benefits, particularly when students self-direct their learning using tools such as online videos.

2   **Students are increasingly leveraging digital tools, notably mobile devices, to support self-directed learning activities in class, but they report two key obstacles are hindering their productivity: teachers limit technology use in class and Internet connectivity is too slow or inconsistent to meet their needs.**

Example: 42 percent of high school students say teachers limit their technology use in class and 54 percent say Internet connectivity is too slow or inconsistent at school to effectively support their learning.

3   **Administrators report that if they had enhanced bandwidth capacity, they would implement more digital learning initiatives.**

Example: Almost two-thirds of the districts currently experiencing bandwidth constraints and limitations say they would implement more multimedia resources and online curricula in their classrooms if they had adequate connectivity.

Finding #1: Teachers and students value the use of technology within learning differently, and this impacts their expectations for effective usage and the criticality of Internet connectivity to support their divergent goals.

Most parents and educators view the benefits of technology use within student learning through an overly simplified lens. When asked to identify the impact of digital learning on students, adults overwhelmingly say that the predominant advantage of technology access and use in school is that it increases student motivation or engagement in learning. The Speak Up research results have documented this response from parents, teachers and administrators since 2004. This perception is based upon their own experiences using technology. While adults have realized efficiency benefits from online banking and shopping, their perceptions of the value of technology to support learning may be limited based upon their own lack of meaningful experiences with high-quality online learning environments.

For example, only 21 percent of teachers say they have taken an online

course for professional learning and fewer than one-third (31 percent) report regular participation with peers in an online learning community despite the plethora of such options available today for teachers. Most teachers (63 percent) continue to

51%

51% of classroom teachers say today that their students are more motivated to learn when technology is part of the lesson or class activity

see the face-to-face conference experience as optimum for their learning style. And while parents, teachers and administrators also report high use of certain social media tools, their usage is more often focused on simple engagement and communications activities rather than sophisticated learning experiences.

It is not surprising, therefore, that given this limited lens, adults believe that students will respond to the question about the value of digital learning with an answer very similar to their own; it's all about engagement. They have observed how their children or students appear to be more engaged in a learning activity when holding a tablet rather than a book, and that students have more focus and stamina when playing an online math game compared to completing a math worksheet. Their assumption about the value of this type of digital engagement is not incorrect, it is just incomplete. Understanding the differences in how teachers and students view the value of technology use in school provides a foundation for examining where the gaps exist in actual usage and what is needed to develop stronger outcomes.

Teachers' views of the value of technology within learning

Teachers talk about the value of technology use in their classroom around two specific types of outcomes: student receptivity to their teaching when using digital tools, and the impact of those tools on their own effectiveness as a teacher. Relative to student receptivity to digital teaching methods, 51 percent of classroom teachers say today that their students are more motivated to learn when technology is part of the lesson or class activity, and that they believe that their students have a better understanding of what they are teaching. A higher percentage of elementary school teachers in K-5 classrooms (65 percent) and teachers in classrooms where every student has a mobile device (58 percent) indicate that the primary benefit is increased student motivation to learn. In general, the number of teachers who value technology as a vehicle for primarily engaging students in learning has not changed since 2009, with a 10-year average of 52 percent.

Comparatively, teachers' views about their abilities to address individual student needs more effectively using digital tools have evolved over the past few years. Technology tools and new classroom models that rely upon digital tools have enabled more personalized learning where teachers can tailor instruction to meet individual student strengths and weaknesses. Accordingly, more teachers say that technology use supports their ability to create more personalized learning environments than just four years ago (Table 1). For example, in 2014, only 26 percent of teachers said the effective use of technology helped them differentiate instruction within their classroom. Within the last four years, the number of teachers realizing that outcome has more than doubled, with almost two-thirds of teachers (62 percent)

now saying that differentiation is a significant benefit they associate with technology in their classroom. For teachers in classrooms where every student is assigned a tablet, laptop of Chromebook, slightly more teachers (69 percent) connect technology use with differentiated instruction.

Table 1: Teachers articulate outcomes of their technology use to support personalized learning (2014 vs. 2018)

As a result of how I have integrated technology within my practice, I am now...	Percentage of teachers who agree	
	2014	2018
Better able to differentiate instruction	26%	62%
Able to give my students more personalized attention	21%	45%
More aware of what my students are learning and who needs help	22%	34%
Spending more time with individual students to help them understand the content	17%	26%

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The growth in the number of teachers holding these views indicates that teachers' valuations around technology use, at least as it pertains to their classroom practices, may be changing. It is also significant relative to the discussion in many school districts about bandwidth capabilities. Increasingly, online content being used in classrooms is creating a rich data trail about student performance. As teachers become more comfortable using those tools and value the way they can leverage the online data to support personalized learning, the quality and consistency of Internet connectivity will become a more critical issue for them.

Students' views of the value of technology within learning

Students see the value of the integration of digital tools in the classroom from a different perspective than their teachers. Contrary to the views of most adults, digital learning is about much more than engagement for today's students. This may be because students are using digital tools and online resources outside of school for tasks beyond efficiency and simple communications. With increased access to the Internet through a smartphone and WiFi access, nearly half of high school students (49 percent), for example say they use technology more outside of school for self-directed learning purposes than they do within their classroom. Students understand that the mere existence of technology does not magically make the learning process more engaging or that they

are more motivated for learning just because they have a device in their hand. For students, it is about how the process of digital learning supports a twin set of goals: helping them develop college- and career-ready skills and personalizing the learning process through self-direction and self-determination.

Students understand the importance of developing skills that support their preparation for future success in college, career or the workforce. They are keenly aware of the new demands for these skills as a result of the increasingly globalization of the economy and society, and the dependence upon information-intensive systems across all sectors. With that in mind, students report that the effective use of technology within the learning process at school helps them develop important college- and career-ready skills. At the same time, the students intrinsically appreciate how online tools and content can change the learning process for them by personalizing the process and providing unprecedented new opportunities for them to self-determine their learning paths. This understanding emanates from their highly personalized experiences using digital tools outside of school. Whether watching a TED Talk about a topic of interest (41 percent of high school students say they do this regularly outside of school) or tapping into social media channels to identify people who share their academic interests (56 percent), the students have developed not only a preference for self-directed learning around areas of

passion but also a proficiency in leveraging online resources to meet their specific needs. These experiences therefore translate into how today's students view the outcomes of using technology within school (Table 2).

Table 2: Grade 6-12 students' identified outcomes from effective technology use in school

As a result of using technology for learning at school, I am...	Percentage of students who agree	
	Grades 6-8	Grades 9-12
Development of college- and career-ready skills:		
Developing creativity skills	55%	51%
Collaborating more with classmates	48%	55%
Applying what I have learned to practical problems	48%	49%
Developing critical thinking and problem-solving skills	47%	45%
Changing the learning process:		
Able to learn at my own pace	56%	52%
In control of my learning process	50%	53%
Taking ownership of my own learning	42%	41%

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For both middle and high school students, technology use in school provides an efficient and effective way to develop creativity skills, collaborate with classmates and apply critical thinking to real-world problem applications. They also highly value the ability to leverage these tools to take control of the learning process and to be able to learn at a pace most comfortable for them. For example, four in 10 students report that they regularly research online videos to help them better understand what they are learning in school, and often will self-remediate by watching the videos multiple times. That behavior is not about the engaging value of the video but rather about purposely using the tool to achieve a particular outcome, in this case, better understanding of class content. Students do not totally discount the value of engagement as a motivator for increased technology usage, but it does represent for them a lesser important aspect of the digital learning experience. Only about one-third of students (38 percent) identify increased motivation for learning as a significant outcome from using technology. This divergence of perspectives between teachers and students about the value of digital learning is manifested also in how the digital tools are used to support learning in the classroom.

Finding #2: Students are increasingly leveraging digital tools, notably mobile devices, to support self-directed learning activities in class, but they report two key obstacles are hindering their productivity: teachers limit technology use in class and Internet connectivity is too slow or inconsistent to meet their needs.

Based upon their out-of-school experiences, students highly value self-directed learning activities that allow them to take advantage of the unique features and functionality of online tools to support their learning goals. Increasingly, students are bringing these out-of-school experiences and behaviors into the classroom and that is putting new pressure on bandwidth capacities in school. How students are using mobile devices such as tablets, laptops and Chromebooks in the classroom provides an optimum case study for this new Speak Up research finding.

Students have more access to mobile devices in the classroom than ever before — 54 percent of K-12 teachers now say their students are assigned a mobile device to use in class, representing twice as many as reported in 2013. This increase in student access has been accelerated by school districts' adoption of lower-cost Chromebooks. For the first time, the Speak Up findings now report that the predominant type of mobile device in the hands of students today is an Internet-dependent Chromebook.

Students' use of mobile devices in the classroom naturally varies by grade level or subject content. In general, however, the types of common activities undertaken by students using these devices can be categorized as either teacher-directed or student self-directed activities (Table 3). As an example of teacher-directed activities within a unit on the Civil War, students would be prompted to read about the Battle of Gettysburg in their online textbook and then research three online sources of information about the battle to create a Google document to share with their classmates. Each of these activities is derivative of a planned assignment or lesson unit, and the actions are explicitly directed by the teacher. To support that assignment, however, students may take advantage of the features and functionality of their mobile device individually to organize their work

and enhance their own productivity. Activities such as using their Chromebook to look up the definitions of words they don't know, watching a National Park Service video that they find about Gettysburg, or setting up due dates in their personal calendar for the project are examples of self-directed activities, undertaken by the student independently of teacher sponsorship.

Table 3: Types of activities students are doing using mobile devices in class as reported by students

Teacher directed activities	Student self-directed activities
Collaborate with classmates on a project	Check grades
Read online articles	Email teacher(s) with questions
Create or play online games in class	Find videos to watch to support learning
Create docs to share	Look up class information
Use online textbooks	Receive reminders and alerts about tests or due dates
Take online tests	Take notes and upload to documents
Do Internet research for an assignment	Use online dictionary

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This distinction between teacher-directed and student self-directed is important for two reasons. First, it helps us understand why students say that Internet connectivity in their classroom is too slow or inconsistent and how that level of access thwarts their ability to use their devices and the Internet to support learning. Traditionally, schools plan for Internet connectivity requirements around teacher-directed activities exclusively. Few district technology leaders consider how students will use their assigned mobile devices for their own self-directed learning purposes when planning for bandwidth needs. The paradigm driving these decisions is that the teacher is still directing all learning that is happening in the classroom and that bandwidth calculations are made based on the tools that teachers will use in their instructional plans. What is not considered is either the types of external resources students will be accessing or how often they will leverage school resources as

well as external resources such as YouTube to support their learning. Understanding how students are self-directing their learning using school-provided tablets, laptops and Chromebooks should be considered when evaluating bandwidth needs.

For some teachers, it is challenging to give up on the old paradigm of the teacher as the "sage on the stage" retaining all control over when and how students learn in their classroom. Only one-quarter of teachers today say they are very comfortable giving students choices about how they want to learn. As noted earlier, students relish the opportunity to learn at their own pace and to feel that they have some control over the path and pace of learning. The implementation of mobile devices into the classroom has brought this conflict to the forefront. Even with the assignment of a tablet, laptop or Chromebook for each student to use, some teachers are reluctant to embrace student choices or student self-directed learning using those devices. That is the reason why 42 percent of high school students say that a second major obstacle to using technology for learning is that their teachers limit their technology use in the classroom.

For students who are already leveraging their devices and readily available connectivity outside of school to pursue academic interests, this limited or highly controlled classroom environment feels irrelevant and unproductive. School district leaders acknowledge that motivating teachers to change their instructional practices and embrace more technology-based learning is a top challenge. As they work through this culture shift with their teachers, it is also imperative that capacity challenges with Internet connectivity are not used as a reason by some teachers to obstruct student self-directed learning.

42%

42% of high school students say that a second major obstacle to using technology for learning is that their teachers limit their technology use in the classroom

Finding #3:
Administrators report that if they had enhanced bandwidth capacity, they would implement more digital learning initiatives.

It is clear from the Speak Up research findings that students are ready and eager to embrace new forms of digital learning within their school day. As noted earlier, they are familiar with self-directed learning through their use of digital tools outside of school, and their perceptions of the value of those experiences influences their preferences and aspirations for school-based learning. Too often, however, administrators are forced to make decisions about the types of online learning experiences that students have in school based upon their concerns around bandwidth capacity in their districts. Two-thirds of district technology leaders (68 percent) acknowledge that having adequate Internet bandwidth capacity is a critical factor when deciding if or when to implement new digital learning initiatives in their district. So, if every school had the bandwidth capacity they needed to support student learning with access to high-quality online content and resources, how would schools use those enhanced capacities to create new learning environments that address the needs of every student?

The reality is that 26 percent of K-12 school districts believe that they have adequate bandwidth today to meet all teacher and student needs for Internet connectivity. However, 50 percent of K-12 school districts report that their current bandwidth is "okay but they still have intermittent problems with capacity." And an additional 22 percent of school districts acknowledge that they

are "not meeting current or projected needs" for Internet bandwidth. To understand the relationship between the adequacy of bandwidth capacity and the impact on the student learning experience, it is important to examine how the districts that have bandwidth constraints or concerns would leverage additional bandwidth if they had it to meet student and teacher expectations.

The bandwidth-constrained districts identify four digital initiatives that they wish they could provide to their students and teachers. If bandwidth were not a limitation, the district technology administrators say they would increase the use of videos and other multimedia resources to support student learning in the classroom, promote greater usage of online curricula by teachers, provide more widespread access to cloud collaboration tools, and expand student access to the school network after school hours (Table 4).

Table 4: How districts with current bandwidth constraints would use enhanced connectivity to support student learning

Wish list if they had enhanced bandwidth	Percentage of district technology leaders	
	intermittent problems with bandwidth capacity	not meeting current or projected bandwidth needs
Increased use of videos and other multimedia resources	54%	63%
Greater usage of online curricula	42%	61%
Widespread access to cloud collaboration tools	30%	44%
Expand student access to the school network after school hours	32%	27%
Facilitate more online professional learning experiences for teachers and staff	33%	45%
Implement new communications and community engagement tools	32%	28%
Provide community access to school resources and the Internet	26%	21%

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The increased access or expansion of these types of digital learning environments would have a significant impact on how students are learning and the effectiveness of their teachers. As noted, almost two-thirds of the districts where their current bandwidth is not meeting even current needs wish they could implement more multimedia resources and online curricula. Based upon their current assessment of their connectivity capacity, we can assume that students in those districts more likely have limited or no access to those digital learning tools now. Examining this through the lens of students' valuations on technology use within learning, we can also see how the learning opportunities enabled by increased bandwidth could directly support students' development of college- and career-ready skills and enable students to enjoy a more personalized learning experience.

Let's keep this important discussion going

This report, one in a new series from Project Tomorrow and Spectrum Enterprise, shares new insights about the relationship between bandwidth capacity and students' learning experiences in school and how schools could potentially leverage increased capacity to better address students' aspirations. We understand from the Speak Up research that students and teachers are using technology in class to address different goals and thus, the outcomes they ascribe to digital learning are very different. Students are very familiar with leveraging a wide variety of online tools and resources outside of school to support their learning and they are seeking a similar environment in class where they are not constrained by their teacher or current limitations on Internet connectivity. Too often, however, students' aspirations for more self-directed learning, particularly using school networks, are not fully appreciated by school and district leaders. This may lead to an underestimation of bandwidth demand and unintentional limited capacity to meet student needs. The challenge for K-12 education is how to actualize the students' vision for digital learning given that the majority of school district leaders report some level of concern regarding their bandwidth capacity today.

Our first goal with this report was first to highlight the current environment within K-12 school districts relative to their bandwidth capacity to meet future needs for digital learning. Our second goal is more action oriented. It is our hope that education leaders will use our research-based observations as a catalyst for new local discussions about how to ensure our schools have adequate bandwidth capacity to support their needs today and tomorrow, and to ultimately address the digital learning visions of their stakeholders. To help with those discussions within your districts, we have developed a short list of thought-provoking questions that would be appropriate for an internal planning meeting, a brainstorming conversation with your school board, or to engage your greater community in developing new solutions and plans.

- How are your students and teachers using online tools and resources to support learning in the classroom? Are those use cases taking advantage of all the features and functions available?

- When identifying bandwidth needs, are you considering the multitude of ways that students are self-directing learning using online tools through your network? How are you estimating the load on your system for those activities?

- What concerns do your teachers have about the quality of Internet connectivity in their classroom? What do they say they need to meet their instructional goals or advance their skills in using technology more effectively within instruction?

- What is your district's wish list for digital learning during this school year? How are you addressing bandwidth considerations to make those digital learning visions successful for students and teachers?

- Do you have the resources in place to support new visions for education in your school or district?
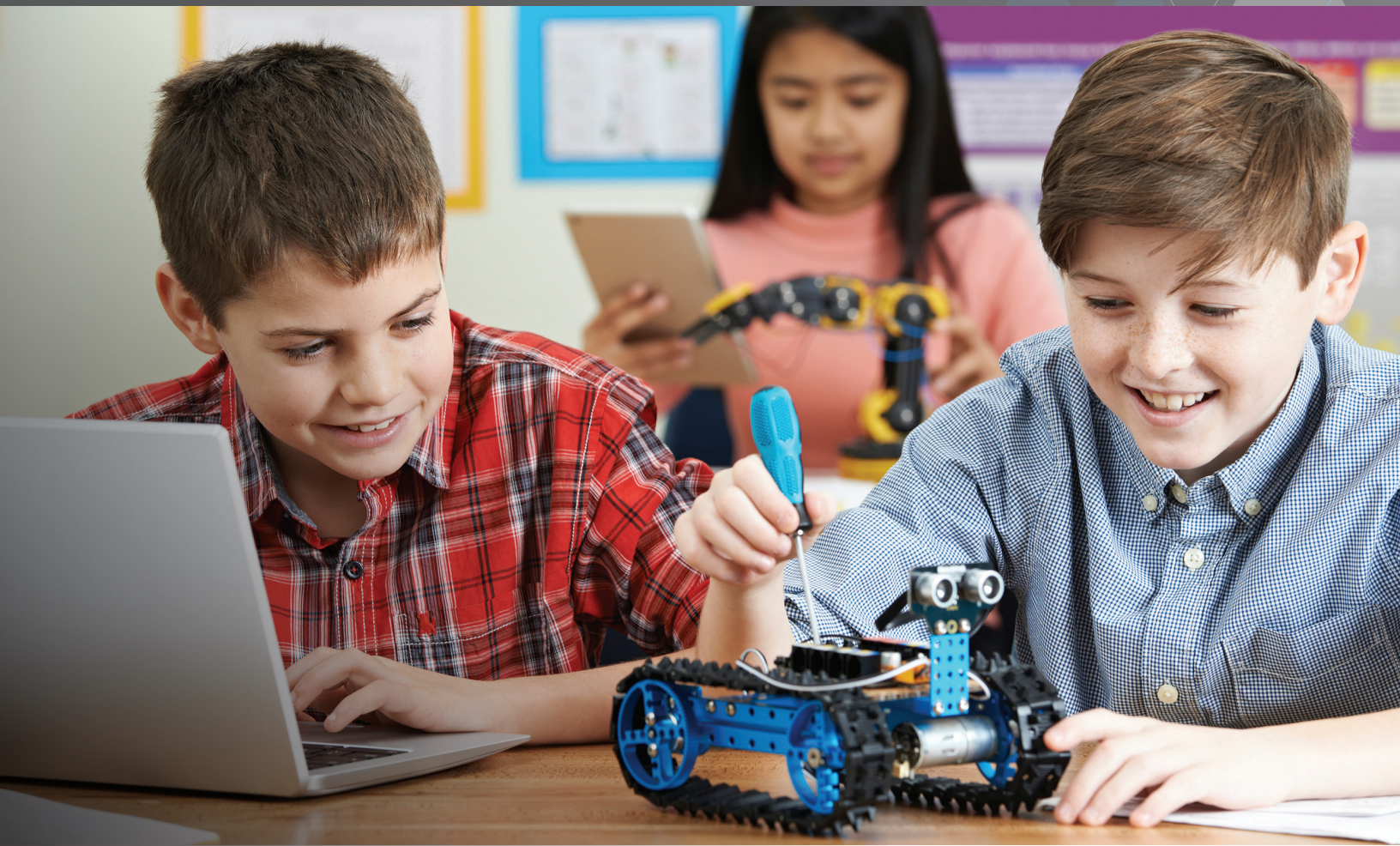
About Project Tomorrow

Project Tomorrow's nonprofit mission is to support the effective implementation of research-based learning experiences for students in K-12 schools. Project Tomorrow is particularly interested in the role of digital tools, content and resources in supporting students' development of college- and career-ready skills. For the past 15 years, the organization has focused efforts on national research projects and the design and implementation of evaluation, efficacy and feedback studies examining the impact of digital tools or technology-enabled learning models in the classroom. Learn more about our research activities, including our globally recognized Speak Up Research Project, at www.tomorrow.org.

About Spectrum Enterprise

Spectrum Enterprise, a part of Charter Communications, Inc., is a national provider of scalable, fiber technology solutions serving America's largest businesses and communications service providers. The broad Spectrum Enterprise portfolio includes networking and managed services solutions: Internet access, Ethernet access and networks, and Voice and TV solutions. Spectrum Enterprise's industry-leading team of experts works closely with clients to achieve greater business success by providing solutions designed to meet their evolving needs. More information about Spectrum Enterprise can be found at enterprise.spectrum.com/education.