A Connected Education For A Digital Generation

A New Strategy

How intelligent, visible connectivity can transform learning outcomes in schools

Aerohive® NETWORKS

95% of IT managers feel teachers and students aren't satisfied with school Wi-Fi systems

Introduction

In the last 5-10 years the modern classroom has undergone significant transformation.

G one are the blackboards, piles of textbooks, and (depending on your age) oversized desktop computer in the corner of the room. Increasingly, pupils of all ages are using tablets, video screens and virtual whiteboards to learn.

The internet has become an indispensable platform for education. Continually evolving academic programmes and tools are putting teachers in a better position than ever before to adapt to the different needs of their students.

Technological development will continue to create new educational opportunities for students and teachers alike. This means schools' IT decisions and network-management strategies will become ever-more central to academic success.

For this reason, Aerohive has commissioned independent research into the challenges faced by IT decision-makers within a wide range of educational establishments worldwide. Among the many findings, it emerges that half of schools lack visibility of devices accessing their networks. It's a 'network of the unknown' that appears to be keeping IT decision-makers up at night.

$(2+3)7=$
$5(8+9)+6=$

It is hoped that by obtaining a sense of the challenges being faced across the world by peers – as well as the strategies and benchmarks being set – IT decision-makers can inform their own educational establishment's approach. Working together, every school – whether primary or secondary, private or public – can maximise the educational opportunities afforded to pupils by the internet.

The study reveals that:

- The proliferation of computing devices, mobile technology and the rise of BYOD are making successful digital-experience management impossible for most. Many have poor visibility over the portfolio of devices being used, and what they're being used for.

- This has created a 'network of the unknown', preventing schools from fulfilling their duty of care to students and ensuring network security. Importantly, a lack of network intelligence means IT managers are unable to plan for demand and ensure they are meeting their school's Wi-Fi needs.

- Most schools will be looking to upgrade their Wi-Fi networks in the next 12 months. Now is the time for IT managers to consider how to invest in the future connectivity of their schools. Achieving ROI will mean more than merely upgrading to the latest Wi-Fi standards.
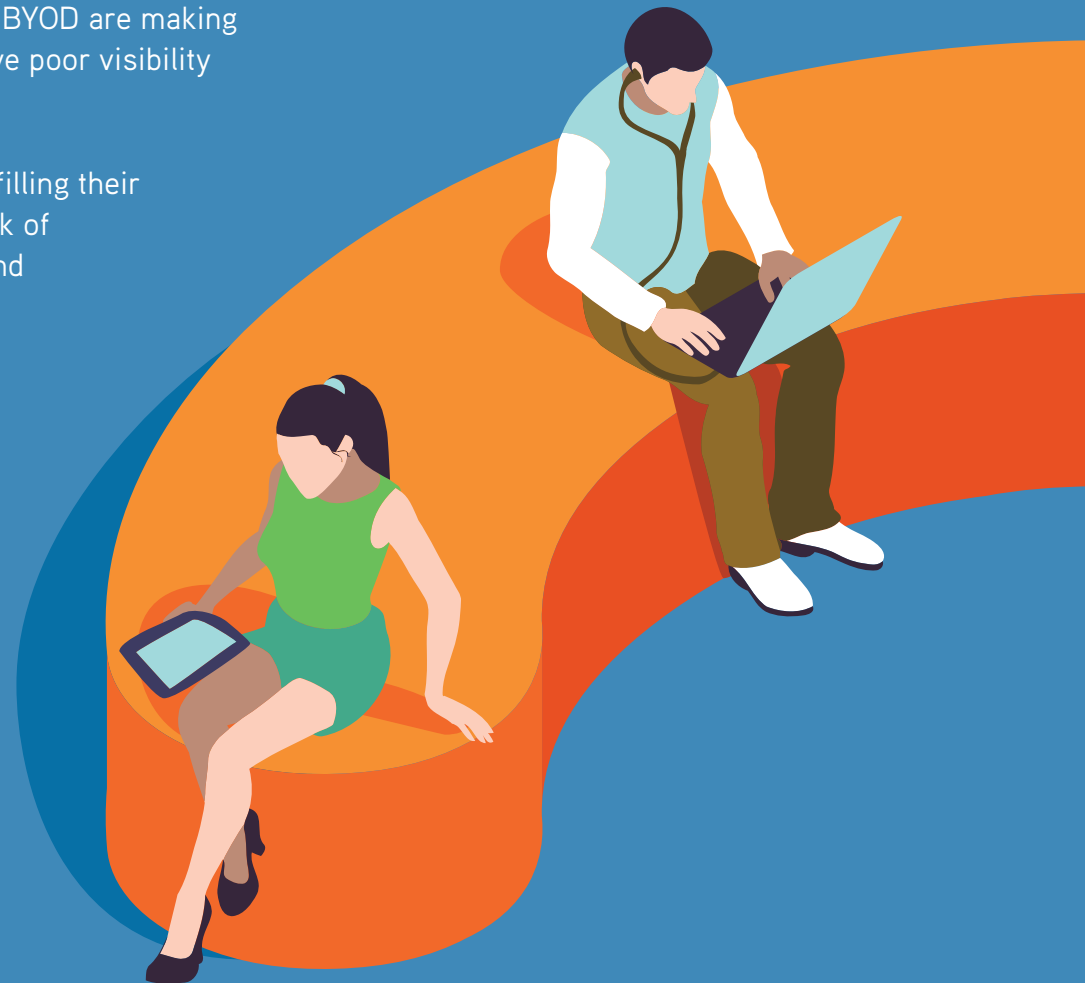
Research Methodology

A total of 560 decision makers with ultimate responsibility for the delivery of IT within their educational establishment – including wireless networks – completed a survey in December 2015. Respondents were spread across eight global regions, from differing educational establishments, school sizes, school ownership models and IT budgets. The survey was commissioned by Aerohive, and conducted by Loudhouse, a London-based independent research agency.

Region	Sample size
UK	102
France	101
Germany	103
Netherlands	50
Australia / NZ	50
Spain	51
Italy	50
Nordics	53
Total	560

Fig A: Research sample size

47% Primary school (aged 5-11)

56% Secondary school (aged 11-18)

31% College / further education (aged 16-18)

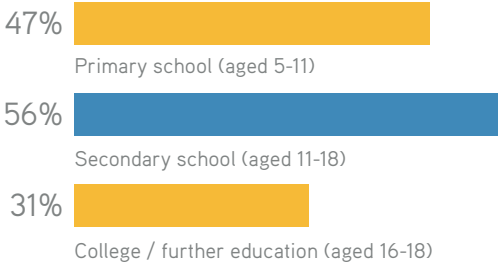Fig B: Which of the following age ranges are taught by the educational establishment you are employed by?

- Fewer than 500 pupils / students (9%)
- 500 – 999 pupils / students (32%)
- 1000 – 1500 pupils / students (35%)
- Over 1500 pupils / students (24%)
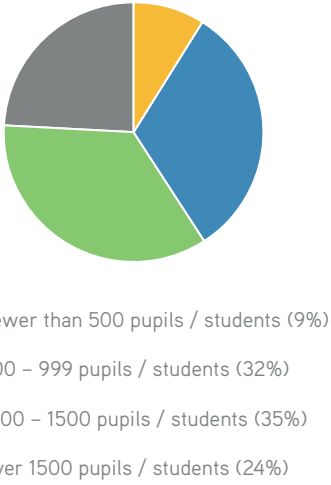
Fig C: Approximately, how many pupils / students attend this establishment?

- Government / state funded (68%)
- Privately funded (32%)
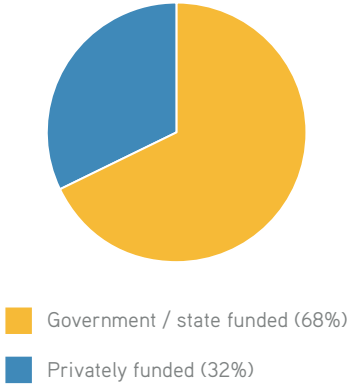
Fig D: How is this educational establishment primarily funded?

- IT budget has increased (39%)
- IT budget has stayed the same (53%)
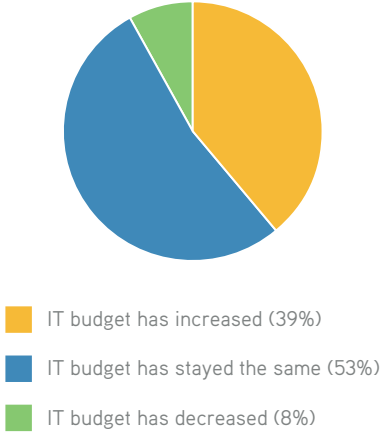- IT budget has decreased (8%)

Fig E: How does your IT budget for 2016 compare to 2015?

The Visibility Challenge

Schools know how Wi-Fi can support education. But the research suggests they aren't seeing these benefits in real terms. Just 5% of IT decision-makers think students and teachers are extremely satisfied with their current Wi-Fi provision.

Importantly, this dissatisfaction with Wi-Fi and its impact on the educational experience isn't limited to any particular kind or size of educational establishment. The challenges being faced by IT decision-makers are similar – whether in primary schools, secondary schools, or colleges.

Nearly two-thirds (59%) acknowledge their school does not have the best possible Wi-Fi / connectivity to support digital learning. And within this group, 90% believe there is room for improvement. Staff and students are calling for change.

But digital complexity is making Wi-Fi improvement increasingly difficult. For many, poor control and visibility over network usage is the main barrier to improved Wi-Fi and digital learning. Educational establishments lack the critical Wi-Fi intelligence to optimise network performance.
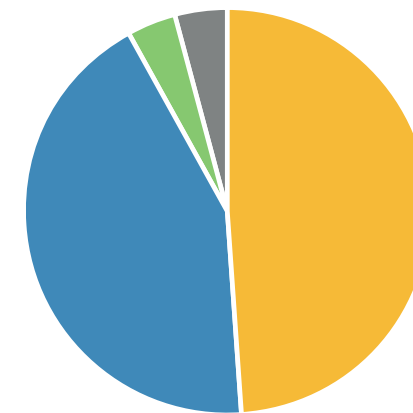
- Pupils / students (49%)
- Staff (43%)
- Parents (4%)
- Other stakeholders (e.g. Governors) (4%)

Fig 1: Where do the biggest demands for higher quality WiFi come from in your experience?

> A worrying 51% of IT managers believe their Wi-Fi infrastructure is holding back digital progress in their school

The Growing Network

Today, the number and variety of both school-owned and student-owned devices IT managers may be expected to cater for on school Wi-Fi networks is huge – and growing. In recent years, schools have invested heavily in tablets and laptops to help enrich their pupils' learning experiences. Many establishments even insist every pupil has a device.

The most deployed school-owned classroom devices include Chromebooks, laptops, Surface tablets and iPads. Chromebooks are the preferred choice for 38% of schools, ahead of any other single device.

With so many different kinds of device being used in schools – each with varying connectivity needs and challenges – it can be difficult for IT managers to provide Wi-Fi that adequately meets all of these needs. Then there is the challenge of ensuring varying types of devices with different configurations, apps and capabilities are being used in the right way. A variety of devices creates a variety of technological problems to overcome – leaving both teachers and IT staff at risk of losing a lot of time to troubleshooting.

Meanwhile, the research shows three in four schools actively encourage students to bring in and use their own devices, creating yet more complexity to manage. Few schools will have the IT resources to check and alter program settings on every device used on the network.

> ❝ 75% of schools and other educational institutions encourage BYOD

Currently used: Chromebooks 44%, Laptops 41%, Microsoft Surface 38%, iPads 38%
Most preferred: Chromebooks 38%, Laptops 25%, Microsoft Surface 17%, iPads 19%

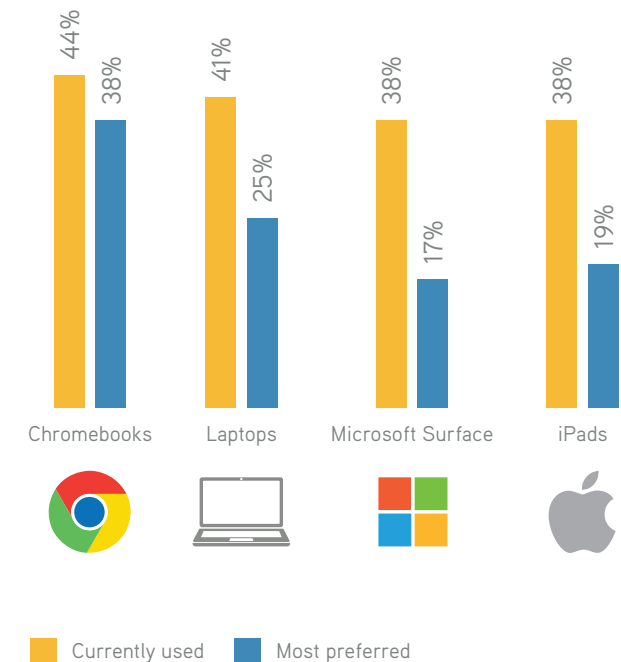■ Currently used   ■ Most preferred

Fig 2: Which of the following devices are used in classrooms at your school / college, and which of these would be your preferred and default choice?

The Unknown Network

The increased usage of Wi-Fi by multiple users, on multiple devices, has created a 'network of the unknown' in many schools.

Only half of schools have full visibility of the school-owned devices that are accessing the network. Visibility of other areas of the network is even muddier.

Most schools encourage students to use their own devices. But just 42% have controls in place to manage this influx. And the situation doesn't look set to improve much in the next three years. By 2018, just 47% are expecting to have the necessary controls in place.

It's no wonder one of the biggest frustrations with current Wi-Fi systems is the need to balance flexibility with security. Almost two-thirds of IT managers experience pain in this area. Schools want to provide students with flexible learning through Wi-Fi and mobile technology, but in reality this creates complex security issues.

> 66 59% report lack of visibility of users / devices / applications as a significant frustration with existing Wi-Fi

| 14% | 47% | 37% | |
Unauthorised or non-educational applications being used

| 11% | 47% | 41% | |
Users (teachers / staff) accessing the network

| 10% | 47% | 42% | |
Users (students) accessing the network

| 10% | 46% | 40% | |
BYOD / personal devices accessing the network

| 13% | 41% | 43% | |
Users (guests) accessing the network

| 8% | 45% | 46% | |
Authorised (or educational) applications being used

| 8% | 43% | 46% | |
Files being uploaded onto school network

| 8% | 38% | 50% | |
School owned devices accessing the network

■ Limited / no visibility ■ Partial visibility ■ Full visibility ■ Don't know
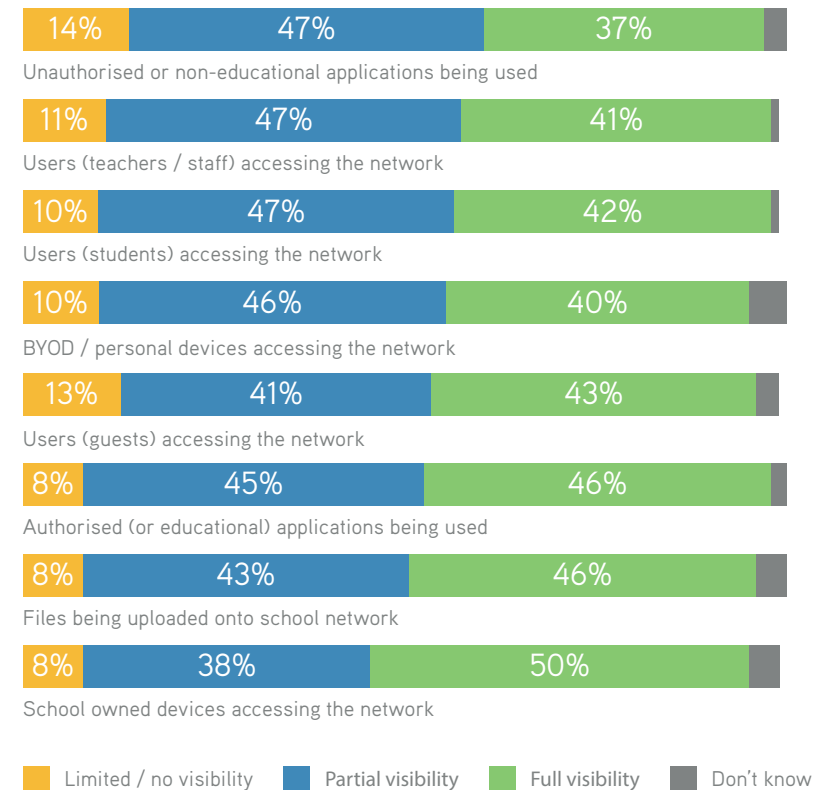
Fig 3: To what degree do you have visibility of the following?

Network Failure

The lack of control and intelligence around devices using school connectivity has created a poor network visibility epidemic. If it's unclear who is using the network for what – and with which devices – it follows that the network will inevitably fail to meet user expectations.

Most IT decision-makers in schools are frustrated by unreliable connections, poor coverage across the whole site, and insufficient capacity to support bandwidth-hungry apps. Greater intelligence around user / device / application bandwidth needs could help greatly.

Duty of Care Failure

Beyond the failure of the network to meet user expectations, poor network visibility allows school Wi-Fi to be used inappropriately.

Schools have a duty of care to fulfil to students when providing internet connectivity.

It is no surprise that 57% worry that access to Wi-Fi will result in pupils being distracted and using devices inappropriately. Many (60%) also face the challenge of students using too much bandwidth with personal devices. Streaming and peer-to-peer sharing applications are particular risks that can go unnoticed and uncontrolled.

% frustrated

| 14% | 50% | 35% | 64% |

Unreliable connection (keeps dropping out)

| 15% | 49% | 36% | 64% |

Poor coverage across the whole site / campus

| 13% | 51% | 36% | 64% |

Insufficient capacity to support bandwidth-hungry applications / multiple users

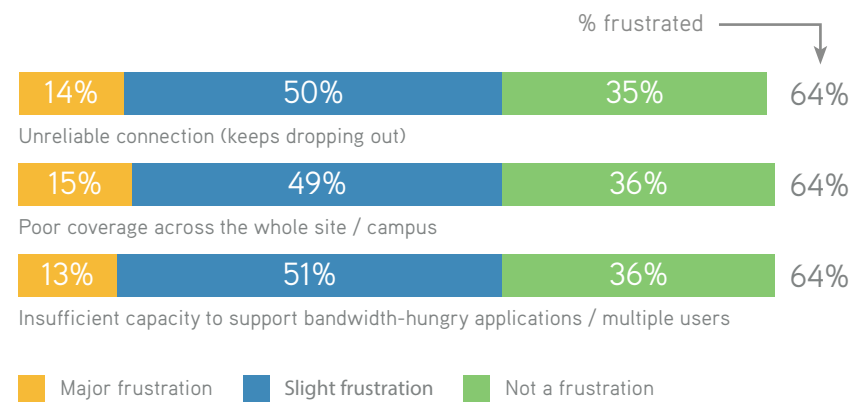■ Major frustration   ■ Slight frustration   ■ Not a frustration

Fig 4: To what extent are the following frustrations with WiFi at your school / college?

Some 91% see duty of care as a critical IT priority over the next year. Yet 59% are frustrated by a lack of visibility into users / devices / applications on the network

Tomorrow's Network

The future will bring greater proliferation of computing devices, applications and Wi-Fi needs. The network challenges raised by the fragmentation of devices, applications and users are here to stay. Since BYOD will continue to become more prevalent, the current trend of poor network visibility is simply unsustainable. To cope with the demands of the next generation of technology, schools need Wi-Fi solutions that will stand the test of time.

51% are dissatisfied with the ease of connecting personal devices to the network, with 89% feeling there is room for improvement around this

Visibility Brings Benefits

With so much at stake, schools recognise the need for action. Some 94% of IT decision-makers in schools believe their leadership team is focused on digital learning and using technology to support learning.

Over the next 12 months, the top three priorities for many include: attaining good quality wireless coverage, balancing levels of access and security, and improving network security.

Importantly, all of these priorities tie into the need for greater network intelligence. Poor network visibility undermines planning for demand – and therefore good quality wireless coverage. It also makes it difficult to improve access without compromising network security.

% priority

54%	43%		97%

Good quality wireless coverage

43%	51%	6%	94%

Balancing levels of access and security

58%	35%	7%	93%

Network security

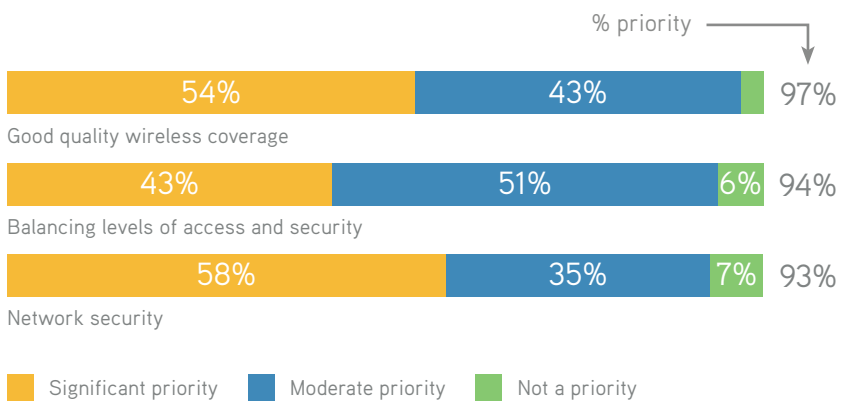■ Significant priority   ■ Moderate priority   ■ Not a priority

Fig 5: To what extent are the following IT priorities for your school / college over the next 12 months?

Intelligence Unlocks Learning

In a climate that requires educational establishments to do more with limited budgets, unlocking network visibility is the key to maximising the potential of school Wi-Fi networks. Greater network intelligence helps schools mitigate security and duty of care concerns, reduce improper use of bandwidth, and ensure their Wi-Fi provision fulfils its purpose – improving learning outcomes.

While other benefits to schools of connectivity are seen to be improving the overall learning experience, creating a more flexible learning environment and improving the overall teaching experience for staff.

53% recognise that connectivity in schools can improve the overall learning outcomes and results
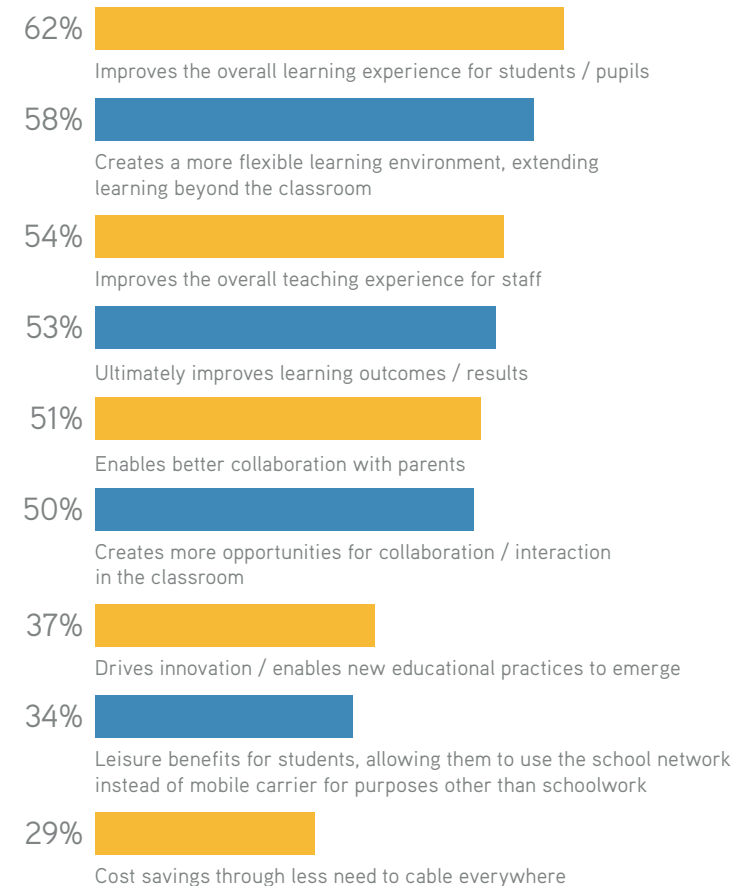
62% Improves the overall learning experience for students / pupils

58% Creates a more flexible learning environment, extending learning beyond the classroom

54% Improves the overall teaching experience for staff

53% Ultimately improves learning outcomes / results

51% Enables better collaboration with parents

50% Creates more opportunities for collaboration / interaction in the classroom

37% Drives innovation / enables new educational practices to emerge

34% Leisure benefits for students, allowing them to use the school network instead of mobile carrier for purposes other than schoolwork

29% Cost savings through less need to cable everywhere

Fig 6: At a general level what do you see as the key benefits of WiFi and connectivity for schools / colleges?

Quality is Key

Educational videos that freeze due to poor connectivity, or web pages that take too long to load, don't cultivate a climate of smooth, engaging, distraction-free learning. High quality WiFi is essential. Naturally, increased network visibility and control are drivers of high calibre connectivity.

High quality Wi-Fi is most likely to improve learning outcomes for IT / technology, science and maths. This is significant, given that global demand for a workforce skilled in STEM (Science, Technology, Engineering, and Mathematics) subjects continues to grow.

> 92% of IT decision-makers in schools believe high quality Wi-Fi positively impacts the learning experience and outcomes for students
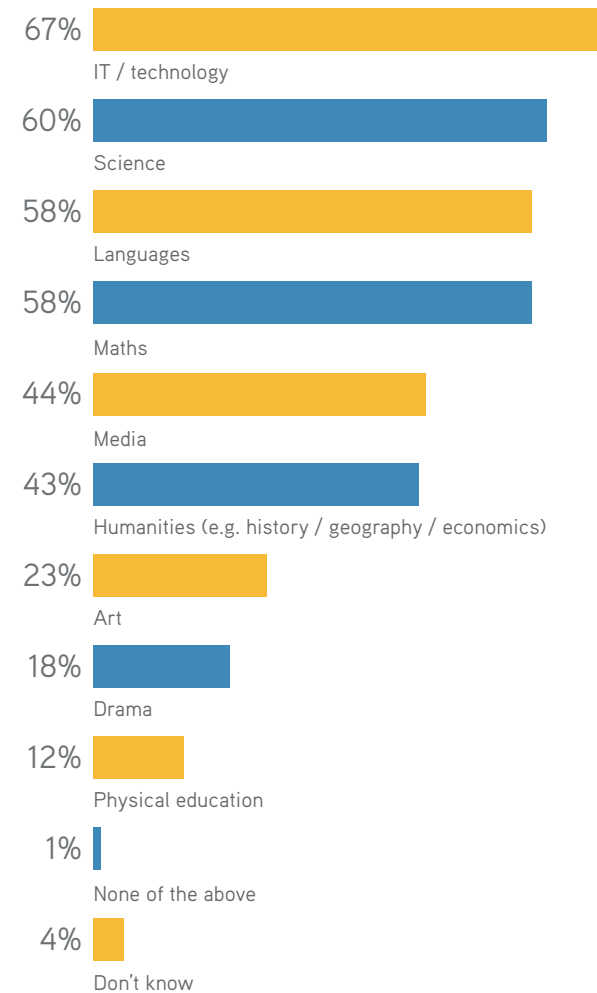
67% IT / technology

60% Science

58% Languages

58% Maths

44% Media

43% Humanities (e.g. history / geography / economics)

23% Art

18% Drama

12% Physical education

1% None of the above

4% Don't know

Fig 7: Which of the following groups do you see particularly benefiting from having high quality WiFi at school / college?

Invest today, for tomorrow . . .

T he report shows schools recognise the need to invest now in order to secure future success. And almost half (48%) think they need to do this now, or in the next six months.

Two thirds of schools (62%) have the latest Wi-Fi standard (802.11ac) but 53% are operating with the previous version (802.11n), and 20% are using standards that pre-date 2007. The latest Wi-Fi standards of course bring with them a higher quality Wi-Fi experience and address some of the frustrations that IT leaders in educational settings face.

Satisfaction levels with overall Wi-Fi performance increase from 43% among those with older standards to 57% among those with the latest standards. This group are less likely to report frustrations around unreliable connections, poor coverage and challenges around balancing flexibility and security needs.

Among those not currently using the latest Wi-Fi standard, 67% plan to upgrade in the next 12 months. With technology continuing to develop at pace, the need to build robust, future-proof Wi-Fi infrastructure is urgent.

Most (78%) educational establishments think they will need to review and update their Wi-Fi provision within the next year to compete with the best schools in their area

A Complete Solution

But the latest Wi-Fi standard is not a cure-all solution. For example, 71% of those with older Wi-Fi versions report poor coverage as a frustration. This number falls to 59% among those with the latest Wi-Fi standard – but it still represents a significant amount of frustrated IT managers.

For true ROI, schools should seek Wi-Fi solutions that support intelligence around the users, devices and applications accessing the network.

A Balanced Budget

Over half of those surveyed recognise their investment in Wi-Fi lags behind their investment in mobile devices and classroom technology.

With schools constantly under pressure to innovate, and incorporate new forms of learning, it is understandable that spending on devices might outweigh Wi-Fi spend. However, Wi-Fi is the fuel that renders these devices useful. A classroom full of devices reliant on low-quality Wi-Fi will bring limited educational benefit.

Furthermore, ensuring IT spend is directed towards scalable, future-fit Wi-Fi solutions means less outlay on IT support and upgrading processes in the future.
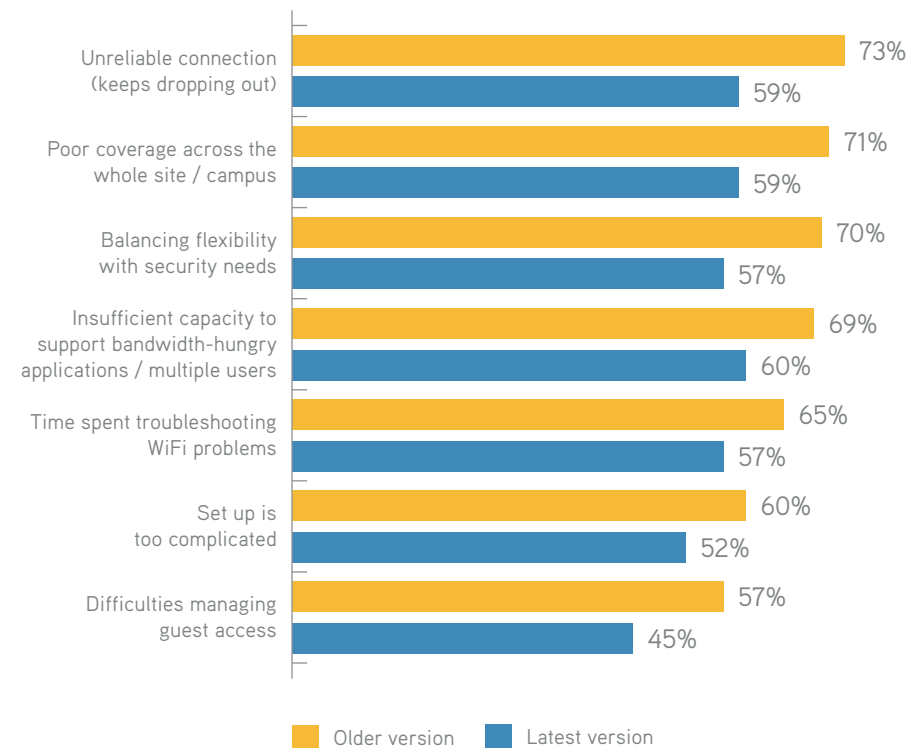

	Older version	Latest version
Unreliable connection (keeps dropping out)	73%	59%
Poor coverage across the whole site / campus	71%	59%
Balancing flexibility with security needs	70%	57%
Insufficient capacity to support bandwidth-hungry applications / multiple users	69%	60%
Time spent troubleshooting WiFi problems	65%	57%
Set up is too complicated	60%	52%
Difficulties managing guest access	57%	45%

Fig 8: What are your biggest frustrations with older WiFi?

Savings In The Cloud

But savings can be won through clever investment in cloud-based solutions.

Cloud networking reduces the cost and complexity of network operations. And it can also improve visibility and control, offering comprehensive oversight of users, devices, and applications. This leads to enhanced user experiences. It follows that over two-thirds of IT managers see a benefit in using cloud technology to manage wireless networks.

> " Limited budgets are one of the biggest barriers IT managers face when seeking to update Wi-Fi provision. This was true for 58% of respondents

Transforming The Connected Experience

E quipping students and teachers with digital learning tools creates engaging and inspiring environments throughout the campus. To support the proliferation of school-owned and personal devices flooding the network however, IT departments should continually analyse their existing infrastructure and determine the right time to expand or upgrade.

The research shows it's a critical moment for IT decision-makers in education across the globe. Many are experiencing pain with their current Wi-Fi solutions, and are getting ready to invest in the next generation of Wi-Fi across their campuses. But what is the next generation? Is it simply about providing more speed, or do we need to look deeper?

Capacity, of course, is a major factor when it is considered that a single classroom may contain 30 to 60 devices. Certainly the rise in mobile devices is often a trigger point for schools looking to move towards newer Wi-Fi standards. However speed is only part of the mobility equation today. While it may drive the initial exploration, the research suggests IT departments should probe potential solutions for their true value, adding security, management, scalability, simplicity, and added value as primary benchmarks.

Ensuring Capacity For The Growing Number Of Devices

With the network witnessing continued demand for access by a wider range of devices, bandwidth is crucial. The 802.11ac Wi-Fi standard has unlocked speeds of a Gigabit and beyond. But how that bandwidth is managed among devices is key to performance success. The major vendors are also gradually removing WLAN controllers from their architecture in favour of distributed control to remove potential bottlenecks.

Guaranteeing Study Time

With a reliance on connectivity by mobile devices in the classroom, the supporting infrastructure must be rock solid. Otherwise there is a significant impact on the digital curriculum. With a myriad of architectural offerings by vendors today (cloud, controllers, and distributed control), IT decision-makers must ascertain the redundancy capabilities of potential solutions.

Flexibility vs. Security

To cope with the influx of devices, IT departments are balancing flexibility with security. The highest levels of security that should be implemented are often neglected in favour of user flexibility. With newer authentication methods such as PPSK (Private Pre-Shared Key) offering secure user and device connectivity without the need for certificates, it is now becoming easier to offer a simple yet secure environment for school and personal devices.

Visibility Of Users, Devices, And Applications

If doors are open to student, staff, and guest personal devices, it may not always be clear who is on the network, which devices they are connecting with, what applications are being accessed, and where they are located. The appropriate management platform will provide comprehensive visibility and control, which should result in optimised network performance and better learning outcomes.

Classroom Management And Engagement

Teachers should be focused on teaching, not troubleshooting Wi-Fi connectivity problems. Cloud-based Wi-Fi solutions are offering exciting opportunities to not only simplify the management experience for the IT department, but also to unlock new engagement possibilities in the classroom that are driven by mobility. For instance, when students bring their device into a classroom, the teacher should be able to register those devices and enroll them within the assigned lesson plan, including screen sharing, pushing resources, monitoring student activity and more.

With the right Wi-Fi solution in place, schools will be free to maximise the potential of their students. It's an exciting time for pupils and those who take pride in delivering the best possible education to the next generation.

Explore your options at aerohive.com/education

Commentary

Technology in schools is no longer confined to the computer lab or back offices; over the course of the last decade technology has become embedded in the classrooms and corridors of virtually every school in the country. This continues to present both opportunities and challenges for school leaders everywhere, and is something we know our 70,000 members both want and need to get right in their settings. This is, of course, made more difficult in the face of budget cuts, sweeping reforms to the curriculum and to assessment, and increasing pupil numbers, all of which place further pressure on schools. We are optimistic about the role technology can and will play in our education system, and my colleagues and I here at The Key regularly visit schools across the country that are using technology to support excellent pupil outcomes. The schools that most effectively deploy technology do so in a way that supports high quality teaching and learning; it is not used to replace or substitute what a skilled practitioner can do for his or her pupils. Furthermore, such schools ensure their staff are well trained and can confidently and sensitively deploy technology so as to develop and extend opportunities for learning. Many schools are also working well with parents, helping pupils access and use technology in safe and appropriate ways both at school and at home.

Fergal Roche, CEO, The Key

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