Wi-Fi Woes:

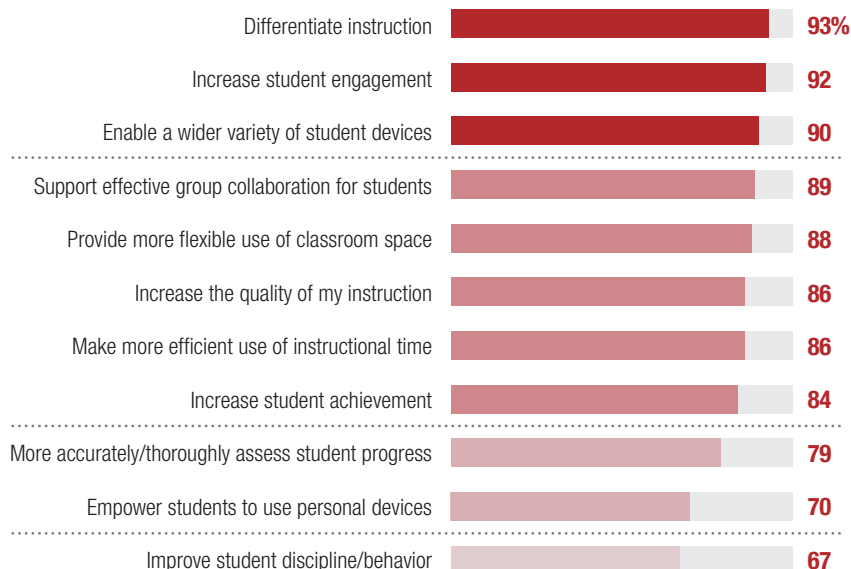## HOW MEDIOCRE WI-FI INTERFERES WITH INSTRUCTION IN AMERICAN SCHOOLS

Teachers Believe Wi-Fi has Educational Value

Teachers view Wi-Fi access is a core component of teaching and learning. The vast majority said that wireless access was an effective way to accomplish key educational objectives such as increasing student achievement, boosting student engagement, differentiating instruction, and improving the quality of teaching.

That's the good news.

Now for the bad.

INTRODUCTION

Wireless internet access used to be a luxury item for K-12 schools. But in recent years, it has gone from an extravagance to an essential.

A **2015 report** from the Consortium for School Networking found that 99 percent of school systems had installed wireless internet access in their high schools in 2015, as compared to 57 percent two years earlier. Elementary and middle schools aren't far behind.

It is clear that the technology has changed and that the change has been fast.

But what about teaching and learning? Have they kept pace?

In November of 2015, the Education Week Research Center set out to explore these and other questions by polling a group of people uniquely qualified to respond. The online survey was taken by 700 self-identified classroom teachers who were randomly sampled from registered users of edweek.org. The results are not statistically representative, and, as with any survey, the number of teachers who responded to any particular question varied (from 514 to 734.) But the sizeable and diverse sample included a range of school locales, poverty rates, and grade levels, as well as nearly every state in the nation.

And, collectively, the results consistently pointed to the same disturbing trend:

Although the teachers strongly value the use of Wi-Fi for instruction, the Wi-Fi they have in their schools is just not getting the job done in the classroom.

Percentage of Teachers Who Say that School Wi-Fi is an Effective Way to:

Differentiate instruction	**93%**
Increase student engagement	**92**
Enable a wider variety of student devices	**90**
Support effective group collaboration for students	**89**
Provide more flexible use of classroom space	**88**
Increase the quality of my instruction	**86**
Make more efficient use of instructional time	**86**
Increase student achievement	**84**
More accurately/thoroughly assess student progress	**79**
Empower students to use personal devices	**70**
Improve student discipline/behavior	**67**

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Existing Wi-Fi Is Not Meeting Educational Needs

The results of the new **Ruckus Wireless Confidence Index** raise serious questions about whether current school wireless configurations can provide the level of service teachers need to accomplish educational objectives.

The Index is based on the average percentage of teachers expressing "a great deal" or "quite a lot" of confidence that their school wireless can meet five different objectives related to student achievement and assessment. The objectives capture whether a school's Wi-Fi:

● Provides glitch-free access during high-stakes online testing.

● Supports the closure of achievement gaps between higher and lower-performing student groups.

● Provides the support students need to meet state or common standards.

● Supports individual students' academic progress over time.

● Provides the level of online access students need in order to be prepared for college and/or careers.

Index results indicate that just 38 percent of teachers have confidence that their schools' wireless can provide the level of service necessary to meet these goals. Confidence levels fell below 50 percent for each of the five objectives, not just for the index as a whole.
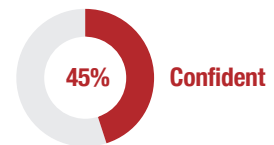
Of the five objectives, teachers were *least* confident that their school wireless could provide glitch-free access during high-stakes online testing. They were *most* confident that it could provide the level of online access students need in order to be prepared for college and/or careers.
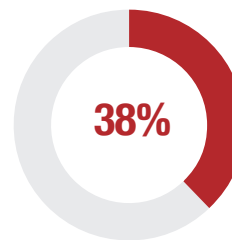
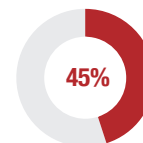**38%** **Ruckus Wireless Confidence Index Total Score**

The Index is based on the percentage of teachers confident their school Wi-Fi can provide a level of access sufficient to:

Prepare students for college and/or careers — **45%** **Confident**
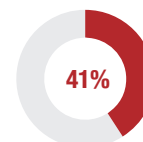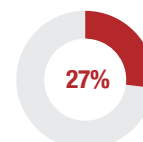
Support student academic progress over time — **45%**

Help students meet state or common standards — **41%**

Support the closure of achievement gaps — **33%**

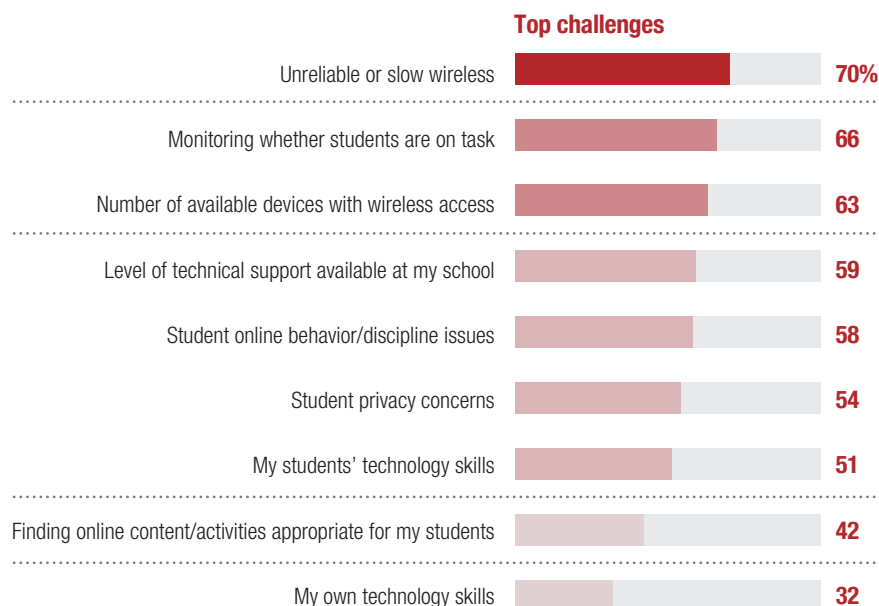Provide glitch-free access during high-stakes online testing — **27%**

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Technology, Not the Teacher, Is Top Wi-Fi Challenge

Why do these teachers lack confidence that their school wireless can support student achievement and assessment? The survey asked about the level of challenge of nine school Wi-Fi problems. Teachers' technological skills were not a major challenge. Neither was the availability of online content appropriate for students. Instead, the top challenges were mainly technical, not instructional. Unreliable or slow connections were the number one problem. Top five challenges also included the number of available devices with wireless access and the level of technical support at school.

Percentage of teachers who say the following considerations are challenging when using wireless internet access for instructional purposes in class this school year:

Top challenges

Consideration	Percentage
Unreliable or slow wireless	70%
Monitoring whether students are on task	66
Number of available devices with wireless access	63
Level of technical support available at my school	59
Student online behavior/discipline issues	58
Student privacy concerns	54
My students' technology skills	51
Finding online content/activities appropriate for my students	42
My own technology skills	32

Wireless GPA Report Card

Digging specifically into the quality of school Wi-Fi, the survey asked teachers to assign a letter grade (A-F) for the reliability, coverage, and speed of their campus wireless. Just 15 percent assigned an overall grade of A across all areas. The average school "wireless GPA" was a C.

Wireless GPA overall grade

Reliability/ consistency of connections

Speed

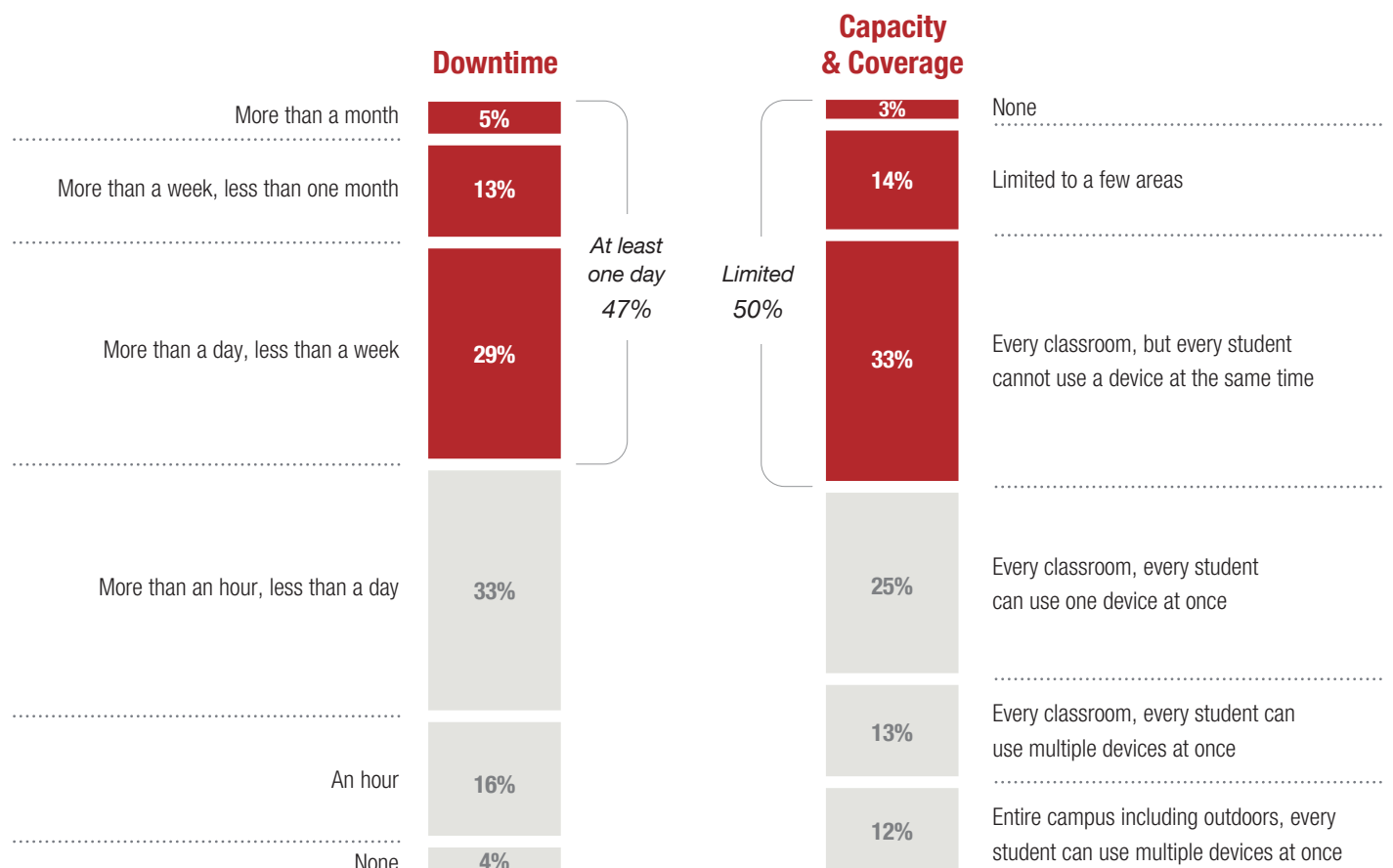**Coverage (of all areas of my campus)**

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School Wireless Downtime and Capacity & Coverage: Fall 2015

Virtually every survey respondent experienced at least some school wireless downtime during the fall semester of 2015. Nearly half had experienced at least one day of downtime. Close to 1 in 5 had experienced at least one week of downtime. And nearly half said their wireless was limited to certain areas of the school or lacked the capacity for every student to use a device at the same time.

Downtime

Category	%
More than a month	5%
More than a week, less than one month	13%
More than a day, less than a week	29%
More than an hour, less than a day	33%
An hour	16%
None	4%

At least one day 47%

Capacity & Coverage

Category	%
None	3%
Limited to a few areas	14%
Every classroom, but every student cannot use a device at the same time	33%
Every classroom, every student can use one device at once	25%
Every classroom, every student can use multiple devices at once	13%
Entire campus including outdoors, every student can use multiple devices at once	12%

Limited 50%

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Home Access Poses Educational Challenges at School

The survey finds a large digital divide when it comes to students' internet access at home. Overall, less than 40 percent of teachers report that students have regular access to internet at home. That number plummets to 12 percent in high-poverty schools.

This digital divide raises the stakes for campus access since schools may offer students their only opportunity to get online, especially in low-income communities.

When students lack internet access at home, their teachers see the implications at school. Most said they had students who could not complete homework assignments as directed because they lacked home internet access. And most also used class-time for homework assignments that students without internet access could not complete at home. Home internet access was a bigger barrier in higher-poverty schools.
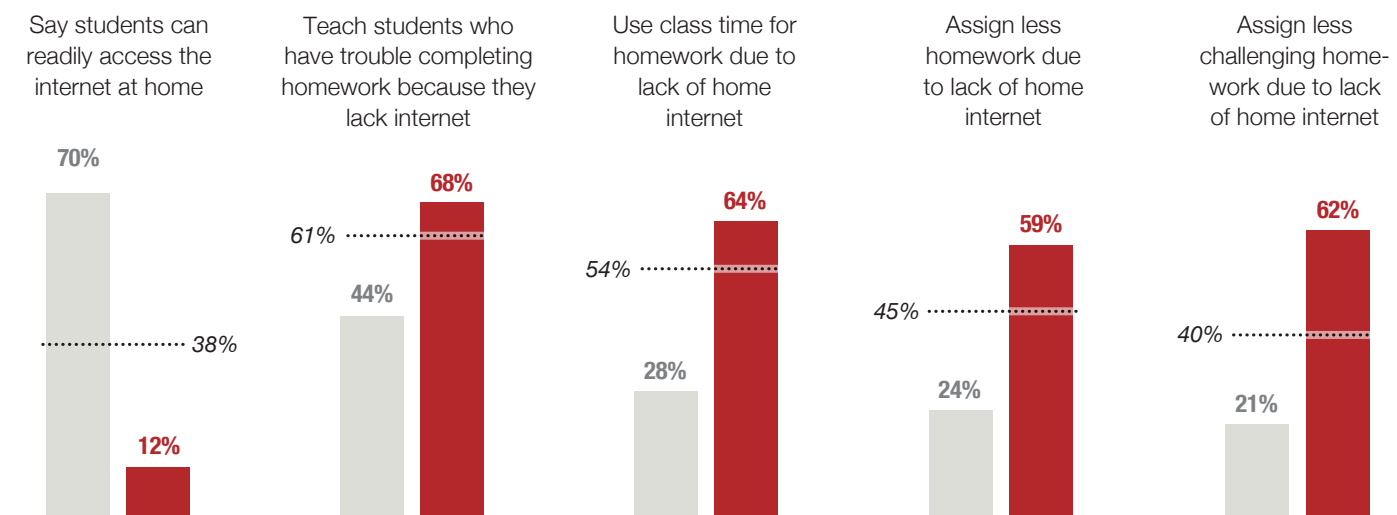

Student Home Internet Access

■ Low-poverty school (25% or less low-income)   ■ High-poverty school (More than 75% low-income)   ┈ *Average of all schools*

Percentage of Teachers at Low-Poverty and High-Poverty Schools Who:

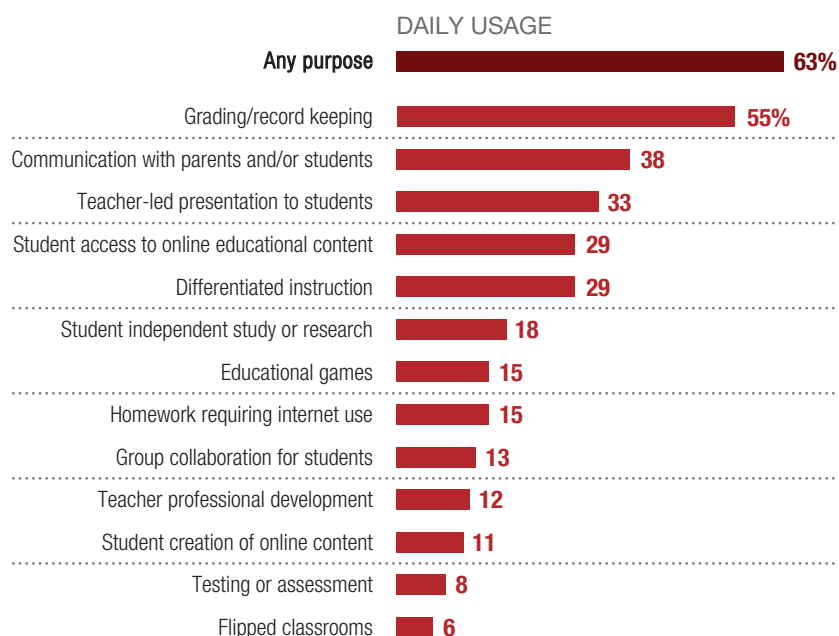| Say students can readily access the internet at home	Teach students who have trouble completing homework because they lack internet	Use class time for homework due to lack of home internet	Assign less homework due to lack of home internet	Assign less challenging home-work due to lack of home internet
70% / 12% (38%)	44% / 68% (61%)	28% / 64% (54%)	24% / 59% (45%)	21% / 62% (40%)

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Challenges May Limit Wi-Fi's Influence on Instruction

The challenges faced both at home and at school may help explain why survey results suggest that school wireless has a limited impact on instruction. Most teachers (63 percent) use their school Wi-Fi every single day. However, the most popular application is not revolutionary. It is grading and record-keeping. Less than 15 percent of teachers used school wireless daily for more innovative practices such as student group collaboration, student creation of online content, or "flipping" the classroom so that students view online lecture-related content at home then get help with practice problems and other work during class time.

Frequency of Classroom Wi-Fi Uses

Percentage of Teachers who Use School Wi-Fi for:

DAILY USAGE

Use	Percentage
Any purpose	63%
Grading/record keeping	55%
Communication with parents and/or students	38
Teacher-led presentation to students	33
Student access to online educational content	29
Differentiated instruction	29
Student independent study or research	18
Educational games	15
Homework requiring internet use	15
Group collaboration for students	13
Teacher professional development	12
Student creation of online content	11
Testing or assessment	8
Flipped classrooms	6

CONCLUSION

More schools than ever before have school wireless access. This technology could be an educational game changer with the potential to boost student achievement and improve the quality of instruction. But barriers stand in the way. **The Ruckus Wireless Confidence Index** indicates that current Wi-Fi access is just not meeting instructional needs. The reasons are technical, not educational. School wireless is too often unreliable, slow, or limited in capacity and coverage. Asked to assess technical aspects of their campus Wi-Fi, teachers assigned a mediocre grade of C. Adding to the challenge is the reality that many students lack internet access at home, especially in the lowest-income communities with the highest educational needs.

These challenges may help explain why teachers aren't using new technologies to adopt innovative practices. After all, it is difficult to plan instruction around student content creation online if you lack confidence that the internet will function reliably during class, or that the students will be able to complete their projects at home. Collectively, the survey results send a strong message to district technology leaders: It is difficult to foster world-class achievement with mediocre Wi-Fi.

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The Education Week Research Center is a division of Editorial Projects in Education, the non-profit organization that publishes *Education Week*. With a staff of full-time researchers, the Research Center conducts analyses for *Education Week*, as well as independent, unbiased research projects for outside organizations on a grant or contract basis.

For more information, visit **http://www.edweek.org/rc/**

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About Ruckus Wireless

Headquartered in Sunnyvale, CA, Ruckus Wireless, Inc. is a global supplier of advanced wireless systems for the rapidly expanding mobile Internet infrastructure market. The company offers a wide range of indoor and outdoor "Smart Wi-Fi" products to mobile carriers, broadband service providers, and corporate enterprises, and has over 36,000 end-customers worldwide. Ruckus technology addresses Wi-Fi capacity and coverage challenges caused by the ever-increasing amount of traffic on wireless networks due to accelerated adoption of mobile devices such as smartphones and tablets. Ruckus invented and has patented state-of-the-art wireless voice, video, and data technology innovations, such as adaptive antenna arrays that extend signal range, increase client data rates, and avoid interference, providing consistent and reliable distribution of delay-sensitive multimedia content and services over standard 802.11 Wi-Fi.

For more information, visit **http://www.ruckuswireless.com**