WHITE PAPER

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Leveraging Intelligent Adaptive Learning to Personalize Education

A Special White Paper Based upon the Speak Up 2011 National Findings

Intelligent Adaptive Learning™

Introduction

Each year, Project Tomorrow®, a national education nonprofit organization, facilitates the Speak Up National Research Project and, as part of this initiative, tracks the growing student, educator and parent interest in digital learning, and how our nation's schools and districts are addressing that interest with innovative ways to use technology in and out of the classroom. As outlined in the Speak Up 2011 national report on our K–12 student and parent findings, *Mapping a Personalized Learning Journey—K–12 Students and Parents Connect the Dots with Digital Learning* (Project Tomorrow 2012), students, parents and educators are increasingly interested in leveraging emerging technologies to create more personalized learning environments where instruction is individualized to students' unique needs. While technological advancements have made it possible for us to customize how we shop, bank and interact with each other, for the most part the traditional classroom model has continued to rely upon a "one size fits all" paradigm that may support efficiency, but does not adequately address individual students' strengths and weaknesses. But that may be changing.

"One size fits all" classrooms may support efficiency, but not individual abilities.

In this special white paper based upon the Speak Up 2011 national findings, Project Tomorrow has partnered with DreamBox Learning to explore a new concept in the use of technology to personalize learning intelligent adaptive learning. With intelligent adaptive learning, every action that a student makes while working in a specially designed instructional technology software program is captured, including right and wrong answers, length of time in making decisions and the student's individual decision-making strategies. The program typically analyzes about 48,000 pieces of information on a single student in a single hour to continuously adjust the student's learning path. By synthesizing such fine-grained data, the program is able to continuously place students appropriately in lessons with the just right amount of difficulty, scaffolding, sequencing and hints, tailored especially to that student's unique needs. The result is literally millions of individualized learning paths that ensure a high degree of personalized instruction for students as well as a wealth of assessment data that teachers can use to better tailor classroom instruction to their students. While personalized learning as an important educational concept is not new, the ability to harness technological advancements as demonstrated with intelligent adaptive learning is a significant breakthrough concept for the classroom.

Though only 6 percent of teachers say that they are currently using this kind of new software in their classroom, interest by parents, teachers and administrators in the potential of this new class of education technology to transform learning is very high. When asked on the Speak Up surveys to identify technologies that would improve student achievement in their ultimate school, both parents and educators ranked intelligent adaptive learning in the top three. Through the analysis of the national Speak Up findings from 416,758 K–12 students, parents, teachers and administrators, it is our goal with this new white paper to better understand the interest in adaptive learning and to examine the next steps for greater adoption of this new technology in the classroom. Thus, the key questions for this analysis are as follows:

- Why is this the right time for greater interest in intelligent adaptive learning?
- What is the value proposition for adaptive learning?
- Are teachers ready for this? What do they need to be able to leverage these new tools effectively in the classroom?

What is "intelligent adaptive learning"?

Intelligent adaptive learning is a new class of education technology that captures every decision a student makes and adjusts the student's learning path both within lessons and between lessons, thereby providing millions of individualized learning paths, each tailored to a student's unique needs in real time.

The right time for greater interest in intelligent adaptive learning

Nationwide, conversations from school board meetings to congressional hearings are focusing on how to more effectively and efficiently tap into technological advancements to improve student achievement. Almost universally, there is strong belief that *if we can harness the same tools used to personalize our everyday lives* and bring those advancements into the classroom, then our students will benefit from a learning environment that is more tailored to their specific needs. Several additional factors are driving this interest in more personalized learning and setting up a fertile environment for new discussions around the potential of intelligent adaptive learning to be an effective tool for increasing student achievement and teacher productivity.

Administrators are focused on technology that increases student achievement and teacher productivity.

Facing new challenges to enhance student performance while at the same time managing tight budgets, district administrators are increasingly focusing on education technology solutions that yield tangible benefits. When asked to identify good justifications for technology investments, district leaders cite increased student achievement (53 percent), increased teacher productivity (49 percent) and ability to leverage current technology (41 percent) as critical. Correspondingly, a majority of district administrators (52 percent) point to emerging technologies such as digital textbooks, mobile devices and online learning as having the greatest potential for enhancing student achievement in their district. Over a quarter of administrators (28 percent) are already endorsing the idea of greater learning personalization by calling for an "individualized education plan" for every student, not just students with special needs.

28% of administrators are calling for an "individualized education plan" for every student, not just special needs.

Tech-enabled principals value technology as key to personalizing learning for each student

School principals also have a particular interest in the use of digital content for instruction. Two-thirds of principals (67 percent) noted that the use of digital content in the classroom increases student engagement in school and learning, and 45 percent see digital content as a new pathway for personalized instruction for each student. As noted in the Speak Up 2011 national report on our K–12 educator findings, "*Personalizing the Classroom Experience—Teachers, Librarians and Administrators Connect the Dots with Digital Learning*" (Project Tomorrow 2012), administrators are increasingly becoming more fluent with the use of digital content and other emerging technologies in their personal and professional lives, and that personal usage is translating into greater interest in the use of these tools in the classroom. Professionally related activities such as taking an online class (36 percent), participating in online learning communities (50 percent) and manipulating online media and content (56 percent) are creating that greater familiarity and providing a strong personal case for understanding the potential of many new technologies to transform learning.

45% of principals see digital content as a new pathway for personalized instruction.

Technology is a win-win for teachers—increasing their effectiveness and student engagement

Teachers are also realizing the benefits of using different emerging technologies in the classroom to both increase their effectiveness and address students' needs. For example, 37 percent of teachers noted that the use of technology has improved their ability to facilitate

more student-centered learning. Teachers are also more interested today in the potential of gaming technologies as a tool for increasing student engagement in learning as well as addressing individual student learning styles. This interest level is also translating into more usage. In 2007, only one in ten teachers was using some type of digital games within instruction; in 2011, a quarter of teachers (24 percent) identified online and software games as part of their instructional toolkit. Additionally, teachers are more comfortable now with using student data to inform their teaching practice; over a third of teachers (38 percent) want more student data within their school professional learning community.

24% of teachers use online and software games as part of their instructional toolkit.

Parents endorse educational tools that personalize student learning

As noted in several of the recent Speak Up reports, parents see the use of technology as a way to create a more personalized learning environment for their child, both in school and at home. Given that 41 percent of parents cite too-big class sizes as their #1 concern about their child's school, it makes sense that parents are eager for schools to adopt technology solutions that would provide a way for individualized instruction. For example, 57 percent of parents see online learning as a way for their child to work at his/her own pace. And when asked to evaluate the importance of the effective implementation of technology within instruction to their child's future success, 87 percent of parents rank it as important; 50 percent rank it as **extremely important**. This high parental value proposition on digital learning is a strong contributing factor to administrators' heightened interest in emerging technologies for learning.

Parents want technology solutions that provide individualized instruction.

Stakeholders' support provides the right time for new interest in intelligent adaptive learning

These factors as well as others are intersecting today to create a new "perfect storm" environment for tapping into intelligent adaptive learning systems to drive greater student achievement and enhanced teacher productivity. The mix of administrators' interest in digital content and personalized learning, coupled with teachers' increased familiarity and comfort with the use of games in the classroom and teachers' desire to use more student assessment data to inform their teaching practice is setting the table for this new discussion. But what is the general awareness level of "intelligent adaptive learning" and how will the value proposition of administrators, teachers and parents on this new class of education technology propel greater interest as we strive to create more personalized learning in our nation's classrooms?

Intelligent adaptive learning helps drive greater student achievement and enhanced teacher productivity.

The value proposition for intelligent adaptive learning

Increasingly, district leaders are making districtwide decisions on the use of digital content within instruction to ensure quality standards and to support district strategic plans for technology use. In fact, 55 percent of decisions regarding the type of digital content to be used in the classroom are now being made at the district office. Thus, the awareness level and value proposition around intelligent adaptive learning solutions within the district leadership are important to understand for this discussion.

District and school site administrators agree: "just right" level of instruction is the #1 benefit of intelligent adaptive learning

On the district leadership survey, the administrators were provided with a simplified definition of intelligent adaptive learning and then asked to identify the characteristic or benefit of this emerging technology that would have the greatest value to their district. As documented in Table 1, providing personalized instruction for each individual student was the highest ranked response.

"Just right" level of instruction is the #1 benefit of intelligent adaptive learning.

Table 1: Ranking of Benefits of Intelligent Adaptive Learning by District Administrators

Benefits of Intelligent Adaptive Learning	Ranking of Value by District Administrators
Provides instruction at the "just right" level for each individual student	**#1**
Provides a way to differentiate instruction with larger class size	2
Engages students in self-directed independent learning	3
Provides teachers with real time reporting on student comprehension by concept	4
Provides adminstrators with real time reporting on student progress against standards	5
Increases the effectiveness of our teachers through the use of technology	6

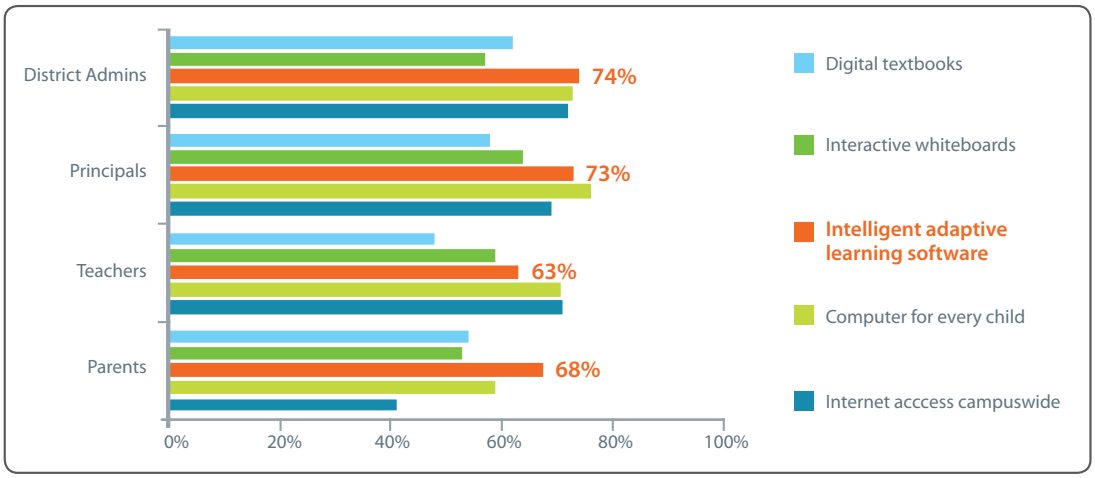
To better determine the awareness level at the school site level, school principals were asked the same question on their survey. Overall, they also identify the "just right" level as the #1 benefit of intelligent adaptive learning. Interestingly, however, depending upon their school assignment and technology skills, the principals rank some of the benefits differently. High school principals place a higher premium on the real-time reporting back to the teacher than their middle school or elementary school colleagues; high school principals rank that as #2 in terms of benefits. The "just right" level benefit resonates most strongly with elementary school principals; 52 percent more of them chose that benefit as #1 compared to their high school counterparts. Principals who self-assess their technology skills at the beginner level choose providing real-time reporting back to administrators as their #2 benefit, indicating their stronger interest in understanding the impact of adaptive learning on student progress.

Shared vision for the ultimate school includes intelligent adaptive learning

The value proposition for intelligent adaptive learning relative to other emerging technologies is effectively captured through the Speak Up question about the ultimate school. In thinking about their ultimate school, teachers, principals, district administrators and parents were asked to identify the emerging technology solutions that they believe hold the greatest potential for improving student achievement. In Chart 1, the five most commonly selected emerging technologies by stakeholder group are compared with each

other. Intelligent adaptive learning ranks in the top three for all four stakeholder groups, most notably as #1 by district administrators and parents.

Chart 1: Top Five Technologies for the Ultimate School



District administrators rank intelligent adaptive learning #1 for improving student achievement.

It is also noteworthy that teachers, principals, district administrators and parents all agree that providing a computer for every child to use also can yield stronger student achievement levels. The combination, therefore, of the intelligent adaptive learning software with the computer for every child underscores the strong interest associated with personalized learning, and provides a tangible foundation for leveraging these tools to create new classroom paradigms.

Parents see adaptive learning as a solution for classes that are too big and impersonal for their child

74% of parents believe that instructional technology is not being used effectively in classrooms today.

Noting the impact that parental interests have on school and district technology planning, it is interesting to also better understand the characteristics of the parents who highly value intelligent adaptive learning. The technology skills of the adaptive-learning-supportive parents closely mirror those of parents of school-age children in general; 58 percent self-assess their skills as average. And their access to technology for their own personal use is typical as well; two-thirds are smartphone users (69 percent) and slightly more than one-third have a tablet computer as well (38 percent). The parents, however, who support adaptive learning solutions are more likely to be concerned about their child learning the right skills at school to be successful in the future (77 percent). These same parents also have stronger concerns regarding their child's school today; three-quarters (74 percent) note that technology is not being used effectively and 70 percent remarked that their biggest concern with their child's school is that the classes are too big. The parent who values intelligent adaptive learning, therefore, is very much in tune with the value of personalized learning, and sees this new class of education technology as a key solution to unlocking individualization of the learning process.

Parents view intelligent adaptive learning as key to individualized learning.

Teachers are tapping into games to increase student engagement and personalize learning

Teachers' comfort level with using digital content within classroom instruction has been steadily increasing each year. Correspondingly, we see increases in actual teacher usage of digital content within instruction. For example, in 2008, only 19 percent of teachers were regularly using podcasts or videos in their classroom; in 2011, that usage increased by 68 percent to now include 32 percent of teachers. As noted earlier, we see a similar increase in teachers' use of online and computer-based games to support instruction. From the 2011 data findings, 24 percent of teachers are now using some form of a game-based environment within their classroom. The benefits teachers associate with games within instruction are important for us to know in order to understand their value proposition for intelligent adaptive learning, which often includes game-based environments. Data from the following specific teacher cohorts was analyzed for this white paper: math teachers, teachers by assigned grade level and teachers who are already using games and/or adaptive learning solutions in their classroom.

As illustrated in Table 2, elementary school teachers in grades K–5 share the strongest value proposition today around games within instruction. This mirrors their usage of games within the classroom. Given that K–12 students regularly voice interest in improving their math classes through the use of technology, it is especially encouraging that math teachers see the value of games as well.

Table 2: Teachers identify benefits to using digital or online games with their students

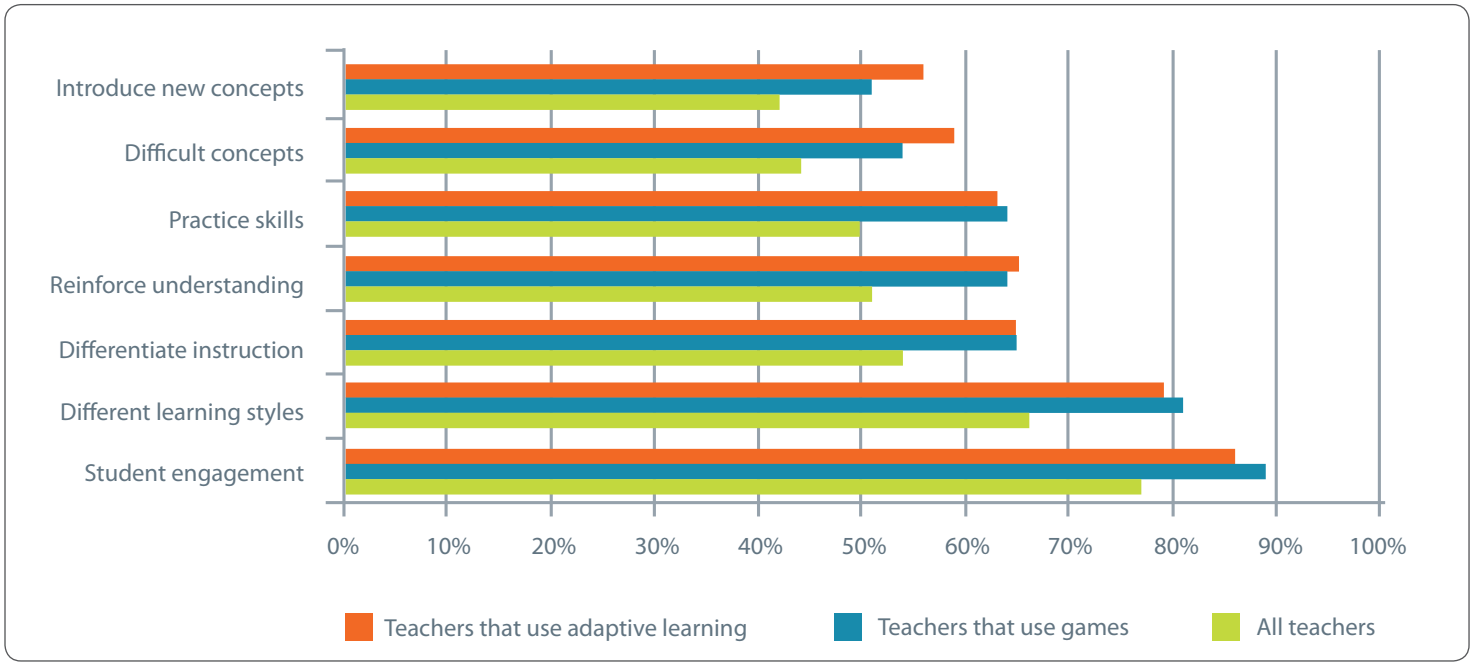
Why would you use digital or online games with your students?	Math Teachers	K–2 Teachers	Gr 3–5 Teachers	Gr 6–8 Teachers	Gr 9–12 Teachers
As a student engagement and motivation tool	78%	82%	83%	78%	71%
To address different learning styles in the classroom	64%	74%	73%	66%	56%
To differentiate instruction	55%	60%	61%	55%	46%
To reinforce understanding and skill knowledge	52%	55%	56%	53%	45%
To provide opportunities for students to practice skills	52%	54%	56%	50%	43%
To Provide ways to students to visualize difficult concepts	44%	43%	49%	45%	40%
As a vehicle for introducing new concepts	42%	43%	45%	44%	39%

Secondary school teachers in grades 6–12 also note some other benefits of games within instruction that did not register as strongly with their elementary school peers, but reflect significant needs within their own classrooms. One-fifth (20 percent) identify that games could help to create an experiential environment for trial and error type activities; 24 percent see games as a way to facilitate student collaboration projects; 22 percent are interested in leveraging games to create more learning-centric classroom spaces.

The data from the teachers who are currently using games and intelligent adaptive learning solutions in their classrooms underscores the significant potential of this technology

to transform learning. Given their actual experiences with these emerging technologies, teachers' thoughts on the value proposition of game-based environments are impressive and important for advancing the larger discussion on the value of technology within learning.

Chart 2: Based Upon Experiences: Teachers' Views on the Value of Games within Learning



As illustrated in Chart 2 above, teachers with firsthand experience with games or intelligent adaptive learning in their classroom are significantly more supportive of the benefits of game-based environments than their colleagues in general. Additionally, 47 percent of the teachers who are using intelligent adaptive learning also note that the game environment provides them with assessment data on student proficiency that is highly valuable; less than one-third of all teachers (30 percent) acknowledge that benefit. In a similar way, those same teachers are also on the forefront of understanding how this emerging technology can transform the classroom. While only 22 percent of teachers see games as a way to create a more learning-centric classroom, 39 percent of the teachers currently using adaptive learning recognize that benefit. Not diminishing the value of games to increase student engagement, the teachers with firsthand experiences are already embracing the more sophisticated benefits, such as those associated with achievement data and using games to transform the teaching and learning environment in the classroom.

Teachers using game-based learning also value high level benefits like progress tracking.

Familiarity with adaptive learning is a key requirement for the next generation of teachers

It therefore makes sense that today's school site administrators are interested in ensuring that the next generation of teachers are familiar with how to incorporate adaptive learning software into instruction. In thinking ahead to their future hires, the principals identify the key technology experiences that they believe preservice teachers should have upon completion

of their certification process. As noted in Table 3 (below), a majority of principals (59 percent) would like the next generation of teachers to already be familiar with intelligent adaptive learning before they arrive at their school.

59% of principals would like incoming teachers to arrive with experience in adaptive learning tools.

Table 3: Principals' Wish List for Preservice Teachers

Know how to use technology to:	Principals
Create authentic learning experiences for students	75%
Support student collaborations	69%
Differentiate instruction	68%
Locate and use digital content	62%
Incorporate intelligent adaptive learning into instruction	59%

Administrators are therefore placing a high premium on digital content and intelligent adaptive learning in particular as they envision their classrooms of the future. But the reality is that a significant barrier to integrating digital content in today's classroom is teachers' need for specific training on how to incorporate these tools effectively. In fact, 43 percent of school site **administrators called "teachers are not trained"** the critical obstacle to realizing the benefits of digital content to personalize instruction. So, what is needed to change this paradigm so that more students can realize the benefits of personalized learning?

Time to rethink professional development to meet teachers' needs and personalize pace and content

A majority of administrators (59 percent) believe that enhancing teacher effectiveness through professional development or professional learning communities will have the greatest impact on student achievement in their school or district. Therefore, it follows that providing highly targeted and effective teacher professional development is a critical challenge for today's education leaders. This echoes teachers' calls for not just more professional development, but new training methodologies that are more highly personalized to their needs. Increasingly, teachers are looking for "just in time" professional development that is less generic and more tightly interwoven with their classroom curriculum or tools. In many ways, today's teachers are looking for the same kind of personalized learning that is paced to their individual needs that we are discussing as **optimal for today's students.**

Teachers want personalized learning technologies in professional development and training as well.

This is especially true in terms of teachers' needs for professional development around the use of digital content in the classroom. Understanding that less than one-third of teachers (29 percent) consider their technology skills to be advanced compared to their peers, it is particularly instructive and valuable to examine a range of the preferred approaches to training on digital content usage across the spectrum of technology comfort levels. As noted in Table 4, the difference between the teachers who assess their skills as advanced and their colleagues who assess their skills at the beginner level is widest with the professional development approaches that are technology-based such as with the online collection of resources or the online course.

Table 4: What type of professional development on digital content would be best for you?

Professional Development Approach	Advanced Tech Using Teachers	Average Tech Using Teachers	Beginning Tech Using Teachers
Access to an online collection of vetted, grade-level, content-specific resources	63%	54%	45%
Face-to-face professional development	39%	39%	38%
Video clips of teachers demonstrating use of digital content	37%	32%	28%
Professional learning community at my school	35%	31%	29%
Online course	34%	24%	15%
Mentoring by an on-site coach	22%	23%	28%
Collection of relevant podcasts	31%	20%	13%
Support from a library media specialist	21%	20%	21%
Blogs, wikis and social networking sites	28%	16%	9%

The teachers who identify themselves as beginners are more comfortable with a social-based learning environment, such as getting personalized help from an on-site coach or a librarian. Interestingly, the concept of the face-to-face teacher workshop or in-service day still holds strong resonance for teachers at all levels of the technology spectrum.

Having a strong value proposition and stakeholder buy-in are critical first steps for any new technology that is being introduced in the classroom. However, translating the vision and its associated benefits into tangible outcomes involves working closely with classroom teachers, meeting them wherever they are with their technology skills and providing meaningful professional development to help them learn how to effectively leverage these new tools within instruction. This is especially true with digital content in general and the use of intelligent adaptive learning solutions in particular.

Intelligent adaptive learning: the catalyst for more personalized learning

Intelligent adaptive learning gets to the heart of personalizing instruction by leveraging technological advancements to provide a **systemic** way for students to master skills and knowledge levels at a pace that is especially tailored to their strengths and weaknesses, and for teachers to have unprecedented visibility into data on student achievement to inform their daily practice. Intelligent adaptive learning, therefore, can be the long-awaited catalyst for transforming the classroom experience for both students and teachers. It has the potential also to be the solution set that marries administrators' desires for more effective technology use with their goal of creating individualized education plans for every student. And it carries the promise of the parents' dream of providing a learning environment that takes into account their own child's specific learning needs and helps every child develop to his or her greatest potential. The opportunity is here today with the new emerging technologies used by intelligent adaptive learning; the challenge is providing the will and vision to make this available for all students.

Intelligent adaptive learning can be the long awaited catalyst for transforming classrooms.

About Speak Up 2011

Speak Up is a national initiative of Project Tomorrow, the nation's leading education nonprofit organization dedicated to the empowerment of student voices in education. Each year, the Speak Up National Research Project polls K–12 students, parents and educators about the role of technology for learning in and out of school. This survey represents the largest collection of authentic, unfiltered stakeholder voices on digital learning. Since fall 2003, over 2.6 million K–12 students, parents, teachers, librarians, principals, technology leaders and district administrators have shared their views and ideas through Speak Up. K–12 educators, higher education faculty, business leaders and policy leaders report that they regularly use the Speak Up data to inform federal, state and local education programs.

In fall 2011, Project Tomorrow surveyed 330,117 K–12 students, 44,006 parents, 36,477 teachers, 2,025 librarians, 814 district administrators and 3,319 school administrators representing 5,616 public and private schools from 1,250 districts. Schools from urban (24 percent), suburban (41 percent) and rural (35 percent) communities are represented. Over one-half of the schools that participated in Speak Up 2010 are Title I eligible (an indicator of student population poverty). The Speak Up 2011 surveys were available online for input between October 10 and December 23, 2011.

The Speak Up surveys included foundation questions about the use of technology for learning, 21st century skills and schools of the future, as well as emerging technologies (online learning, mobile devices and digital content), science instruction and STEM career exploration. In addition, educators shared the challenges they encounter integrating technology into their schools and districts and how budget challenges have impacted these decisions. The data results are a convenience sample; schools and districts self-select to participate and facilitate the survey-taking process for their students, educators and parents. Any school or school district in the United States is eligible to participate in Speak Up. In preparation for data analysis, the survey results are matched with school level demographic information, such as Title I, school locale (urban, rural and suburban) and ethnicity selected from the Common Core of Data compiled by the National Center for Education Statistics (http://nces.ed.gov/). Speak Up data is cross-consulted with NCES statistics to ensure that data represents nationwide school demographics. The data is analyzed using standard cross-tab analysis. Key variables (such as Internet and device access) are tested for statistical significance.

About Project Tomorrow

Project Tomorrow is the nation's leading education nonprofit organization dedicated to the empowerment of student voices in education. With 16 years of experience in the K–12 education sector, Project Tomorrow regularly provides consulting and research support about key trends in K–12 science, math and technology education to school districts, government agencies, businesses and higher education.

About DreamBox Learning

DreamBox Learning was founded in 2006 in Bellevue, Washington, and is transforming the way students learn mathematics through its groundbreaking combination of intelligent adaptive learning# , rigorous elementary mathematics curriculum and motivating learning environment. DreamBox Learning Math is designed to teach and reinforce key mathematical concepts through effective, individualized instruction in an engaging and fun manner and is aligned with the Common Core State Standards. The platform has won more than 20 top education and technology industry awards and is in use in all 50 states. Learn more about DreamBox Learning at www.dreambox.com.

For more information, contact Client Care at 877.451.7845, email **schools@dreambox.com** or visit **dreambox.com**.