BILL & MELINDA GATES *foundation*

Teachers Know Best

What Educators Want from Digital Instructional Tools 2.0

ABOUT THIS STUDY

As part of the Bill & Melinda Gates Foundation's efforts to improve educational outcomes for all students, and particularly low-income students and students of color, we seek to encourage innovation in K–12 education by supporting educators to personalize learning for students. Personalized learning ensures that students' learning experiences—what they learn, and how, when, and where they learn it—are tailored to their individual needs, skills, and interests and enable them to take ownership of their own learning. Personalized learning environments also help students develop meaningful personal connections with their fellow students, their teachers, and other adults. Our hypothesis, based on initial observations of schools that are developing these innovative approaches, is that access to a well curated set of high quality, Common Core-aligned digital instructional tools and content is foundational for teachers to be able to implement personalized learning models more efficiently and effectively. With great tools, teachers can better support students by targeting their specific needs and engaging their passions and interests. By doing so, they can attain dramatically better learning outcomes.

To that end, the foundation is supporting ongoing market research through the *Teachers Know Best* series. Our aim is to generate information for the field about what teachers need to successfully design and use personalized learning approaches, and to draw attention to areas in which focused product development could more effectively support teachers and students in all classrooms, including those that are in schools developing personalized learning models. Our research focuses extensively on teachers' perceptions and experience because, as those working directly with students, they can provide the best insights into the challenges of personalizing instruction and point the way for product developers and purchasers of curricular resources to address the greatest unmet needs of their users.

Teachers Know Best: What Educators Want From Digital Instructional Tools 2.0 renews our understanding about how teachers currently use digital instructional tools, teachers' attitudes toward digital technology, and teachers' perceived effectiveness of digital tools. By sharing this information, we hope to enable product developers to be responsive to the emerging needs of teachers so they can create instructional tools that support teachers in guiding all students to accelerate progress toward college readiness.

Our initial report was released in April 2014 to aggregate and amplify the voices of teachers and students to help strengthen digital content and tools. It surfaced valuable insights about the instructional purposes for which teachers use digital tools and identified gaps in the availability, usage, and perceived effectiveness of products across subjects and grade levels. The original report was followed up by two studies, the first focusing on teachers' perceptions of the professional development opportunities available to them, and the second on a particular subset of digital instructional tools: those that help teachers collect and make use of student data to tailor and improve instruction for individual students.

Since the release of the initial *Teachers Know Best* study, the market for K-12 digital content and tools has evolved significantly. And over time, teachers, schools, and districts have become even more sophisticated in their selection, procurement, and use of digital tools, and their expressed needs change accordingly. To continue supporting better connections among teachers, those who procure resources for them, and product developers, the field needs up-to-date knowledge about how educators' needs are being met by digital instructional tools. We hope this report makes a contribution in this critical area.

CONTENTS

SUMMARY OF KEY FINDINGS

Since the Bill & Melinda Gates Foundation began its *Teachers Know Best* research project in 2013, the work has been guided by a simple premise: No one knows how technology can and should be used in classrooms better than the teachers who put it to use every day.

This study of more than 3,100 teachers revisits key questions explored in the original *Teachers Know Best* report: how teachers use digital instructional tools in the classroom, as well as their attitudes toward technology and whether they believe existing digital tools are effective. As with the original report, a nationally representative survey of teachers provides an opportunity to shift from anecdotes to a richer understanding of whether product developers are creating the digital tools that teachers want and need, as well as the extent to which school leaders are providing and supporting these tools in classrooms.

This report explores five key areas:

● What today's classrooms look like

● Teachers' use of digital tools

● Growing teacher confidence in the availability and sufficiency of resources to help master content standards

● Evolving teacher perceptions of the effectiveness of digital tools

● School environment and teacher choice as continuing barriers to adoption

What Today's Classrooms Look Like

Despite the proliferation of technology that enables student learning experiences to be tailored to meet individual skills, needs, and interests, most teachers still report working in classrooms where students generally learn the same content, working at the same pace together as a class.

● More than two-thirds (69 percent) of participating teachers report teaching in classrooms where students generally learn the same content, working at the same pace together as a class. However, the majority of teachers (65 percent) report grouping students of similar abilities together for differentiated instruction or other supports. These groupings are also increasingly responsive to ongoing changes in student learning, with 73 percent of teachers changing the composition of student groups at least monthly.

● Whole-class instruction still consumes the most classroom time, accounting for 35 percent of time spent on average. Small group instruction accounts for another 19 percent of class time.

● Despite the availability of digital tools to assist with independent practice, assessment, and tutoring, most classroom time in these areas is still spent without using digital content. Teachers spend 16 percent of class time, on average, on independent practice without digital content, compared to 11 percent using it; another 16 percent of class time on paper-and-pencil assessment, compared to 9 percent on computer-based assessments; and 10 percent of class time on individual in-person tutoring, compared to 4 percent on online tutoring.
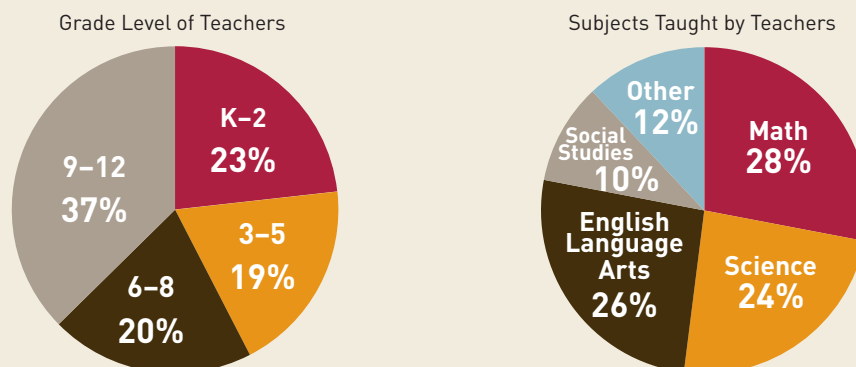
Teachers' Use of Digital Tools

In large numbers, educators believe in the promise of digital tools, but both teachers and their schools remain divided on the role of technology in the classroom—and how to support it.

● Only 2 percent of teachers say they don't see the value of using technology for student learning, and previous research among a separate sample of teachers in 2013 confirms that almost all (93 percent) now regularly use some form of digital tool to guide instruction. Teachers also believe the digital

tools they use most frequently are effective at meeting student needs (only 12 percent believe they are at least somewhat ineffective).

● However, teachers remain evenly split on how they use digital tools: In almost equal numbers, they say technology plays a primary role in their classrooms (38 percent), a secondary role (34 percent), or no role at all (28 percent). This split remains consistent in virtually all school settings—at different grade levels, in traditional and charter schools, and in urban, suburban, and rural settings.

SURVEY RESPONDENTS AT A GLANCE

We conducted an online survey of a nationally representative sample of K–12 educators in August and September 2015. Many questions from the initial 2013 research were repeated to gauge change.

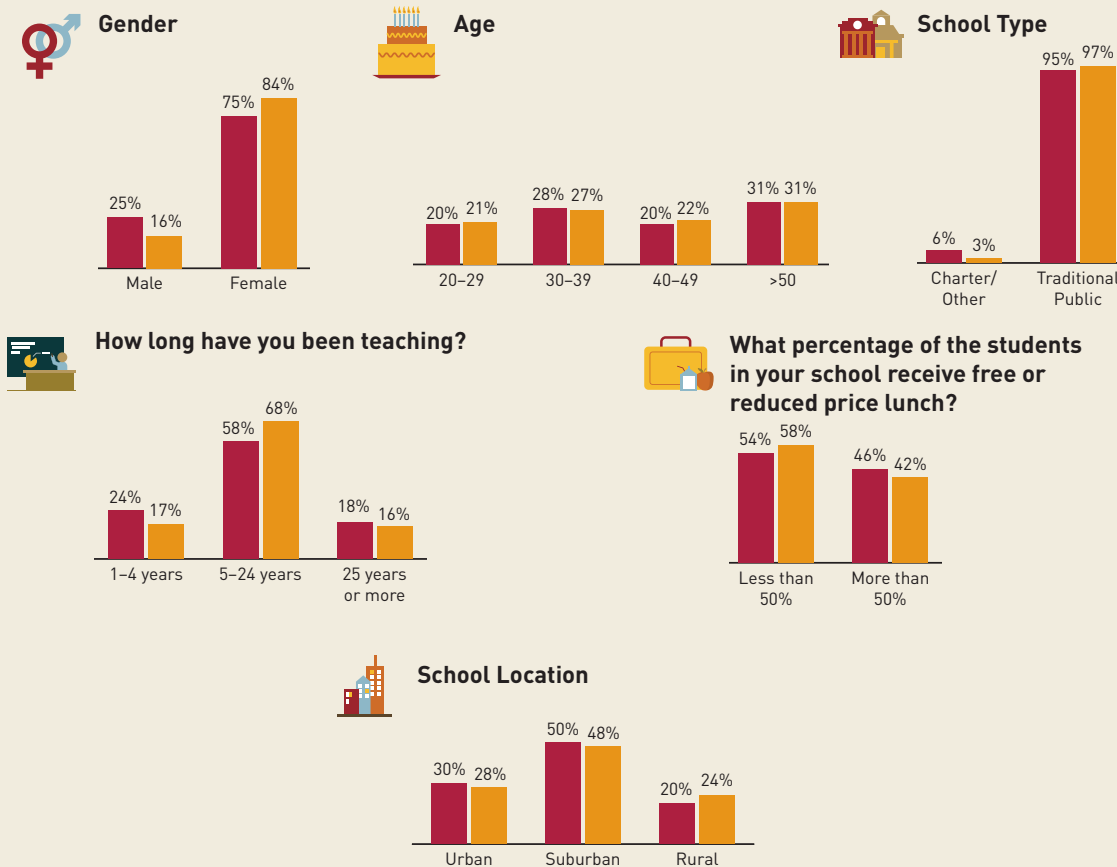## 3,123 K–12 PUBLIC SCHOOL TEACHERS

Grade Level of Teachers

- 9–12: 37%
- K–2: 23%
- 3–5: 19%
- 6–8: 20%

Subjects Taught by Teachers

- Other: 12%
- Social Studies: 10%
- Math: 28%
- English Language Arts: 26%
- Science: 24%

Given the sample size, we can say with 95% certainty that the results are accurate to ±2.05% (larger margin for subgroups).

Comparing our teacher survey sample with the general teacher population

Our teacher survey sample reflects the U.S. K–12 public school teacher population.

■ Teacher survey respondents ■ National average

Gender
- Male: 25% / 16%
- Female: 75% / 84%

Age
- 20–29: 20% / 21%
- 30–39: 28% / 27%
- 40–49: 20% / 22%
- >50: 31% / 31%

School Type
- Charter/Other: 6% / 3%
- Traditional Public: 95% / 97%

How long have you been teaching?
- 1–4 years: 24% / 17%
- 5–24 years: 58% / 68%
- 25 years or more: 18% / 16%

What percentage of the students in your school receive free or reduced price lunch?
- Less than 50%: 54% / 58%
- More than 50%: 46% / 42%

School Location
- Urban: 30% / 28%
- Suburban: 50% / 48%
- Rural: 20% / 24%

- Teachers spend the most time using digital tools to provide instruction directly to students (10 hours per week) and are most likely to identify direct instruction as their primary use of digital resources (43 percent). Teachers devote significantly less time to other uses of technology in the classroom, including varying the delivery method of instruction, fostering independent practice, supporting student collaboration, tailoring the learning experience to meet individual student needs, and diagnosing individual student needs. They are also far less likely to identify these other uses as their primary reason for using digital tools.

Growing Teacher Confidence in the Availability and Sufficiency of Resources to Help Master Content Standards

In general, higher percentages of teachers now believe that resources of all kinds—digital and non-digital—are available and capable of helping students master subject standards than in our original research two years ago.

- Fully two-thirds of all teachers (67 percent) now think that digital and non-digital resources are available and sufficient to help students master subject standards, up from 55 percent in our initial findings in 2013.

- We saw improvements in availability and sufficiency in almost every subject. Teachers, however, still report gaps between different grade levels within subject areas, as well as specific standards where resources were either unavailable, or available but not sufficient to fully teach the standard. The specific standards teachers found most likely to be addressed by available and sufficient resources tend to address foundational knowledge more often than complex skills and concepts, particularly in math.

- Despite their confidence in digital tools, teachers say that these tools make up just 25 percent of the resources they have to teach standards. Among those teachers who consider digital tools insufficient, half say their district does not provide them, while another 27 percent say they are not aware of them.

- When teachers say digital tools are not sufficient to meet their needs, they are much more likely to point to the supplemental nature of the tools available to them (37 percent) or say they do not fully support student mastery (34 percent) than to cite alignment issues. Still fewer teachers cite a mismatch in the resources' format or their own style of teaching (21 percent and 12 percent, respectively).

Evolving Teacher Perceptions of the Effectiveness of Digital Tools

Compared to those surveyed two years ago, higher percentages of teachers now consider the digital tools they use the most often to be effective. While teachers think these resources are most effective for enrichment, they believe they have the potential to be useful in all areas of instruction.

- A clear majority of teachers (58 percent) across all subjects found digital tools effective. However, key gaps still exist in all subject areas and grades, as detailed on p. 16.

- While teachers believe digital tools can help with all areas of instruction, they give the highest rankings to the tools' potential to vary the delivery method of instruction; 68 percent believe the tools have the potential to be either effective or very effective in this area. Sixty-four percent say digital tools have the potential to foster independent practice of specific skills; 62 percent say the tools could help tailor the learning experience to individual student needs; 59 percent say the tools have the potential to deliver instruction directly to students; and 58 percent say they had the potential to support student collaboration and provide interactive experiences. Just over half of all teachers (52 percent) believe digital tools have the potential to effectively diagnose student learning needs.

- Teachers also believe digital tools are most effective for enrichment activities and core instruction (54 percent and 47 percent, respectively). Only one in three believe they are effective for remediation.

School Environment and Teacher Choice as Continuing Barriers to Adoption

Teachers identified ongoing—and vast—variations in individual schools' commitment to technology. Teachers also don't choose most of the technology they use—but they are still largely responsible for incorporating it into their teaching.

- Teachers report wide variations in the commitment to technology at individual schools. Over one-third (37 percent) of teachers say their school has committed to investing in both hardware and software, but one in five say the investment has not been significant.

- Teachers are almost equally likely to report that they are on their own using digital technology and managing the data it generates as they are to say that their school has dedicated staff to support them in these areas (31 percent vs. 39 percent, respectively).

- Only 18 percent of teachers select most of the technology they use, while nearly one-third (31 percent) select almost none. Most teachers (51 percent) select between 10 percent and half of the education technology they use.

- When teachers do select resources, they are more likely to think the digital and non-digital resources meet their needs (74 percent of those who select 30 percent or more of their tools, compared with 62 percent of those who select less than 30 percent of their tools). In choosing the tools, 48 percent of teachers focus on cost-effectiveness, 46 percent attach the greatest weight to ease of integration, and 38 percent put the greatest emphasis on the tools' ability to help them tailor instruction.

- Most teachers (56 percent) choose digital tools recommended by other teachers. Forty-seven percent rely on principals or administrators. When researching tools on their own, only 17 percent of teachers rely on education-specific online resources such as Graphite and EdSurge, compared to 42 percent of teachers who use general search engines such as Google or Bing.

- Access remains a critical barrier to technology adoption. Nearly half of teachers (42 percent) say their students lack sufficient access to technology outside of the classroom, and more than a third (35 percent) say their schools lack adequate funding for technology.

- In particular, barriers to access inhibit the expansion of one-to-one learning. More than half of teachers (55 percent) now report they have access to mobile devices, such as laptops and tablets, while fewer than one in five of those teachers say their schools provide individual mobile devices to students.

- The majority of schools' technology investments still focus on the sorts of tools typically used to facilitate whole-class or large-group instruction. The most commonly used hardware by teachers remains projectors (76 percent), laptops (72 percent), and interactive whiteboards (69 percent).

- Barriers to access keep more teachers from using digital tools than do all other challenges, including teachers' approach to instruction, discomfort with technology, or availability and sufficiency of digital resources.
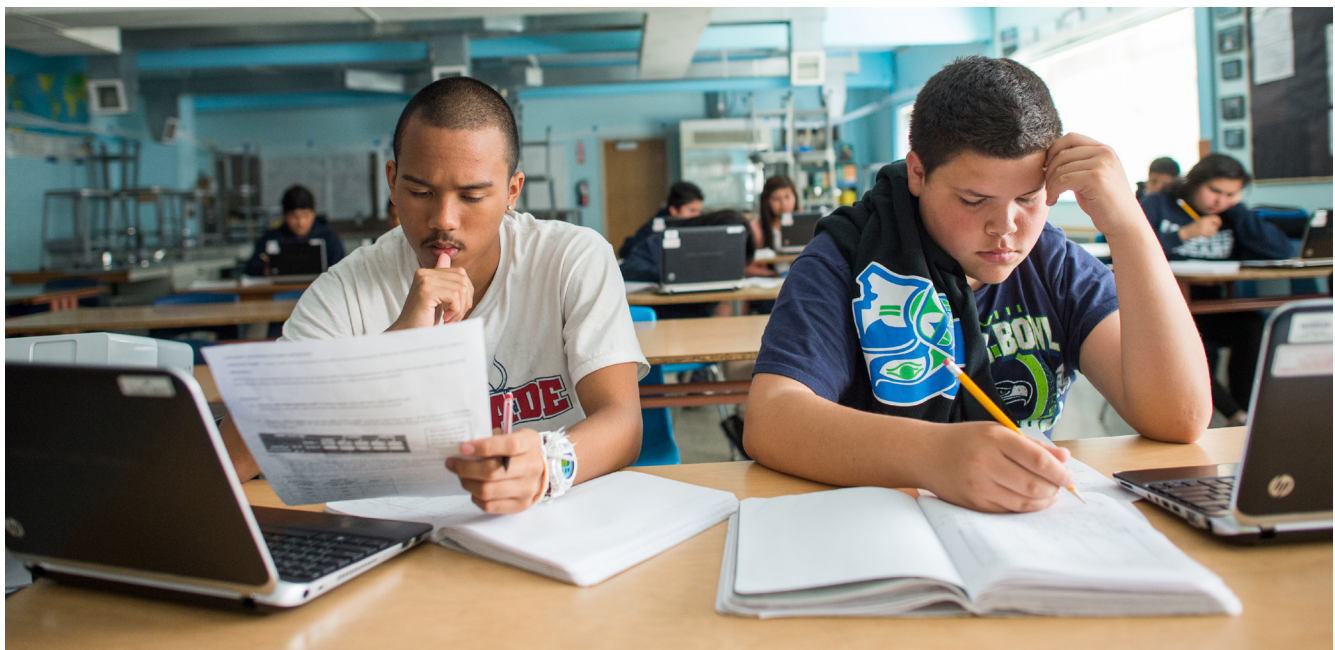
WHAT TODAY'S CLASSROOMS LOOK LIKE

Despite the spread and sophistication of technology that lets teachers tailor student learning to their experiences, individual skills, needs, and interests, the vast majority of teachers—69 percent—still report working in classrooms in which students generally learn the same content, working at the same pace. Yet these standard settings are not necessarily as monolithic as they once were.

> "We need more learning opportunities for elementary-aged children. They are very engaged by technology, yet most of our programs focus on their independent practice of skills. If we had some programs that could provide differentiated instruction, it would greatly improve the flow of centers in my classroom."

Differentiation Takes Root

In an era of differentiated instruction, the majority of teachers (65 percent) report grouping students of similar abilities together for targeted instruction or other support. Likewise, the 2013 *Teachers Know Best* project found that 69 percent of teachers believed that they must tailor instruction to improve student achievement.[1] Our current research suggests that grouping strategies are also increasingly responsive to changes in student learning: Nearly three-quarters of teachers who group students based on their ability (73 percent) change the composition of student groups at least monthly; 29 percent do so at least weekly.

MOST TEACHERS ADJUST STUDENT GROUPS BASED ON ABILITY

Percent of teachers who group students of similar ability levels together

- ■ Yes
- ■ No

35%
65%
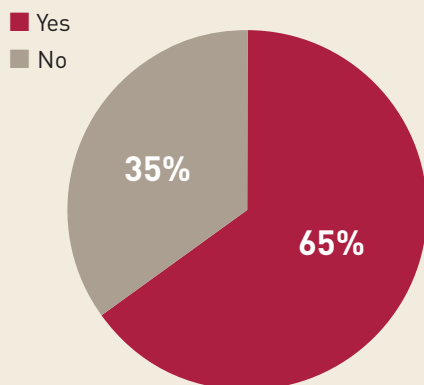
Frequency at which teachers change composition of student groups based on learning

At least weekly — 29%
Once or twice a month — 44%
A few times a year — 22%
Never — 5%
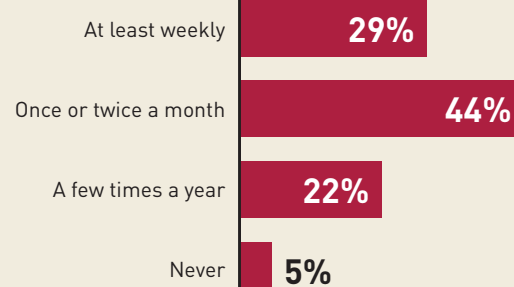
1 *Teachers Know Best: Making Data Work for Teachers and Students,* June 2015.

Personalization Grows in the Earliest Grades

While 31 percent of all teachers report teaching in classrooms in which students work on different content, at different paces, depending on their level of ability, nearly half of teachers say they teach in these sorts of classrooms in the earlier grades. English language arts teachers in grades K–2 (46 percent) and grades 3–5 (48 percent) are most likely to teach in these settings, a trend that was also reflected in the 2013 research. Conversely, and also reflecting an earlier trend, high school math teachers remain least likely to teach in these settings: Just over one in five (22 percent) do so.

But Whole-Class Instruction Consumes Most Classroom Time

Despite these shifts, whole-class or large-group modes of instruction still characterize most classroom teaching.

Teachers spend more time on whole-class or large-group instruction (35 percent of time on average) than any other instructional approach. Teacher-led small group instruction accounts for 19 percent of class time.

Other classroom time is devoted to independent practice, assessment, and tutoring—components of instruction for which numerous digital tools can help teachers meet individual student needs. And yet:

- Teachers spend 16 percent of class time on independent practice without using software, compared to 11 percent of time spent on independent practice using software or digital content.

- Teachers spend another 16 percent of class time on paper-and-pencil assessment, compared to 9 percent of time on computer-based assessment.

- Teachers spend 10 percent of class time on in-person individual tutoring. Four percent of class time is devoted to online tutoring.

Together, these findings suggest that the rollout of digital instructional tools remains uneven.

TEACHERS' USE OF DIGITAL TOOLS

In large numbers, educators believe in the promise of digital tools, but both teachers and their schools remain divided on the role of technology in the classroom—and how to support it.

Growing Confidence in Technology

Teachers are not technophobes. Only 2 percent of teachers say they don't see the value of using technology for student learning, a proportion that has remained steady since our initial research. Almost all teachers (93 percent) regularly use some form of digital tool to guide instruction, according to earlier research in this project.[2] (See the box on p. 14 for more details on the ways teachers use digital tools in the classroom.)

Indeed, the vast majority of teachers not only believe in the value of digital tools and use them regularly, they are equally confident in the tools' potential to be effective across all instructional purposes. Only 12 percent of teachers now say that the digital tools they use most frequently are at least somewhat ineffective at meeting student needs.

Of the digital tools they use most frequently, large majorities of teachers agreed with the following statements:

- This resource is consistent, inviting, and easy for me to use.

- This resource is intuitive and easy for students to use.

- This resource saves me time and is simple to integrate into instruction.

- This resource allows both teachers and students to continually tailor tasks and instruction based on individual student skills and progress.

However, only half or fewer strongly agree in each area, suggesting that existing tools still have room for improvement in usability, complexity, and personalization.

> "Education is turning to technology more and more. It is more important than ever for our students to be technologically advanced. We are preparing them for jobs that do not even exist, so it is important to change with the world and keep integrating new technology into the classroom to keep our students engaged in learning."

But Usage Varies

For all the positive feelings teachers have about digital tools, their actual use varies widely in practice.

Teachers remain evenly split on how they use technology: In almost equal numbers, teachers tell us that digital tools play a primary role in their classrooms (38 percent), a secondary role (34 percent), or no role at all (28 percent).

As seen in the chart on the next page, this split remains consistent in virtually all school settings—at different grade levels, in traditional vs. charter schools, and in urban vs. suburban or rural settings.

Teachers spend the most time (10 hours per week) using digital tools to provide instruction directly to students. Delivering instruction directly to students is also by far the most common primary motivation for teachers' use of digital tools (43 percent identify this as their primary use), although this varies by subject area: 49 percent of social studies teachers consider technology a primary driver for delivering instruction, compared to 39 percent of English language arts teachers. Teachers also devote significantly less time to using technology in other ways, such as for diagnosing student learning needs, which accounts for 4.6 hours per week.

---

2 *Teachers Know Best: Making Data Work for Teachers and Students,* June 2015.
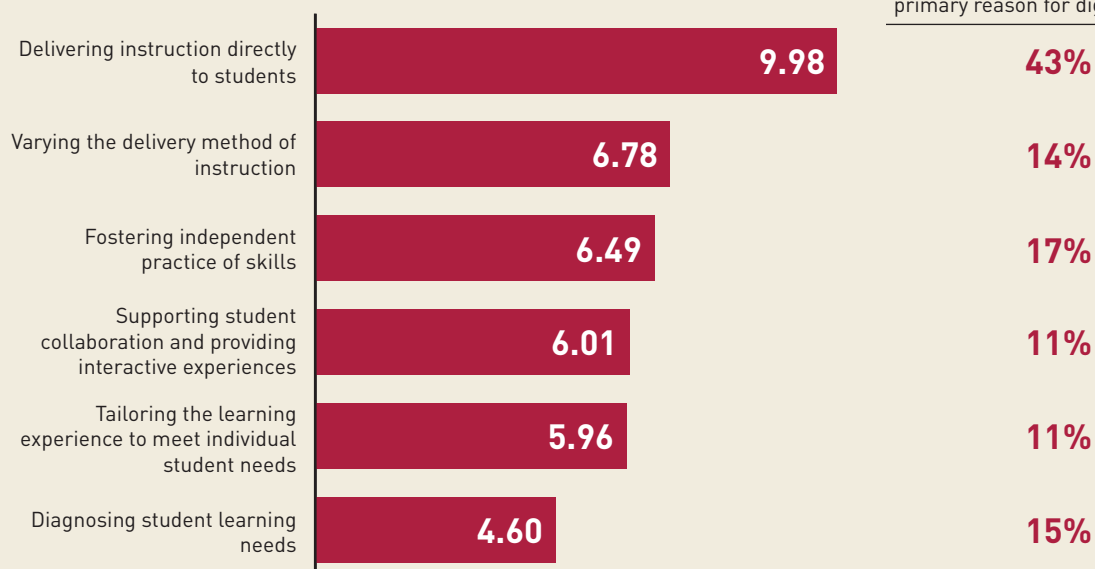
PRIMARY ROLE OR SUPPORTING ROLE?
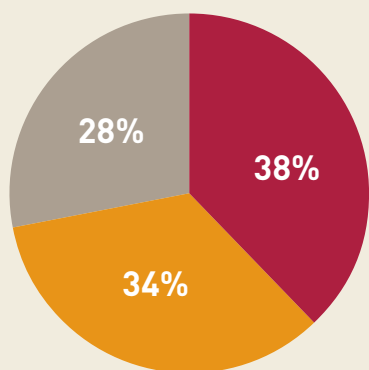
- ■ Technology plays a primary role
- ■ Technology plays a supporting role
- ■ Technology not utilized

	PRIMARY ROLE	SUPPORTING ROLE	NOT UTILIZED
Public School	38%	34%	28%
Charter School	37%	31%	32%
Urban	38%	33%	29%
Suburban	37%	34%	28%
Rural	38%	34%	28%
Under 30 years old	40%	33%	27%
30–39 years old	42%	33%	25%
40–49 years old	37%	34%	29%
50+ years old	34%	34%	32%
<50% Free/Reduced-Price Lunch	38%	34%	28%
>50% Free/Reduced-Price Lunch	38%	33%	29%

DIRECT INSTRUCTION IS MOST COMMON USE

Average number of hours per week teachers estimated using digital tools for instructional purposes inside or outside of the classroom*

Percentage of teachers who say this instructional purpose is the primary reason for digital tool use

	Hours	Primary reason
Delivering instruction directly to students	9.98	43%
Varying the delivery method of instruction	6.78	14%
Fostering independent practice of skills	6.49	17%
Supporting student collaboration and providing interactive experiences	6.01	11%
Tailoring the learning experience to meet individual student needs	5.96	11%
Diagnosing student learning needs	4.60	15%

*Teachers provided open responses and were not bound to the number of hours in a typical work week.

GROWING TEACHER CONFIDENCE IN RESOURCES

A higher percentage of teachers now believe that digital and non-digital resources are available and capable of helping students master subject standards than they did when they responded to our survey two years ago. When teachers say digital tools are insufficient, they are most likely to cite their supplemental nature.

"Having supportive technology is very important in teaching. Technology that matches the core standards is imperative, and digital resources should be easy for students to use as well as for the teacher to implement in the curriculum."

Growing Availability and Impact

Nearly two-thirds of all teachers (67 percent) now think that digital and non-digital resources are available and sufficient[3] to help students master subject standards, up from 55 percent in the 2013 *Teachers Know Best* findings.[4] While the two reports pull from different samples of teachers, both are generally representative of the broader teaching population in the United States. Teacher perceptions of both availability and sufficiency improved from 2013—and dramatically so in some grades and subject areas, as seen in the highlighted areas of the chart at right.

In almost every subject and grade, between 60 percent and 75 percent of teachers now report that resources are available and sufficient to meet their needs. Accordingly, we have seen a narrowing of the *standards gaps*—specific subjects and grades identified in our original research for which resources were not as available, sufficient, or offered in a digital format. We saw statistically significant improvements in availability and sufficiency in grades 3–5 math, across all grade levels in science, in elementary and high school English language arts, and in middle and high school social studies. The standards gap in high school math also improved. In all grades and subject areas, the percentage of teachers citing that standards-aligned resources are not available has dropped to 10% or less.

MORE TEACHERS BELIEVE THEY HAVE SUFFICENT RESOURCES

AVAILABLE AND SUFFICIENT		
	2013	2015
MATH		
K–2	71%	76%
3–5	**63%**	**73%**
6–8	59%	66%
9–12	52%	65%
SCIENCE		
K–2	**49%**	**67%**
3–5	**35%**	**59%**
6–8	**43%**	**64%**
9–12	**51%**	**60%**
ENGLISH LANGUAGE ARTS		
K–2	**58%**	**73%**
3–5	**51%**	**69%**
6–8	54%	61%
9–12	**60%**	**67%**
SOCIAL STUDIES		
6–8	**44%**	**64%**
9–12	**53%**	**69%**

Note: Percentages in red indicate a statistically significant change.

---

3   Teachers defined sufficiency primarily as the degree to which available resources were affordable, were accessible, and fully supported student mastery.
4   *Teachers Know Best: What Educators Want From Digital Instructional Tools,* 2014.

However, within subject areas, teachers still report gaps between grade levels. Math teachers in the later grades, science teachers in grades 3–5 and 9–12, and middle school English language arts and social studies teachers are more likely to report that resources are not available, or that they are available but not sufficient to meet their needs, as seen in the table below.

GAPS VARY BY GRADE AND SUBJECT

	AVAILABLE AND NOT SUFFICIENT	NOT AVAILABLE
	2015	2015
MATH		
K–2	19%	5%
3–5	23%	4%
6–8	26%	8%
9–12	**25%**	**10%**
SCIENCE		
K–2	24%	10%
3–5	**31%**	**10%**
6–8	30%	6%
9–12	**31%**	**9%**
ENGLISH LANGUAGE ARTS		
K–2	22%	6%
3–5	26%	5%
6–8	**31%**	**8%**
9–12	28%	5%
SOCIAL STUDIES		
6–8	**28%**	**8%**
9–12	25%	6%

Significant Gaps in Some Areas

Within the core subject areas, teachers identified specific standards for which resources were either unavailable or available but not sufficient to fully teach the standard. As illustrated in the charts on the next page, particularly in math, the standards most likely to have unavailable or insufficient resources often center on complex tasks or concepts, such as vectors, matrices, and statistical analysis.

By contrast, the standards teachers found most likely to be addressed by available and sufficient resources tended to cover more foundational knowledge, such as the counting sequence, time, addition, subtraction, and multiplication in math. As one teacher said:

> "[I need tools with] more higher-level thinking skills—with lots of practice available on those."

LEAST SUFFICIENT: HIGH SCHOOL MATH RESOURCES

Percentage of teachers who say standards have "available but not sufficient" resources

SUBJECT	GRADE	STANDARDS	PERCENTAGE
Math	9–12	Interpret functions that arise in applications in terms of the context.	43%
Math	9–12	Interpret expressions for functions in terms of the situation they model.	41%
Math	9–12	Model periodic phenomena with trigonometric functions.	41%
ELA	8	Present claims and findings, integrating multimedia components.	39%
Science	9–12	Use, synthesize, and develop models to predict and show relationships among variables between systems and their components in the natural and designed worlds.	39%
ELA	K	Participate in shared research and writing projects.	39%
ELA	5	Draw information from multiple print or digital sources, explain how an author uses reason or evidence to support a point, and integrate information from several texts on the same topic.	39%
ELA	6	Conduct short research projects using several sources, including print and digital sources.	38%
ELA	6	Integrate information presented in different media or formats, trace and evaluate the argument and claims in a text, and compare and contrast an author's presentation of events with another.	38%
ELA	7	Compare and contrast a text to other multimedia sources, and analyze two or more authors writing about the same topic.	37%

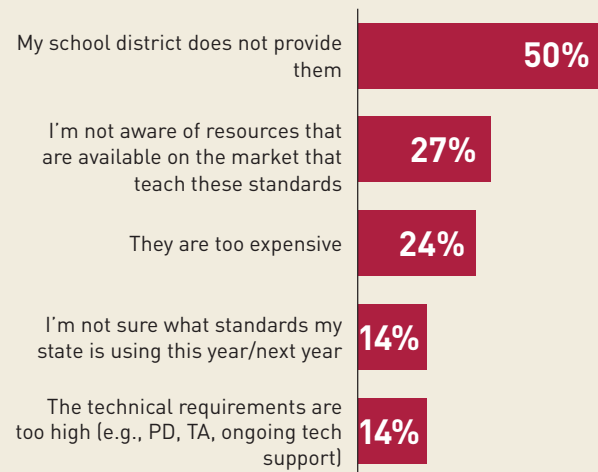## LEAST AVAILABLE: MIDDLE AND HIGH SCHOOL MATH RESOURCES

Percentage of teachers who say standards do not have available resources

SUBJECT	GRADE	STANDARDS	PERCENTAGE
Math	9–12	Represent and model with vector quantities.	20%
Math	9–12	Extend the domain of trigonometric functions using the unit circle.	18%
Math	8	Investigate patterns of association in bivariate data.	18%
Math	9–12	Perform operations on vectors.	17%
ELA	K	With support, explore digital tools to produce and publish writing.	16%
Math	9–12	Translate between the geometric description and the equation for a conic section.	16%
Math	9–12	Perform operations on matrices and use matrices in applications.	16%
ELA	4	Conduct short research projects and draw evidence to support analysis or reflection.	16%
Science	9–12	Obtain, evaluate, and communicate information to evaluate the validity and reliability of the claims, methods, and designs.	16%
Math	6	Develop understanding of statistical variability.	15%

Teachers Identify Key Obstacles ...

While teachers express increasing confidence in digital tools, they say that these tools are included in just 25 percent of the resources they have to teach standards. Half of the teachers say the district does not provide these resources. Other teachers say they are not aware of resources in the marketplace (27 percent) or find digital tools too expensive (24 percent). Their responses suggest that availability, as well as communication about technology among vendors, schools, and teachers, remain primary obstacles.
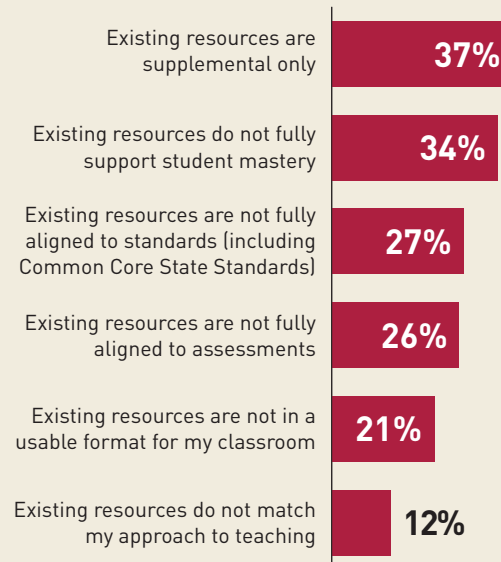
... and Limitations

When teachers say digital tools are not sufficient to meet their needs, they most commonly point to the supplemental nature of the tools available to them (37 percent) or say that the tools do not fully support student mastery (34 percent). Alignment issues—both with standards and assessments—were less commonly cited (27 percent and 26 percent, respectively), while still fewer teachers cited a mismatch in the resources' format or their style of teaching (21 percent and 12 percent, respectively).

KEY BARRIERS: AVAILABILITY, AWARENESS, AND COST

My school district does not provide them	**50%**
I'm not aware of resources that are available on the market that teach these standards	**27%**
They are too expensive	**24%**
I'm not sure what standards my state is using this year/next year	**14%**
The technical requirements are too high (e.g., PD, TA, ongoing tech support)	**14%**

DIGITAL RESOURCES ARE NOT ROBUST ENOUGH TO SUPPORT STUDENT MASTERY

Existing resources are supplemental only	**37%**
Existing resources do not fully support student mastery	**34%**
Existing resources are not fully aligned to standards (including Common Core State Standards)	**27%**
Existing resources are not fully aligned to assessments	**26%**
Existing resources are not in a usable format for my classroom	**21%**
Existing resources do not match my approach to teaching	**12%**

HOW TEACHERS USE DIGITAL TOOLS

Through interviews with educators and students, the original *Teachers Know Best* report identified six ways in which teachers use digital tools to enhance learning, as illustrated in the chart below:[5]

Instructional Purpose		Description	Benefits Sought from Digital Tools
Deliver Instruction		Facilitate delivery of the lesson plan and content	● Aligns with lesson plan and/or Common Core State Standards ○ Enables high degree of teacher control
Diagnose Student Learning		Evaluate class learning progress and adjust lessons	● Demonstrates and/or surfaces gaps in student understanding ○ Enables high degree of teacher control
Vary Delivery Method		Increase class-wide engagement through multimodal instruction	● Makes it easy for students to understand the content ○ Captures greater student attention/engagement
Tailor Learning Experience		Adapt lessons to the needs of individual students	● Adapts pace, content, and/or style to students' personalized needs ○ Allows students to practice independently
Support Student Collaboration and Interactivity		Empower students to collaborate and to take charge of their own learning	● Enables collaboration with student peers ○ Provides high degree of interactivity
Foster Independent Practice		Enable independent practice and student ownership	● Allows students to practice independently ○ Provides additional mode of learning for students

TEACHER-DRIVEN ← → STUDENT-DRIVEN

● Primary benefit sought
○ Secondary benefit sought

Source: 2013 survey of 3,131 public school K–12 teachers across the United States

These six primary instructional purposes are evenly divided between teacher-driven activities (delivering instruction, diagnosing student learning, and varying delivery methods) and student-driven activities (tailoring the learning experience for individual students, supporting student collaboration and interactivity, and fostering independent practice).

---

5 *Teachers Know Best: What Educators Want from Digital Instructional Tools,* 2014.

WHAT TEACHERS WANT FROM DIGITAL TOOLS

Teachers reported having different needs for digital tools depending on the grades and subjects they teach. For example, teachers in the earlier grades are often more likely to rely on these tools to deliver instruction, while those in higher grades more often seek opportunities for student collaboration and independent practice. Teachers' opinions of the relative importance of these six activities varies by subject and grade, as shown in the chart below.

	Grades K–2	Grades 3–5	Grades 6–8	Grades 9–12
Mathematics	● Vary delivery method ● Deliver instruction	● Deliver instruction ● Tailor learning experience	● Foster independent practice ● Vary delivery method	● Support student collaboration ● Diagnose student learning
Science	● Deliver instruction ● Vary delivery method	● Support student collaboration ● Foster independent practice	● Vary delivery method ● Diagnose student learning	● Support student collaboration ● Tailor learning experience
English Language Arts	● Tailor learning experience ● Diagnose student learning	● Diagnose student learning ● Vary delivery method	● Deliver instruction ● Support student collaboration	● Support student collaboration ● Vary delivery method
Social Studies	● Deliver instruction ● Vary delivery method	● Tailor learning experience ● Deliver instruction	● Support student collaboration ● Foster independent practice	● Vary delivery method ● Diagnose student learning

Source: 2013 survey of 3,131 public school K–12 teachers across the United States

Much as school contexts differ greatly, product developers must also remain cognizant of these key differences in how teachers in different grades and subjects believe technology can play the strongest role in their classrooms.

EVOLVING TEACHER PERCEPTIONS OF THE EFFECTIVENESS OF DIGITAL TOOLS

More teachers now think digital tools are effective than did the teachers surveyed two years ago. While teachers think these resources are most effective for enrichment, they believe they have the potential to be useful in all areas of instruction.

> "Using digital resources can really help students visualize many things in science, rather than relying on verbal descriptions. It can also help to quantify certain concepts that would be more difficult and time consuming otherwise."

As mentioned earlier, only 12 percent of teachers now say that the digital tools they use most often are ineffective at meeting students' learning needs. A clear majority (59 percent) across subject areas find them effective. In 2013, only 54 percent of teachers, on average, found the products they used frequently to be effective.[6] That improvement is even more dramatic in some subjects and grades, as shown in the chart on the right.

While perceptions of effectiveness have improved overall, teachers found the digital resources they use most frequently to be less effective in certain grades than others in specific subject areas. For example, math teachers in grades K–5 were more likely to find the digital resources they use most often to be effective than their counterparts in middle and high school, although the percentage of teachers in the higher grades who consider the resources they use most frequently to be effective has increased since 2013. And high school social studies teachers were less likely to consider the resources they use most frequently to be effective than their counterparts in middle school.

6   *Teachers Know Best: What Educators Want From Digital Instructional Tools,* 2014.

DIGITAL TOOLS EFFECTIVELY SUPPORT STUDENT LEARNING IN MOST GRADES AND SUBJECTS

How teachers rate digital tool effectiveness at meeting students' learning needs

- Effective/ Very effective
- Somewhat effective
- Somewhat ineffective
- Ineffective/ Very ineffective
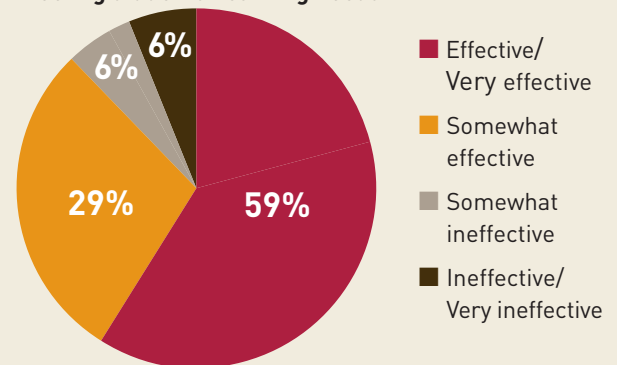
	EFFECTIVE/ VERY EFFECTIVE		INEFFECTIVE/ VERY INEFFECTIVE	
	2013	2015	2013	2015
MATH				
K–2	60%	60%	5%	7%
3–5	58%	61%	4%	6%
6–8	**46%**	**56%**	7%	7%
9–12	49%	54%	6%	7%
SCIENCE				
K–2	56%	61%	4%	9%
3–5	57%	59%	5%	5%
6–8	60%	66%	5%	6%
9–12	**54%**	**63%**	7%	8%
ENGLISH LANGUAGE ARTS				
K–2	53%	57%	6%	6%
3–5	60%	58%	1%	7%
6–8	59%	59%	7%	7%
9–12	59%	56%	4%	5%
SOCIAL STUDIES				
6–8	61%	63%	4%	6%
9–12	55%	52%	3%	5%

Note: Percentages in red indicate a statistically significant change.

Digital Tools Most Effective for Enrichment

Teachers believe digital tools have the potential to be effective in all areas of instruction. Teachers ranked their potential to effectively vary the delivery method of instruction most highly (68 percent believe they have the potential to be either effective or very effective), followed by fostering independent practice of specific skills (64 percent), tailoring the learning experience to meet individual student needs (62 percent), delivering instruction directly to students (59 percent), and supporting student collaboration and providing interactive experiences (58 percent). Just over half of all teachers (52 percent) believe digital tools have the potential to diagnose student learning needs, as seen in the chart below.

DIGITAL TOOLS ARE EFFECTIVE FOR MOST INSTRUCTIONAL PURPOSES

■ Very effective ■ Effective ■ Somewhat effective ■ Somewhat ineffective ■ Ineffective ■ Very ineffective

	Very effective	Effective	Somewhat effective	Somewhat ineffective	Ineffective	Very ineffective
Varying the delivery method of instruction	32%	36%	23%	5%	1%	2%
Fostering independent practice of specific skills	27%	37%	26%	5%	2%	2%
Tailoring the learning experience to meet individual student needs	25%	37%	28%	6%	2%	2%
Delivering instruction directly to students	23%	36%	29%	6%	3%	3%
Supporting student collaboration and providing interactive experiences	23%	35%	29%	7%	2%	3%
Diagnosing student learning needs	20%	32%	34%	9%	3%	2%

Teachers believe digital tools they use most often are most effective for enrichment activities, with more than half (54 percent) identifying them as effective in this role. Nearly as many (47 percent) consider them effective for core instruction. As one teacher told us:

> *"Enrichment and practice are always my emphasis. Being able for them (and me) to see their progress is a plus."*

However, only one in three teachers (33 percent) believe digital tools they use most often are effective for remediation.

Core	47%
Enrichment	54%
Remediation	33%

HALF OF TEACHERS BELIEVE THAT DIGITAL TOOLS ARE EFFECTIVE FOR CORE INSTRUCTION AND ENRICHMENT ACTIVITIES
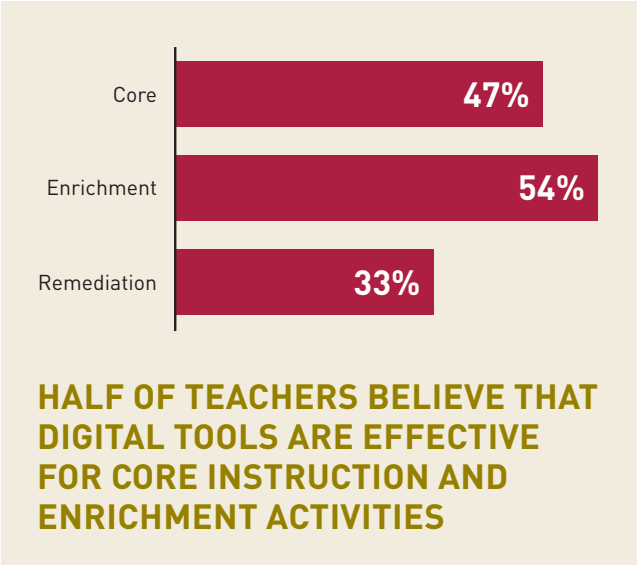
While teacher perceptions of effectiveness continue to evolve, these findings suggest room for improvement among existing digital learning tools, particularly those focused on diagnosing student learning needs and remediation. As one science teacher told us:

> *"I can find plenty of online videos. However, I have not been able to find a program that checks a student's understanding of the content. There are testing apps, but none that can be modified based on a student's level. I need a science program with more remediation."*

MIND THE GAP

Among key gaps in different grade levels and subjects:

ELA. Across all grades, less than 60 percent of ELA teachers report the digital tools they use frequently to be effective. Middle school ELA teachers are least likely to have access to sufficient digital and non-digital resources to meet the standards.

SOCIAL STUDIES. Middle school social studies teachers are more likely to report that digital and non-digital resources are not available and sufficient to meet the standards. High school social studies teachers are more likely to rate the digital tools they use frequently as less effective.

MATH. Math teachers in high school are more likely to report that the digital and non-digital resources are not available and sufficient to meet the standards. They also are more likely to perceive the digital tools they use frequently to be less effective.

SCIENCE. K–5 science teachers are more likely to find the digital tools they use frequently to be less effective, while those in grades 3–5 and 9–12 are more likely to say that digital and non-digital resources are not available and sufficient to meet the standards.

SCHOOL ENVIRONMENT AND TEACHER CHOICE AS CONTINUING BARRIERS TO ADOPTION

Teachers identified ongoing—and vast—variations in individual schools' commitment to technology. Teachers also don't choose most of the technology they use in their classrooms—but are still largely responsible for incorporating it into their teaching.

"More teacher input is necessary in order to better utilize the appropriate technologies in the classroom. Too often administrative decisions are made without the serious consideration of the valuable input of teachers and students—those directly impacted by decision makers."
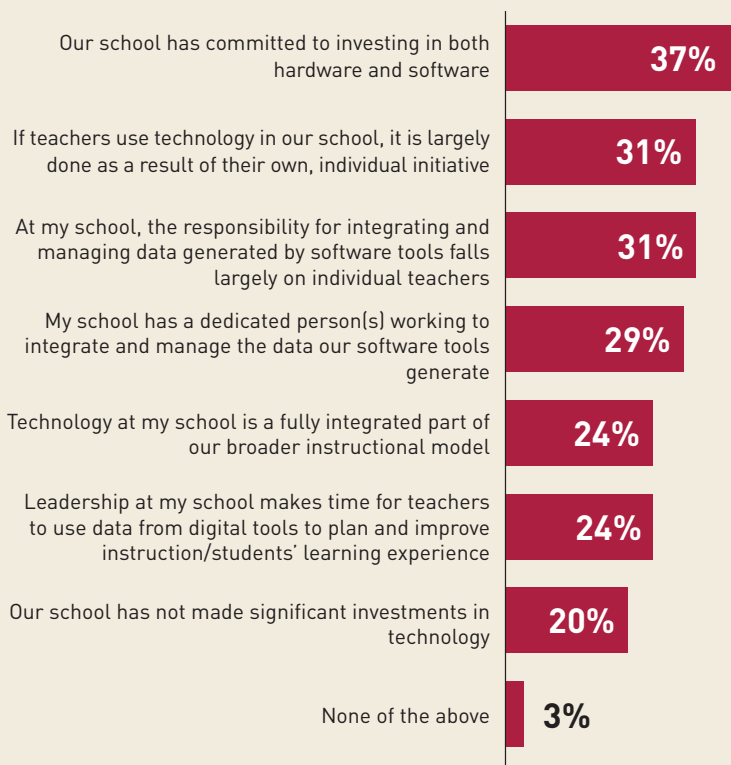
Schools' Commitment to Technology Varies Widely

Surveyed teachers reported wide variations in the commitment to technology at individual schools. Over one-third (37 percent) of teachers say their school has committed to investing in hardware and software, but one in five (20 percent) say their school has not made a significant investment in technology.

Between these two extremes, however, teachers also report other variations in how their schools view technology:

- Teachers are almost equally likely to report that they are on their own—that they must take their own initiative to use digital tools or that the responsibility for integrating and managing data generated by software tools falls on them—as they are to say that their school has dedicated staff working to integrate and manage the data the software tools generate (31 percent vs. 29 percent).

SCHOOLS OFFER VARIED SUPPORT

Our school has committed to investing in both hardware and software	**37%**
If teachers use technology in our school, it is largely done as a result of their own, individual initiative	**31%**
At my school, the responsibility for integrating and managing data generated by software tools falls largely on individual teachers	**31%**
My school has a dedicated person(s) working to integrate and manage the data our software tools generate	**29%**
Technology at my school is a fully integrated part of our broader instructional model	**24%**
Leadership at my school makes time for teachers to use data from digital tools to plan and improve instruction/students' learning experience	**24%**
Our school has not made significant investments in technology	**20%**
None of the above	**3%**

- While nearly four in 10 teachers (37 percent) say their schools have made commitments to investing in technology, only one in four (24 percent) report that technology is a fully integrated part of the school's broader instructional model, or that leadership allots time for teachers to use data from digital tools to plan and improve instruction and student learning.

The Implementation Dilemma

Many teachers face a dual challenge working with digital tools in their classrooms. They don't choose most of the products they use, yet they are still often responsible for finding ways to incorporate them into their teaching.

- Less than 20 percent of teachers (18 percent) select most of the education technology they use.

- The majority of teachers (51 percent) select between 10 percent and 50 percent of the education technology they use.

- Nearly one-third of all teachers (31 percent) select almost none of the education technology they use (fewer than 10 percent).

As one teacher told us:

> "Districts need to give the teachers a chance to check out the technology before the school buys it. The district needs to learn the teachers' needs before they just purchase a product."

Along with limited control over selection, many teachers report limited support for the tools they are required to use—a trend which appears again to vary widely across individual schools. As noted above, nearly one-third (31 percent) of teachers say the responsibility to integrate and manage data generated by software tools largely falls on individual teachers. An equal number say they must take their own initiative to use digital tools. However, nearly as many (29 percent) can point to a dedicated person (or people) on staff responsible for integrating and managing the data generated by digital tools. These disparities suggest a landscape that remains highly fragmented between schools that have begun to embrace digital tools and those that have not.

MOST TEACHERS DON'T HAVE MUCH CHOICE

I/my fellow teachers choose...

- More than 50% of the education technology we use
- 30–50% of the education technology we use
- 10–30% of the education technology we use
- Less than 10% of the education technology we use
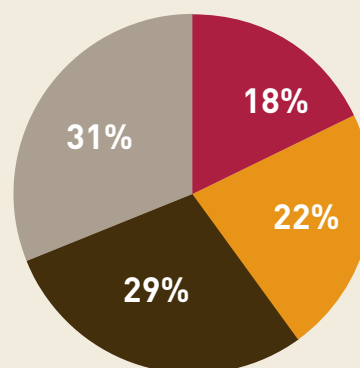
WHEN TEACHERS SELECT RESOURCES

While the majority of teachers select half or less of the digital tools that they use in the classroom, when they do select tools, they rely on a variety of information sources. They cite cost-effectiveness, ease of integration, and personalization as key factors—and they are more likely to think the tools they use meet their needs.

TEACHER AND ADMINISTRATOR RECOMMENDATIONS COUNT

I choose products recommended to me by other teachers	**56%**
I choose products recommended to me by my principal and other administrators	**47%**
I choose products on my own	**37%**

Teachers learn about the products they decide to use through professional development (60 percent), conferences (44 percent), and general purpose online search engines such as Google or Bing (42 percent).
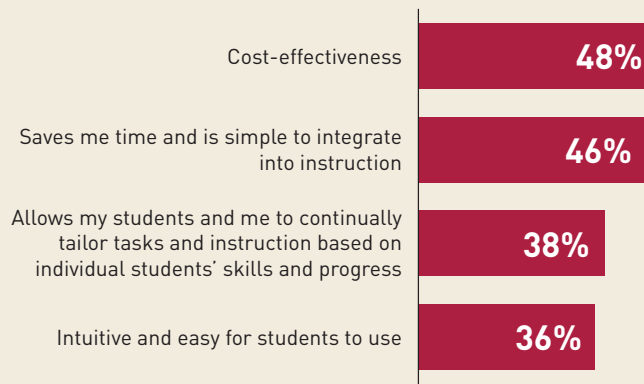
However, most choose products recommended by the people they trust most—either other teachers (56 percent) or the principal or other school administrators (47 percent). As one teacher told us:

> *"There are so many digital resources out there, I am lost as to which ones are good. I usually try things that some of the more technology-knowledgeable people I teach with [use]."*

Just over one-third of teachers (37 percent) choose products on their own. And fewer still take advantage of education-specific online resources such as Graphite and EdSurge,[7] each of which features extensive online reviews of edtech, to research digital tools (17 percent).

When teachers look for digital tools on their own, cost-effectiveness (48 percent) and ease of integration (46 percent) were cited as the most important factors in the decisions they make. They also seek tools that allow them and their students to continually tailor tasks and instruction based on each student's skills and progress (at 38 percent, the third-most frequently cited task, followed by ease of use at 36 percent).

COST AND EASE OF USE COUNT

Cost-effectiveness	**48%**
Saves me time and is simple to integrate into instruction	**46%**
Allows my students and me to continually tailor tasks and instruction based on individual students' skills and progress	**38%**
Intuitive and easy for students to use	**36%**

And when teachers are given the opportunity to select more of their resources, they are significantly more likely to find those tools available and sufficient to meet their needs. Nearly three-quarters (74 percent) of teachers who select 30 percent or more of their digital tools say that digital and non-digital resources are available and sufficient to teach subject standards, compared with 62 percent of those who select less than 30 percent of their tools.

---

7   The Bill & Melinda Gates Foundation has made investments in both of these online resources.

Access Remains a Key Barrier

> *"There are so many digital resources available, many at not much cost, but schools have to have the technology to support it."*

As suggested by the wide variation in school environments, the top barriers teachers say they face in using more digital tools center on issues related to access:

- Nearly half (42 percent) say students do not have sufficient access to technology outside of the classroom. As one teacher said:

> *"Wealthier students have the resources to fill the gap left by many public schools with inadequate funding, but students living in lower socioeconomic circumstances don't have that advantage."*
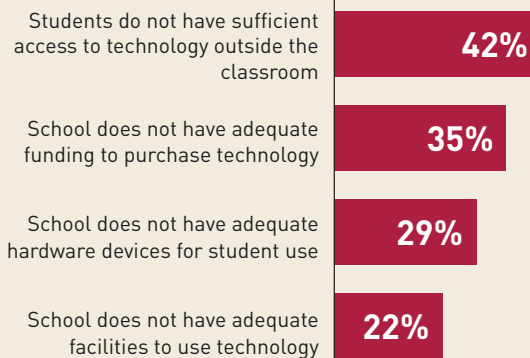
- More than a third (35 percent) say their schools lack adequate funding to purchase technology.

- Roughly three in ten (29 percent) say their schools do not have adequate hardware devices for students, while more than two in ten (22 percent) say their schools lack adequate facilities to use technology.

Conversely, teachers cited significantly fewer barriers related to their instructional approach, such as discomfort with using technology for teaching or the perception that doing so is challenging or inconvenient. Fewer still cited availability and sufficiency as key barriers, as seen in the graphic on the right.
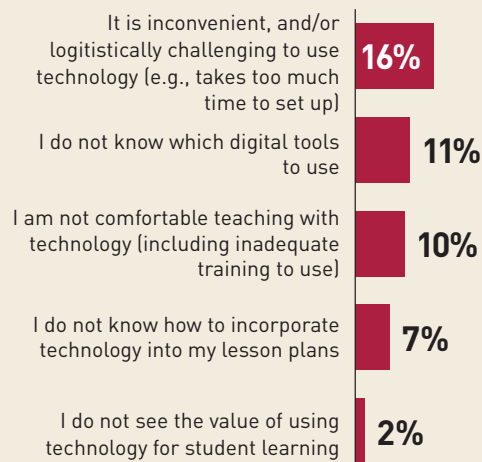
Teachers' perceived barriers again confirm an ongoing challenge for technology adoption in our nation's schools. While teacher confidence and comfort with digital tools continues to grow, for many the reality is that their schools and districts have yet to make the commitments required to bring new technology into the classroom.
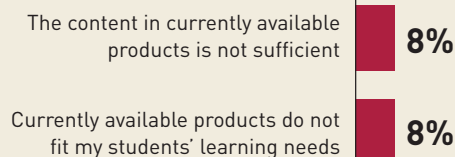
ACCESS IS THE LARGEST BARRIER

BARRIERS RELATED TO ACCESS

Barrier	%
Students do not have sufficient access to technology outside the classroom	42%
School does not have adequate funding to purchase technology	35%
School does not have adequate hardware devices for student use	29%
School does not have adequate facilities to use technology	22%

BARRIERS RELATED TO TEACHERS

Barrier	%
It is inconvenient, and/or logitistically challenging to use technology (e.g., takes too much time to set up)	16%
I do not know which digital tools to use	11%
I am not comfortable teaching with technology (including inadequate training to use)	10%
I do not know how to incorporate technology into my lesson plans	7%
I do not see the value of using technology for student learning	2%

BARRIERS RELATED TO CONTENT

Barrier	%
The content in currently available products is not sufficient	8%
Currently available products do not fit my students' learning needs	8%

One-to-One Learning Remains Out of Reach for Many

Perhaps nowhere are these access-related barriers more evident than in the one-to-one learning space, where interest in digital tools that promote personalized learning is tempered by limited access to the hardware needed to use them.
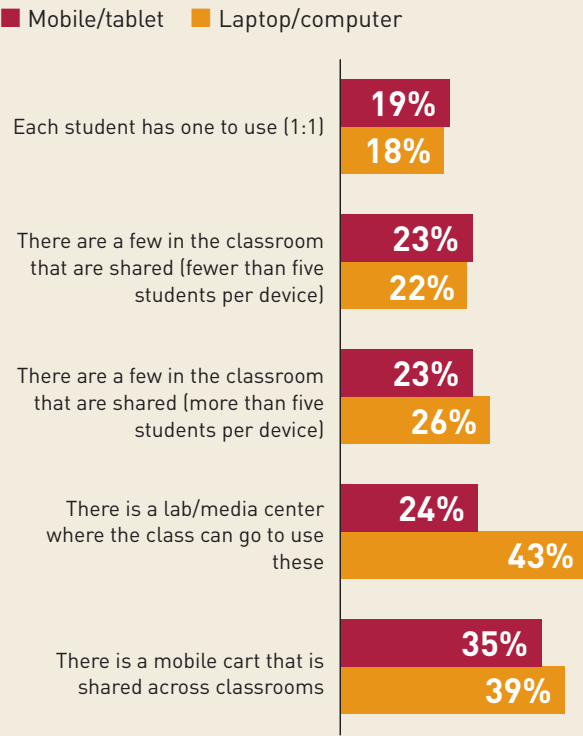
Growing numbers of teachers report they have access to the types of equipment that facilitate 1:1 learning—55 percent say they now use mobile devices and tablets in the classroom. However, just 19 percent of teachers who use these devices say their schools provide individual mobile devices or tablets to students for 1:1 learning—a trend which also holds true for 1:1 implementation of laptops (18 percent).

Instead, a plurality of teachers who use these devices in their classroom (35 percent) say tablets and mobile devices are located in carts for part-time use, while a quarter (24 percent) point to a lab or media center where students can go to use them. Some 46 percent of teachers who use these devices also reported having some mobile devices or tablets to share in their classrooms, with an even split between having more than five students per device and having fewer than five students per device (23 percent each).

When looking at where most schools have made technology investments, most teachers still point to more traditional tools that are often used to facilitate whole-class or large-group instruction. The most commonly used hardware by teachers remain projectors (76 percent), laptops (72 percent), and interactive whiteboards (69 percent). As one teacher put it:

> *"We do not have iPads in our classroom. We do not have Smart Boards. I have a projector and two old computers. That makes up the technology available to my 20 students."*

FEW CLASSROOMS USE 1:1 DEVICES

■ Mobile/tablet ■ Laptop/computer

	Mobile/tablet	Laptop/computer
Each student has one to use (1:1)	19%	18%
There are a few in the classroom that are shared (fewer than five students per device)	23%	22%
There are a few in the classroom that are shared (more than five students per device)	23%	26%
There is a lab/media center where the class can go to use these	24%	43%
There is a mobile cart that is shared across classrooms	35%	39%

Fewer than 20% of teachers who use mobile devices, tablets, laptops, or computers say they have 1:1 devices for their students.

Perceptions Differ in Tech-Forward Schools

While barriers involving access suggest ongoing challenges to teachers' adoption of digital technology, the situation is very different in "tech-forward" schools. As described in our previous research,[8] these schools are ones that make investments in technology and encourage teachers to integrate digital tools into instruction—and provide support, including dedicated staff, to help them do so. They typically have technology-proficient principals, create dedicated time for teachers to make use of data, and give teachers the flexibility to choose their own tools.

The impact on teachers' perceptions and use of digital tools is significant:

● In tech-forward schools, teachers report spending more time using technology in a primary role in the classroom (46 percent of the time, compared to 31 percent of time spent by their peers in other schools).

● Teachers in tech-forward schools are far less likely to say that their schools lack access to adequate hardware devices for student use (14 percent, compared to 61 percent in other schools).

● Teachers in tech-forward schools select more of their digital tools than their peers elsewhere (35 percent select at least half of the digital tools they use, compared to 22 percent of teachers in other schools).

● Teachers in tech-forward schools are significantly more likely to learn about digital tools through professional development than their peers in other schools (89 percent vs. 68 percent, respectively).

● Teachers in tech-forward schools are more likely to consider using digital tools to continually tailor tasks and instruction to individual student needs and progress (54 percent, compared to 37 percent of teachers in other schools).

● Teachers in tech-forward schools are significantly more likely—between 10 percent and 25 percent more likely than their peers at other schools—to perceive digital tools as effective across the full range of instructional uses identified on p. 14.

● And they are dramatically more likely to believe there are no barriers to using technology to help their students learn— 33 percent, compared to 3 percent in other schools.

These findings reinforce the importance of making the kinds of investments in technology that can foster a tech-forward environment in individual schools—one that is supported by leaders who understand and can guide the implementation of technology in the classroom and provide the time, staffing, and resources to support it. As one teacher told us:

"I think that districts need to be more proactive in making the digital resources available to teachers. They also need to provide better in-servicing about the technology and how it can be applied to the classroom. Last, we need a dedicated person to help support the implementation."

---

8   *Teachers Know Best: Making Data Work for Teachers and Students,* June 2015.

AREAS FOR FURTHER STUDY

The results for this year's study are still being analyzed. We plan on sharing further insights about specific aspects of this research in 2016, including more details about gaps in areas important to teachers and the characteristics of tech-savvy educators, that can help us better understand ways to support the successful adoption of digital tools for personalized learning.

Nor is our work done. The field as a whole—product developers, schools, educators, investors, and funders—needs to better understand teacher needs in several important ways, including:

- **Product effectiveness.** What makes a digital tool effective? How can the field identify the characteristics that indicate that a tool in development will contribute to student learning gains? What measures of effectiveness should be used to evaluate tools? How can the field better understand the wide variety of use cases, instructional purposes, and contexts for digital tools in the classroom? And finally, how can understanding the ways different students interact with digital tools help support the broader shift to personalized learning?

- **Teachers as purchasers.** Given the limited opportunities for teachers to select digital tools, what are ways to get teachers more involved in decision-making? What information do educators need, aside from recommendations from the people they know, to make good decisions? How can teachers better take advantage of existing resources such as EdSurge and Graphite? And when teachers are given more autonomy—or funding—to choose or purchase resources for their classroom, what drives them to select digital instructional tools over other resources?

- **The voice of students.** What do students think of digital instructional tools and the shift towards more personalized learning in the classroom? In what learning contexts do they prefer to use digital tools, and in what contexts do they find traditional instructional methods more helpful? How do they use digital tools that allow them to track their progress and tailor what they are doing based on their learning needs?

- **Involving teachers and students in product development.** How can the field ensure that the factors valued most by teachers and students are incorporated into future product design? In what ways can product development focus on the user experience for students and teachers that will speed the adoption of technology in the classroom? How can developers tighten the feedback loop between coding and the classroom? To what extent can developers better understand what information about each student's progress best suits the needs of those students and their families?

CONCLUSION AND RECOMMENDATIONS

As with previous *Teachers Know Best* reports, this research reflects teachers' insights about the use of digital tools across the full range of instruction in the classroom. It also identifies areas of challenge and frustration for educators—in particular, the limited information and ability to choose effective digital products for their own classrooms.

As part of its ongoing outreach to education technology developers, the foundation's companion website to this research, TeachersKnowBest.org, will feature more in-depth data from the research as it becomes available, along with existing resources for developers and interviews with a wide range of teachers who provide real-life examples of their needs and challenges.

Through this research and ongoing efforts, the foundation hopes to elevate the voices of educators about what they need and spark conversation among the developer community, teachers, school leaders, and other supporters of public education.

The recommendations for product developers, district and school leaders, teachers, funders, and investors made in earlier *Teachers Know Best* reports continue to offer our best guidance, grounded in the research, for ways the field can make technology more responsive to teachers' needs and speed its adoption in the classroom. Based on our current findings, we add to that guidance a small number of additional, more specific, recommendations:

Product Developers

● Teachers need core resources, a sentiment backed up by their perception of the supplemental nature of many digital tools and the belief that they are less useful for remediation than other classroom purposes. Product developers should continue to work to fill perceived gaps in the market—in part by identifying and addressing specific standard, subject, and grade-level needs cited by teachers.

● Developers should make their feedback process more transparent. Following the lead of their counterparts in other sectors, support and feedback could be driven by open, online communities in which teachers and developers collaborate to identify and resolve issues and iterate on improvements.

District and School Leaders

● District leaders must find ways to address the digital divide. Without ensuring equal access to technology in all schools and classrooms, learning gaps are likely to increase as digital tools become a more integral part of classroom instruction. Equity must also be considered in digital instruction plans, as teachers will be less likely to embrace the use of digital tools and more personalized instruction if they feel that they do not equally benefit all students.

● District leaders should ensure that they better understand how teachers will use the digital tools they are considering for implementation—and create avenues to help teachers become more directly involved in school- and district-level technology decisions.

Teachers

● Educators should familiarize themselves with resources like Graphite and EdSurge that provide information not just about digital tools, but also the strategies that align those tools to the most effective instructional purposes. Doing so can help ensure that a digital tool that other educators have found effective is used effectively in their own classrooms as well.

● Educators should provide feedback to developers of the digital tools they use most. Doing so will close the feedback loop and speed ongoing improvements.

Funders and Investors

● Given the continued prevalence of access-related barriers to technology adoption, funders and investors should identify ways to address school and educator needs. Doing so involves not just supporting the improvement of access to digital tools, but also the hardware required for students and teachers to use them, as well as the training and professional development needed for them to be used effectively and for teachers to become more engaged technology consumers in their classrooms.

TEACHER VOICES

As part of our research, more than 3,100 teachers nationwide shared their insights and opinions about the value of digital instructional tools. Their comments on the state of educational technology speak to the areas in which they think digital tools have the greatest potential, as well as ways that technology providers and school leaders can improve the use of digital tools. The selection of quotes below was taken from almost 1,400 free responses from our teacher survey.

"Whatever resources [students] use need to be accessible from anywhere; able to be modified for difficulty by students on the fly; available to students who do not have consistent internet access."

"Digital resources tend to be 'one size fits all.' A more flexible approach would be welcome."

"Teacher collaboration would encourage the sharing of technology tips and more effective integration."

"In my school, language barriers make it difficult for students to learn and show what they know. I would like to see digital tools which help with language translation."

"There are so many digital resources available, many at not much cost, but schools have to have the technology to support it."

"Teachers need the tim e to practice and see the use of digital resources modeled in a classroom."

"Digital resources often don't integrate with one another. This, to me, is the single most frustrating thing about them. I have classroom clickers that allow students to take quizzes with a remote control. Love it! The data is hard to integrate into our school's online grading program. Hate it! The disconnect is nearly universal and very frustrating. Fix that, and you've got a big one out of the way."

"Get teachers in the room on [technology] presentations, not just principals and superintendents."

"Digital resources are exciting tools that captivate and connect with students, motivating them to become independent learners, responsible for their own growth and learning. But due to varying abilities of students with technology and their degrees of proficiency, some data is skewed and does not provide a true read of student ability as much as observation and interacting with the student does."

"The three biggest opportunities to develop future digital resources are more specialization to each child's unique abilities, more customization on the part of the teachers to make the tool more accessible to a larger population of students, and more variety in what technology can do for students."

"Digital resources that can be easily tailored to students with severe cognitive delays [and] used with students with physical disabilities."

"I am always excited to learn about new technology, but overwhelmed at how much there is out there. It is hard to find time to research it all, especially all the new education apps."

"I think there should be more opportunity to bring digital tools together with physical tools and labs in science. Lots of tablets are great, but the money has been taken away for real physical laboratory supplies."

"I would love to see more apps/software available for keeping track of data… Our kids sometimes see several different teachers, and I would love to have a way for everyone to access the data easily."

"Have resource companies actually enter classrooms and observe the kids working with their resources."

"It would be fantastic to have tools that not only support math, but also support the integration of disciplines, something that would align with STEM/STEAM learning objectives (example: developing models to solve problems)."

"Digital tools need to be easier to use and have only one login for all platforms. Having to make students sign up and create different user names and passwords for each platform is prohibitive."

"The three biggest opportunities to develop future digital resources are reading intervention, math intervention, and homework assistance for individual studies."

"Digital resources should ideally be web-based, so they can be accessed on a variety of platforms and equipment. They should have teacher components as well as student areas, and should allow teachers to track student progress. Due to limited education budgets, digital resources should be available at little or no cost, and preferably in all three languages used for education in North America (English, Spanish, French)."

"[Technology] companies themselves should come out and schedule in-service time with teachers so we can be better trained on their products."

"Make absolutely sure that real classroom teachers are involved in the development of new resources."

BILL&MELINDA GATES *foundation*

Guided by the belief that every life has equal value, the Bill & Melinda Gates Foundation works to help all people lead healthy, productive lives. In developing countries, it focuses on improving people's health and giving them the chance to lift themselves out of hunger and extreme poverty. In the United States, it seeks to ensure that all people—especially those with the fewest resources—have access to the opportunities they need to succeed in school and life. Based in Seattle, Washington, the foundation is led by CEO Sue Desmond-Hellmann and Co-chair William H. Gates Sr., under the direction of Bill and Melinda Gates and Warren Buffett.

For additional information on the Bill & Melinda Gates Foundation, please visit our website: www.gatesfoundation.org.

NOVEMBER 2015