Opportunities & challenges facing schools using technology for learning

N4L Touchpoint Survey 2018

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1 Executive Summary

Each year, Network for Learning (N4L) surveys New Zealand schools to gauge their satisfaction with the Crown company's Managed Network internet services, which are fully funded and supported for every state and state-owned school. The survey also seeks to gain a better understanding of the opportunities and challenges facing schools using technology to connect their school, classrooms and students to the internet. These three areas - connecting schools, connecting classrooms and connecting students - are the three key strategic priorities outlined in N4L's Statement of Intent (SOI)[1], a four-year statutory plan produced by all Crown Companies. The questions asked were selected to help inform these three areas and are different from the questions asked in previous years, as they aim to provide insights into the company's current and future product and service development.

Participants
The survey was addressed to 2,342 school principals and sent by email, with all responses received between September 10-25, 2018. More than 450 schools fully completed the survey (20%), and so the margin of error was below 5% for all questions except for one. The exception is the question asking schools about their confidence that their budget will cover the costs of network maintenance and upgrades, as only a subset of schools who said they were planning for these costs were able to answer this question.

Responses from primary schools vs secondary schools
Primary schools are slightly over-represented in the survey sample; 20% of primary schools in New Zealand responded, compared to 13% of secondary schools. However, it should be noted that 8 out of 10 schools in New Zealand are primary schools, and in our survey, 84% of all respondents are primary schools.

Survey Highlights
The survey reveals that schools must navigate increasingly complex technical landscapes, with respondents identifying a number of programmes they are planning to implement, including a one-to-one ratio for students to devices, upgrading wireless networks and hardware, moving data to the cloud, introducing community wireless projects and integrating the new Digital Curriculum. These programmes can build up significant costs for schools and there are many points in the process where schools would appreciate assistance and advice along the way. Further, not all students have the option to carry on their learning at home because some don't have home internet access.

Key insights

Connecting classrooms - Wireless internet

[1] N4L Statement of Intent 2018-2022.

Schools are responsible for connecting classrooms to wireless internet, with many schools identifying trends and projects that are, or will soon impact, their connectivity.

Planned projects
We asked schools to tell us about the technical projects they had planned in the upcoming year, allowing them to select from a list of four initiatives or indicate other projects they are planning. In addition, we asked an open-ended question about the types of technical projects or issues that they would like support for. The projects being planned include:

- **Introducing more devices** - Implementing a one-to-one device ratio for students was cited as the most common project being planned by schools. Almost 40% said they were planning for a one-to-one student ratio, with secondary schools more likely to be doing this (57%, compared to 37% of primary schools).

- **Moving data to the cloud** - This was the second most commonly identified project being planned for the next 12 months, with 37% of surveyed schools saying they are intending to move their records or data to the cloud in the next year. Secondary schools are more likely to be planning this shift (64%) than primary schools (33%). Moving data to the cloud was also the most frequently mentioned project respondent schools want support for, including the most cost-effective ways of doing this, how to take full advantage of cloud-based storage, how to integrate cloud services, and how to ensure their data is secure. For schools wanting to shift data to the cloud, ensuring their data is in a secure environment is a common concern.

- **Additional network security** - 14% of respondent schools want to provide additional network security at their schools in the next year, with schools looking for technical support in improving their network security.

- **Community wireless projects** - 11% said they are planning community wireless projects, with 53% of these schools being lower decile.

- **Upgrading wireless networks** - Just over half of primary schools (52%) and almost three quarters of secondary schools (74%) are planning for the costs of maintaining or upgrading their school's network and wifi infrastructure. Thirty-one percent of responding primary schools and 24% of responding secondary schools are confident or very confident that their budgets will cover these costs.

Tech trends impacting connectivity

- **Devices** were most commonly mentioned as the technology that would have the biggest impact on learning in the next three years, indicating that many schools are still working to have devices integrated into their school in the most effective way.

- **Other trends impacting schools:** Respondent schools believe that robotics (15%) and coding (14%) are also likely to have a big impact on learning in the future.

Technology support & advice

- Respondent schools (72%) want technical support on their projects, and have greatly differing support needs. They identified a need for support and unbiased advice weighing up the benefits of moving to cloud-based storage, which devices to purchase, and how to improve their wireless networks.

- Schools reported they sought IT support from external technology companies between 0 and 160 times per year, with 62.6% of respondents seeking external support 10 times or fewer.

- Secondary schools seek external support (on average, 12 times per year) more frequently than primary schools (7 times per year).

- Some schools schedule a regular weekly or fortnightly session with external IT support.

- The introduction of the new digital curriculum is a salient issue for surveyed schools, and they are seeking advice and support to integrate it into their school.

Connecting students - Equitable digital access for anytime learning

- Access to home internet was perceived to be an issue for a significant number of respondent schools, with 52% saying that 25% or more of their students don't have home internet access.

- The disparity is concentrated in lower decile schools, with low decile schools most likely to say that home internet access has an impact on teaching and learning at their school. Just over 85% of decile 1-3 schools say that fewer than three quarters of their students have access to the internet at home.

- A lack home internet access was reported to impact teaching and learning by 36% of respondent schools. Lack of home internet access can be a barrier to learning, as these students were identified as being more likely to be left behind or under-served.

General trends - School's internet use

While our annual survey evolves to reflect our strategic and operational priorities as outlined in our Statement of Intent and Annual Report, we can observe clear trends over time revealed

through the survey responses and the data consumed across the Managed Network.[2] These trends include:

1. Schools are consuming more data across the Managed Network (data consumption doubled from 2017 to 2018);

2. Schools are using more devices to access the internet (evidenced by schools' future plans to introduce one-to-one student-to-device ratios);

3. Schools are using the Managed Network outside the classroom and beyond school hours (doing more 'in the field', using the internet before and after school, and sometimes on weekends);

4. Internet users are facing a rising number of online threats and new malware variants (in 2018, N4L blocked 82% more security threats than the previous year);

5. More learning is taking place online and the range of learning activities and technology uses is widening (evidenced through the open-ended comments shared by schools).

Conclusion

N4L is currently involved in a number of projects aimed to address the challenges and concerns identified with connecting schools, classrooms and students to allow learning to take place where and when it's needed. The findings in this survey will help inform how we deliver support and services in these areas for current and future streams of work and will be shared with our shareholding ministers, as well as our partners across government, education and technology.

[2] For example, data consumption and the number of security threats blocked.

2 Introduction

2.1 Background

Touchpoint is N4L's yearly customer survey, sent to school principals to gain insights about customer satisfaction and schools' experiences and future plans around technology. The questions in this report are focused on the two latter points, and there is a separate report outlining customer satisfaction. The questions asked were selected to shed light on N4L's strategic priorities as identified in its Statement of Intent, and to provide insights around product and service development.[3]

The survey was sent out in September 2018 to all schools using N4L's Managed Network that are subscribed to our email communications (95% of all schools). We received 459 complete responses, with an additional 41 partial responses, giving a relatively high response rate of almost 20%.

Readers should note that while N4L conducts this survey annually, the questions may differ each survey, particularly around the 'technology in schools' section, and therefore making comparisons to the findings of previous surveys may not be possible.

2.2 Goals and structure of report

The aim of this report is to translate the responses received into insights that can inform N4L's current and future products and services. Primarily, the questions were written to shed light on schools' needs around the Connected Classrooms and Connected Students (Equitable Digital Access initiatives), and they also aim to tease out schools' perceptions of technology in general.

Connected Classrooms
The report begins with two sections that provide information related to Connected Classrooms. The first discusses schools' tendencies to plan for the costs of maintaining and upgrading their wireless networks, as well as their confidence that their budgets will be able to cover these costs.

The next section, titled "IT in Schools", discusses the projects schools are implementing in the next 12 months related to IT; how often they have to call external IT support; the types of projects they would appreciate support on; and asks what technical issues related to N4L's products and services they are experiencing.

Connected Students
Following this, the report describes the responses to the questions relating to Equitable Digital Access (Connected Students), to help us understand the prevalence of student internet access at home and what impact this may have on schools.

[3] See the summary of N4L's 2015 Technology in Schools survey here.

Future Trends
The final section discusses schools' views of the future and what kind of technology they see as having the most profound impact on learning in the next three years.

2.3 Methodology

Data input - We used GetFeedback to gather survey data, which we paired with the information held within our customer database housed in Salesforce, which includes information such as school type, decile, location, and size.

This allows us to make inferences based on these attributes, to ascertain if schools are having vastly different experiences with technology.

Process and analysis - Data were processed and analysed in the statistical programme R; this includes calculating percentages, weighting responses, performing text analysis, and generating visualisations. Chi-square tests were performed to determine whether group differences in categorical responses reached statistical significance, with a significance level of .05. For questions with numeric responses, the Mann Whitney U test was used due to the skewed, non-normal distribution of these responses. The machine learning platform, BigML, was used to investigate associations between responses.

Weighting - An investigation of survey responses demonstrated that primary schools were more likely to respond than secondary schools, meaning the sample is not representative by school type (for more information, see Appendix A). Weighted percentages are also reported in all tables (see Appendix B), which compensate for the lower response rate of secondary schools. All percentages given in visualisations throughout the report are crude percentages.

Confidence intervals and margin of error - In Appendix B, 95% confidence intervals are also reported for each percentage. The margin of error tends to be largest around figures that are close to the 50% mark (as this is where there is the most uncertainty about which options are preferred) and are smallest closest to the extremes (such as 100% or 0%). The confidence interval is reported as a ± percentage value, reflecting the error range both above and below the given value. If a figure is reported as 50% with a ±5% margin of error, there is 95% confidence that the actual figure is between 45% and 55%. The high response rate of the sample means that, for most questions, the margin of error is below 5%. This is a statistically acceptable level of uncertainty and allows us to make some inferences about the school population from the sample surveyed.

2.4 Definition of school characteristics

2.4.1 Definition of school type

In this report, comparisons are made between different school types. The Ministry of Education designates a school's official type, but there are a variety of types. In order to make

comparisons, schools have been categorised into three distinct groups for ease of reporting. These groups are the same as the ones used in previous N4L surveys, to aid in the tracking of responses over time.

Primary schools	Contributing schools (offer education to year 1-6 students)
	Full primary schools (offer education to year 1-8 students)
	Intermediate schools (offer education to year 7-8 students)
Secondary schools	Composite schools (also identified as 'area schools', they provide education to all year students
	Secondary schools (offer education to year 9-15 students, and sometimes year 7-8 students as well)
Other schools	Activity centres (centre for secondary students experiencing problems with schooling, who need alternative options
	Special schools (provide specialist education for students with specific physical, behaviour, sensory, or intellectual support needs)
	Teen parent units (provide education for teenagers who are pregnant or who have prime responsibility for their children's care)

2.4.2 Definition of decile

Presently, New Zealand schools are divided into ten deciles based on the percentage of the school's students living in low socio-economic communities, with lower decile schools having more students living in poorer communities.[4] In line with this, decile 1 schools are granted more government funding, while decile 10 schools are more likely to receive funds from the families of students via donations. The location of the school itself does not directly factor into the calculation of decile; decile is supposed to indicate the socioeconomic status of the students attending the school, rather than the school itself.

3 Maintaining or upgrading network infrastructure

3.1 Do schools plan for the costs of maintaining or upgrading their network infrastructure?

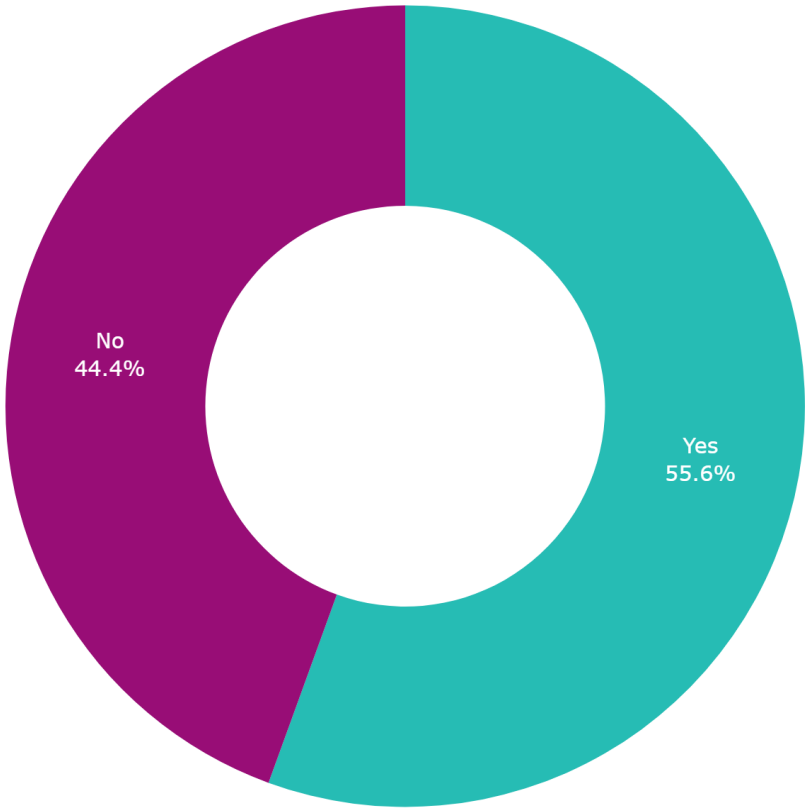
Responses: 459

[4] For more information about how deciles are calculated, see the Ministry of Education's page on School Decile Ratings.

More than half of surveyed schools (56%) say they plan for the costs of maintaining or upgrading their wireless network infrastructure. However, over a third of respondent schools do not plan for these costs. There are significant differences between school types; secondary schools are more likely to plan for costs (74%) than primary schools (52%). This may be because secondary schools rely on their wireless network infrastructure to deliver the NCEA curriculum, and therefore would experience a significant impact if their wireless internet connection is not performing optimally.

Following along from this, large schools are more likely to plan for maintenance and upgrade costs (71%) than small schools (42%). One reason for this may be that unreliable wireless connectivity impacts more people in larger schools, and so there is a stronger incentive to plan for upgrades. Another is that larger schools are more likely to have in-house skills, with a dedicated IT person or department, than smaller schools, where staff may serve multiple functions. Schools with dedicated IT staff are more likely to have the time and resources to plan for these costs.

Figure 1: Percentage of survey respondents that say they plan for the costs of maintaining or upgrading their network infrastructure.



3.2 Are schools confident that their budgets will cover these costs?

Responses: 255

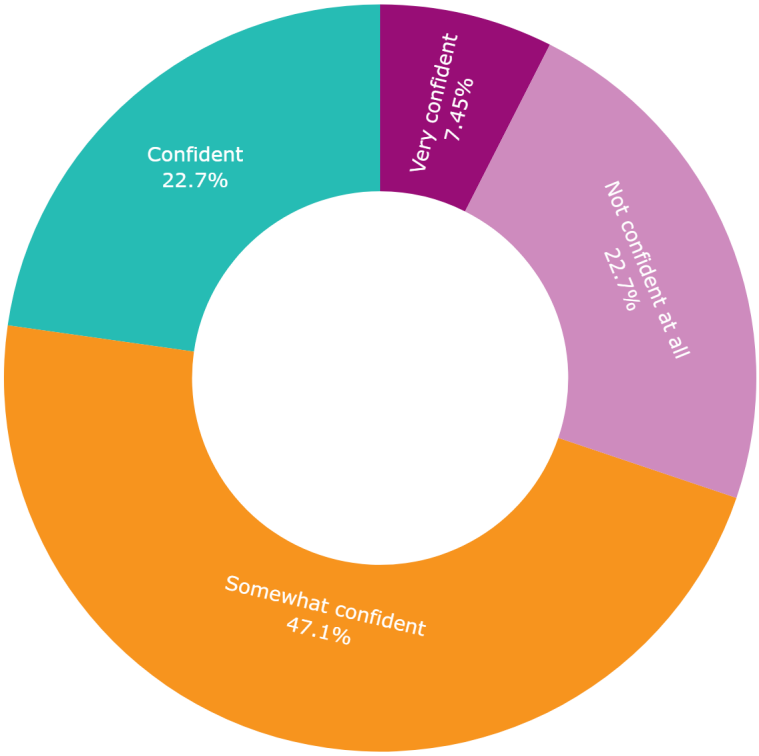
Of those that plan for maintenance and upgrade costs, 30% say that they are confident or very confident that their budget will be able to cover these costs. More than a fifth of respondents (23%) say they are not at all confident that they will be able to cover these costs. The margin of error around these responses is slightly larger (6.4%), as only those planning for the costs of network maintenance or upgrades were able to answer this question, resulting in a smaller pool of respondents.

While a similar proportion of primary and secondary school principals say that they are confident their budget can accommodate these costs, secondary schools are more likely to report being not at all confident their budget will cover maintenance and upgrade costs (35%) than primary schools (20%). See Appendix C for more detail.

Other surveys (noted below) of school staff have found that costs are a salient challenge facing schools; NZCER's survey of primary and intermediate schools identified the costs of maintaining and replacing digital technology as the most frequently identified issue faced by principals (52%) and teachers (35%). One comment from the NZCER survey said that, "It is a strand whose ongoing costs are challenging to finance through the budget."[5] In another NZCER survey, 8% of principals reported that their operational funding was sufficient to cover costs.[6] In a previous N4L Touchpoint survey (2017), managing growth, maintaining infrastructure, and managing costs were all cited as major issues facing schools.[7]

Figure 2: Confidence of schools that their budgets will be able to cover their network maintenance and upgrade costs.

[5] Bolstad (2017), p.29.
[6] Wylie (2017), p.1.
[7] N4L (2017), p. 12.



4 IT in schools

4.1 How often schools seek IT support

Responses: 454

Schools were asked how often they seek external IT support in the span of a year. Responses were variable, ranging from zero to 160. Some schools engaged a regular service, communicating with external IT support once a week or once a fortnight. Others called external support only a few times a year, when necessary. Clearly, there are some outliers; however, the majority of respondents (63%) receive support ten times or fewer per year.

The number of times schools seek support differs depending on school type. Secondary schools are more likely to seek support more frequently throughout the year, a median of 12 instances, compared to primary schools (7 times). This may be because of the need to deal with potential issues quickly in order to get NCEA-based learning back on track, whereas primary schools may have more flexibility in the types of learning they can engage in, and can switch between digital and more traditional (and offline) forms of learning more easily.[8]

[8] For more information about the potential differences in the integration of technology into the classroom between primary and secondary schools, see N4L (2016), p. 22.

Table 1: Median and mean numbers of calls to external IT support, divided by school characteristics.

	Median	Mean
All schools	8	17
Primary schools	7	14
Secondary schools	12	27
0-100 students	4	9
101-400 students	10	20
401+ students	12	20

4.2 Projects being planned by schools

Responses: 450

Schools were asked what IT-related projects they were planning on implementing in the next 12 months from a list of four options and were able to specify other projects they may be planning. They were most likely to say they were planning a one-to-one ratio of students to devices (40%) or moving records or data to the cloud (37%). The next most common project being planned was providing additional network security (14%), followed by community wireless (11%). Over a fifth of schools mentioned other projects they were planning, including implementing the digital curriculum and teaching more technical subjects (such as robotics), upgrading their wireless infrastructure, integrating a new Student Management System (SMS), improving communication with parents, and planning professional learning and development for digital technology. Multiple respondents mentioned that they were intending to increase the number of devices in their school without necessarily aiming for a one-to-one ratio.

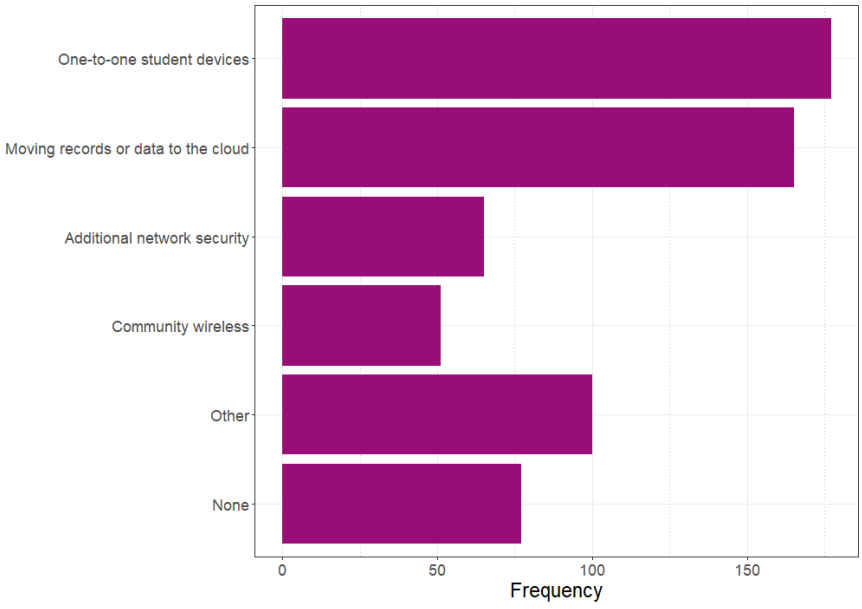
In general, secondary schools were more likely to be planning IT projects than primary schools; 19% of responding primary schools have no projects planned, compared to 4% of responding secondary schools. This is consistent with the pattern identified in an earlier N4L Touchpoint survey.[9] Secondary schools are more likely to be planning to shift their data to the cloud (64%) than primary schools (33%). They are also more likely to be intending to have one-to-one devices (57%) than primary schools (37%).

[9] N4L (2017), p. 11.

In addition, decile 1-3 schools are more likely to be planning community wireless programmes (20%) than decile 8-10 schools (5%), indicating that those living nearby decile 1-3 schools are more likely to benefit from a community wireless project. The desire to pursue this project could indicate that some of the schools' students don't have reliable (or any) internet access at home, and look to community wireless as a solution for this, providing the option for all of their students to continue learning at home As seen later in this report, concerns around equity of home internet access are prevalent, and this issue is most likely to affect students attending decile 1-3 schools. Large schools are also more likely to be engaging in community wireless projects (23%) than small schools (10%). This may be because of a greater pool of resources to focus on such a project, and the benefit to a larger number of students.

We have asked schools about the projects they are planning in previous iterations of the N4L Touchpoint survey, with some changes between years. In 2017, schools were more likely to report they were implementing BYOD (57%) and moving their data to the cloud (46%).[10] This may be because of the change in language between the two years; in 2017, schools were asked if they were implementing BYOD, while in 2018 they were asked about one-to-one devices. Schools may still be used to using the BYOD language, though it is a subset of one-to-one devices. This is likely, as some schools mentioned BYOD as another project unrelated to one-to-one devices. In the March 2017 N4L Touchpoint survey, secondary schools were also more likely to be planning a change or project in their school.

Figure 3: Projects being undertaken by schools in the next 12 months.



4.3 Technical projects schools would like support for

Responses: 388

[10] N4L (2017), p. 11.

Schools were asked what projects they would like support for, with a wide range of responses from the technical to the pedagogical. The main themes included:

Cloud (46 mentions): Of the schools mentioning the cloud, many were debating about moving their data from a local server to the cloud, or would like support for this. They wanted to know the most cost-effective strategies in shifting to the cloud or how to take advantage of their cloud-based storage in the best way. Others sought advice about security when using cloud-based systems, how to optimise the use of cloud-based technology, and how to integrate various cloud services.

Devices (44 mentions): The support desired for devices included a wide range of issues, such as how to deal with both student and network devices (e.g. routers). A was funding for one-to-one devices, and getting unbiased purchasing advice for their school. Other concerns were operational, such as support for setting up devices, managing device content, managing multiple devices, monitoring device use, repairing devices, and keeping them up-to-date. There were some questions around how to cope with ageing devices, and professional learning and development around devices for teachers in order to aid their integration into the classroom. There were also mentions of providing access to devices for the community.

Use of technology (28 mentions): Schools asked generally about how to use the services, apps, and devices they had access to in the most effective way. This was a common theme among their more technical concerns. In addition, schools wanted to expand the reach of their infrastructure and services, providing community access to devices and wi-fi as mentioned above.

Wireless Networks (26 mentions): A primary concern around wireless infrastructure was the ability to improve wireless coverage, speed, and reliability across the school. Respondent schools raised issues about areas that tended to get poor coverage, such as new classrooms that had been built that the network could not accommodate. Schools also talked about replacing hardware, including their switches, and upgrading the network. The cost of performing these tasks this was particularly of note, with some requesting assistance on planning for the costs of upgrades and understanding expectations and financial responsibilities. In addition, improving network security was continuously raised by schools. Training and equipping staff to manage their existing network infrastructure was another point raised, including monitoring the network and troubleshooting issues. There were also specific mentions around establishing distinct networks for different users, such as students, teachers, and guests.

Server (19 mentions): Servers were commonly mentioned in queries about shifting to the cloud, but schools were also interested in getting technical support on upgrading, maintaining, organising, or replacing their server. One person asked about ensuring they had a future-focused server solution. Another asked about managing server permissions.

Digital (16 mentions): Those that used the word 'digital' in their comment were either asking about using digital devices, or asking about how to integrate digital learning into their school. Advice on how to integrate the new digital curriculum was cited as a common concern, as was how to support digital citizenship programmes. Schools also desired professional learning and development around digital literacy.

The kinds of technical support issues prioritised by schools are in line with the challenges they indicated they were facing in the previous N4L Touchpoint surveys. While the primary challenges in the 2017 N4L Touchpoint survey were funding-related, schools were also apprehensive about managing growth, maintaining their infrastructure, and improving their technical skills.[11] Schools are still focused on trying to overcome these issues.

4.4 Technical issues experienced by schools

Responses: 54

The most frequently discussed issue that schools said they were experiencing was related to the speed of their internet. In some cases, speed was described as variable, slowing down during busy periods. Some also pointed out that their connection was unreliable, sometimes dropping off or not working.

While almost all schools in New Zealand now have a reliable fibre internet connection thanks to N4L's Managed Network, this connection runs to the schools server cabinet and the usability of this connection inside the school and within classrooms is dependent on the configuration and usability of the school's wireless internet connectivity, which the schools are responsible for operating and maintaining. A school's ability to operate and maintain wireless networks varies, and generally depends on the schools' budget and skillset.

While multiple people mentioned filtering, two specifically mentioned VPNs and their desire to have some predictability around the Managed Network Upgrade[12] in order to understand when they will have an improved ability to block students using them to circumvent the school's internet use policy. Schools will be better equipped to block VPNs following the upgrade of their N4L Managed Network connection. One school mentioned that they had to pay for a commercial web filtering service because N4L did not offer the functionality of group-level filtering; for schools with identity integration, N4L will be providing simplified group-level filtering following the completion of the upgrade later in 2019. In last year's N4L Touchpoint survey, filtering was a commonly mentioned issue.

The issues raised by schools are being worked through by N4L's Relationship Managers, who are our direct contacts with schools, to ensure they are solved.

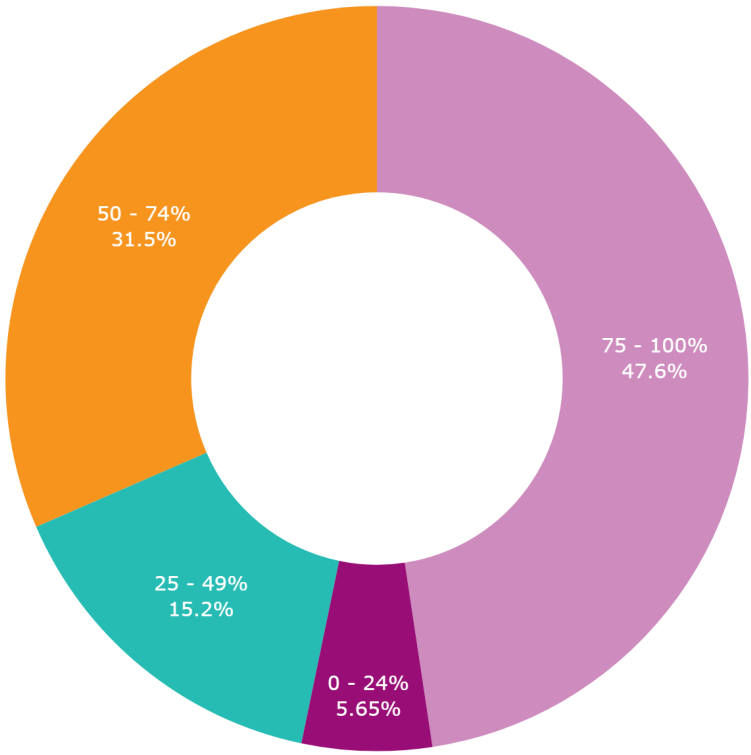
[11] N4L (2017), p. 12.
[12] See more information on our webpage, Managed Network Upgrade.

5 Connecting students - Students' internet access at home

Responses: 460

Less than half (48%) of the 460 respondents said that more than 75% of their students had access to the internet at home (see Figure 4). The distribution of internet access among school students was different according to decile; 85% of decile 1-3 schools said less than three quarters of their students had home internet access, compared to 52% of decile 4-7 schools and 16% of decile 8-10 schools. The responses suggest a clear gradient in the pattern of home internet access, with students living in low-income areas being the least likely to have access. Small schools, with fewer than 100 students, were also more likely to have a lower proportion of students living with home internet access, which could be because many of these schools are situated in rural areas. This is supported by the observation that primary schools are also more likely to have fewer students with home internet access, as these schools are also more likely to be smaller and rurally located. Another report estimates that 100,000 school-aged children are lacking home internet access,[13] which aligns with the findings of the Touchpoint survey.

Figure 4: Percentage of students at each school that have access to the internet at home.



[13] Digital Inclusion Research Group (2017), p. 9.

5.1 Does home internet access impact learning?

Responses: 457

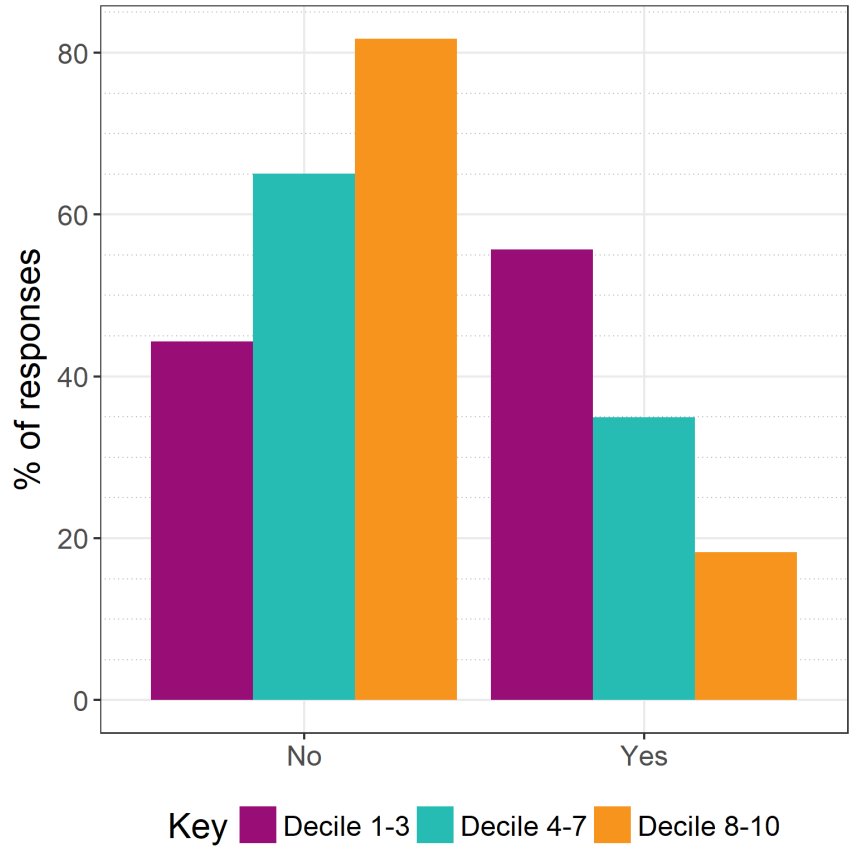
Survey respondents were asked if home internet connectivity impacts their teaching and learning practices, with follow-up comments indicating the impact is generally negative. Over 35% of the 457 respondents said that there is an impact, with the same gradient apparent according to decile. This is comparable to the Digital Technology in Schools survey, in which 19% of schools identified home internet access as a major barrier to using technology in the classroom, and 44% said it was somewhat of a barrier.[14]

Decile 1-3 schools are most likely to be impacted (56%), especially compared to decile 8-10 schools (18.3%), a distinction that was also found in the Digital Technology in Schools survey.[15] Schools that had a high proportion of students with home internet access were more likely to say this did not impact their teaching and learning practices. However, even in schools where more than three quarters of the students can access the internet at home, 19% still said that there is an impact, demonstrating that even when a few students do not have home internet access it can impede teaching practices in class.

"We have three students who don't have access at home - and this creates disparity."

Figure 5: Does a lack of home internet access impact teaching and learning practices? (segmented by decile)

[14] Research New Zealand (2017), p. 88.
[15] Research New Zealand (2017), p. 89.



5.2 Open-ended comments: The impact of home internet access

Responses: 159

Of the 168 people that said that student home internet access impacted their teaching and learning responses, 95% offered comments explaining these impacts in further detail, with clear themes emerging.

Impeded access to learning opportunities: Many respondents pointed out the technologies and learning programmes used in class, could not be accessed by students at home when they had no internet access. Comments were made that more classwork and homework is issued "digitally" and is "cloud-based" and therefore this 'limits opportunities' for students without home internet access. Some examples are Google Classroom or parts of the Google Suite, Mathletics, Maths Whizz, Reading Eggs, and general research. Further, new ways of learning, such as flipped learning (where students are asked to watch videos at home for discussion in class), or virtual classrooms, cannot be implemented when some of the students don't have home internet access.

"Limits learning opportunities for students at home. It is a barrier to their learning."

"When we move to one-to-one devices next year for our senior students, this will have a major impact (if students can't access internet from home)."

"Teachers cannot assume students have home access for research, learning applications and assignment work."

"Students have to wait until they return to Kura to carry out research. It also prevents us from learning courses online."

"For students who do not have internet, it affects the way they do their homework, their personal revision, their research."

"We do lots of flipped classroom learning but this doesn't work well if the students don't have internet access at home."

"It reduces the students' ability to extend their learning whilst at home. It also means that we have large numbers of students staying at school for long periods before and after school which poses a risk if they walk home when it is getting dark.

"Students can not access relevant examples to reinforce their daytime learning activities."

"Children miss out on online learning and collaboration outside of school hours."

"They cannot continue using learning programmes at home in the holidays."

"Students on farms cannot access wifi at home."

Equity: Multiple comments emphasised the impact on learning due to the inequity of home internet access. Respondents say "it's unfair" to students without home internet, that it creates "a barrier" to learning, "creates disparity", and "disadvantages" students that do not have access, "leaving them behind." The students most likely to be impacted are those from low-income households, Māori and Pacific students, and those living in rural areas.[16] Many of these students are already underserved by the education system,[17] and not having the same access to technology may disadvantage them further. A lack of internet access often intersects with other

[16] These observations from our survey respondents are supported by digital exclusion research, such as that performed by the Digital Inclusion Research Group (2017).
[17] For example, Māori and Pacific students and those attending low-decile schools are less likely to leave school with NCEA Level 3. For more information, see Education Counts' Indicators.

aspects of deprivation, with the same families unlikely to be able to afford devices or school activities.

"It's an equity issue. The families who can't afford it are the same ones who cannot afford camp or trips or even food…"

"Learners are not on an equal platform for learning opportunities."

"Students do not get supported by programmes that others get, and are left behind."

"Most classwork and homework is cloud-based. Lack of access is a barrier."

"Children without this access are disadvantaged."

"It means that some students can do the set work, and others cannot."

"Yes, the disparity is huge between those who have and those who don't."

"Unfair to those who are not able to connect from their homes and complete their learning online."

Parental involvement and engagement: Many schools have transitioned to digital newsletters or communicating with parents about their child's learning progress via online platforms or apps. A lack of home internet access means that schools have to find alternative ways of communicating with parents, with offline methods seen as less efficient. Some respondents believe that this leads to parents being less engaged with the school and their child's learning, as they are unable to be kept informed of their child's progress in a timely manner.

"[Impacts include] the feeling from whanau that they are unable to support their children; a lack of confidence to use technology; [and] not understanding the risks or impact of some of the activities they allow their children to take part in e.g. posting YouTube videos."

"Home and school partnerships are affected as parents cannot see nor children can share work. Emails and messages get missed."

"Parents can't access eportfolios and therefore are not as engaged in learning as they could be."

"It makes communication with home difficult."

"Parents not able to connect with their child's digital learning. And be in full communication with school."

"Only some parents are connected in our small rural community. This limits our potential use of eportfolios and blogs."

"It impacts the ability for parents and students to interact with the school."

"Children can't complete tasks and home school communication is impeded."

"Can't give all whanau the same service."

"It restricts what could have done in class because it cannot be supported at home."

24/7 or "anytime learning": Many comments were based around the importance of extending learning beyond school hours, including during the holidays, with some specifically mentioning "24/7 learning". The internet is not only seen as a way of distributing homework to students conveniently, and enabling them to consolidate the concepts learnt at school that day, but it is also viewed as a means for self-directed learning beyond what is covered in school. This is seen as important for encouraging students to see learning as something that can happen anywhere, even outside of school. Students who do not have internet access at home are seen as facing more barriers to "24/7 learning".

"They are unable to share learning with their families and the restrictions inhibit self-directed learning opportunities."

"Restricts 24/7 access to learning for some."

"Can only work on "online tutor" programmes at school."

6 Future trends and impact on learning

Responses: 429

We asked schools what technologies they thought would have the most impact on learning over the next three years. There was plenty of variety in the responses, with some more future-focused, and others appreciating seemingly ubiquitous technology, such as the internet, that can sometimes be taken for granted.

Devices (112 mentions): Devices were mentioned most frequently as the technology expected to impact learning in the next three years years. Some mentioned specific devices, including chromebooks and iPads (both being mentioned 36 times each). Respondents often added context to emphasise the way devices are used to enhance learning will change. However, in tandem with other themes throughout this report, the continuous mention of devices in response to this question shows they are in demand, and the impact of increasing the ratio of

the number of devices per student may yet still to be felt for some. This is likely because of the strains schools feel around funding device purchase and replacement. Looking to the future, increasing the number of devices may also impact the stability or operability of the school's wireless networks, and schools may need to increase their investment for these networks accordingly.

Robotics (64 mentions): The use of robots or robotics in the classroom were commonly mentioned themes in response to this question. This may be explained by the increasing number of education-related robotics products on the market and demonstrate schools' enthusiasm for their use in the classroom.

Coding (60 mentions): Coding was often cited alongside mentions of robotics. This skill is seen as useful and impactful for student learning; for example it can help develop problem-solving abilities.

Internet access (30 mentions): Though almost all schools in New Zealand now have a reliable fibre internet connection thanks to N4L's Managed Network, as mentioned earlier in this report, the usability of this connection inside the school and within classrooms depends on the configuration and useability of wireless internet connectivity, which schools are responsible for operating and maintaining. Further, as emerging technologies such as Artificial Intelligence and Virtual Reality require quality, reliable internet connections, the internet underpins many forms of technology that are likely to have an impact on learning over the next three years.

Some other commonly mentioned items include the digital curriculum and cloud-based systems.

7 Stories of technology use in classrooms

Responses: 73

We asked schools to share interesting stories around their use of technology in the classroom. A wide range of examples and stories were mentioned, from movie making, animation, game making, coding, robotics, 3D printing, virtual reality, augmented reality (for maths strategies), to using YouTube for Teacher PLD (professional learning development) and the arts (painting and dance), as well as EOTC (Education Outside the Classroom).

However, it should be noted that some respondents said they were still facing the challenges of access to technology; lack of funding, access to devices, access to PLD, or inequity of home internet access meant they were unable to "maximise opportunities as well as they should."

"We use ipads for field work and learning outside the classroom e.g. trips to the bush, swamp, marae etc."

"Creating memes in Te Reo to share language, robotic challenges have had an impact on mathematical thinking. As well as having contact with students and people nationally and internationally.

"Augmented reality being used to teach maths concepts. The teacher prepares basic hard copy examples of maths strategies, displays them on the wall and the kids use iPads to view the AR (normally films and/or sound clips) that explain the concept in details. Hugely engaging."

"We will be using very interesting technology in our upcoming river monitoring programme eg remote wireless river level and weather monitoring systems. Students will be learning about making raspberry pi computers to receive and store data and this data will be analysed with the help of real scientists."

"We are harnessing senior students to act as ICT tutors."

"Teachers learn off each other and share tips and methods of good use at staff meetings. I have seen teachers who are not great at art use YouTube clips from artists to teach a technique etc. The development of Inquiry Learning and teaching students better questioning techniques is where we are going at present. Not just Googling. Teachers know that they are free to follow whatever extra PD in ICT when they wish."

"We use technology all the time to access learning online classrooms and video conferencing with experts. Students engage with other schools and the vln classroom. Using online tools for reflection and in the future to share with parents as digital portfolios. Creating music, problem solving coding, movie making. nothing particularly exciting or innovative but the students love it."

"We do not ask our families to provide devices for their child as we believe this puts undue pressure on families who are already struggling. Currently ICT in schools is not yet equitable."

"Our 6 pupils used web-based CAD programmes to design and create 3D printer models. This is a small group activity (about 16 - 20 Pupils) and the children who do not have internet or devices at home find it more difficult to keep up, but they do as much as possible in other classes during the school day."

8 Conclusion

The results from the 2018 N4L Touchpoint survey indicate that schools are facing similar challenges to what they encountered in previous years. Cost remains an impediment, and is reflected in a school's ability to pay for the maintenance of their internal network infrastructure. A school's wireless internet connectivity can impact the quality, speed, and reliability of a student's internet experience.

In general, wireless network infrastructure is a key area schools are seeking support for, and can often slow down users' internet speeds if they are not maintained and upgraded, especially if the school is connecting more devices to the network. A school's ability to operate and maintain wireless networks varies, and can depend on the schools' skillset and the funding allocated to this infrastructure. The most consistent differences in technology experiences within schools are noted between primary and secondary schools. Schools have different priorities when it comes to integrating technology into teaching and learning. Secondary schools are more likely to be implementing technology projects in the next twelve months, especially a one-to-one ratio of devices for students.

In addition, secondary schools are more likely to be planning for the costs of maintaining and upgrading their wireless networks. They also consult or engage with external IT support more frequently. This could be for a number of reasons: larger schools can equate to more school users connecting across a larger physical campus, requiring more complex and robust wireless network configurations, which in turn require a more advanced skill-set to maintain. Further, in secondary schools, when there are external examinations, there is less flexibility in the curriculum. In this context, unreliable technology is a major disruption, and needs to be quickly remedied. As a consequence, it may be that secondary schools are better supported to implement these projects.

A school's decile, which is reflective of the school's government funding and percentage of its students living in low socio-economic communities, can also impact how the school uses the internet for learning. This correlation was especially apparent with respect to the equity of home internet access, where students with home internet have the option to continue to learn at home, after school hours and therefore are presented with different learning opportunities over students living without a home internet connection. Low decile schools are most likely to feel the negative impacts of students without home internet access, with wide-ranging effects including the inability to implement new forms of pedagogy, difficulties communicating with parents, and inequity in learning. Because of these impacts, low decile schools are more likely to be looking to implement community wireless projects in the coming year.

N4L is currently involved in a number of projects aimed to address the challenges and concerns identified with connecting schools, classrooms and students to allow learning to take place where and when it's needed. The findings in this survey will help inform how we deliver support and services in these areas for current and future streams of work.

9 Bibliography

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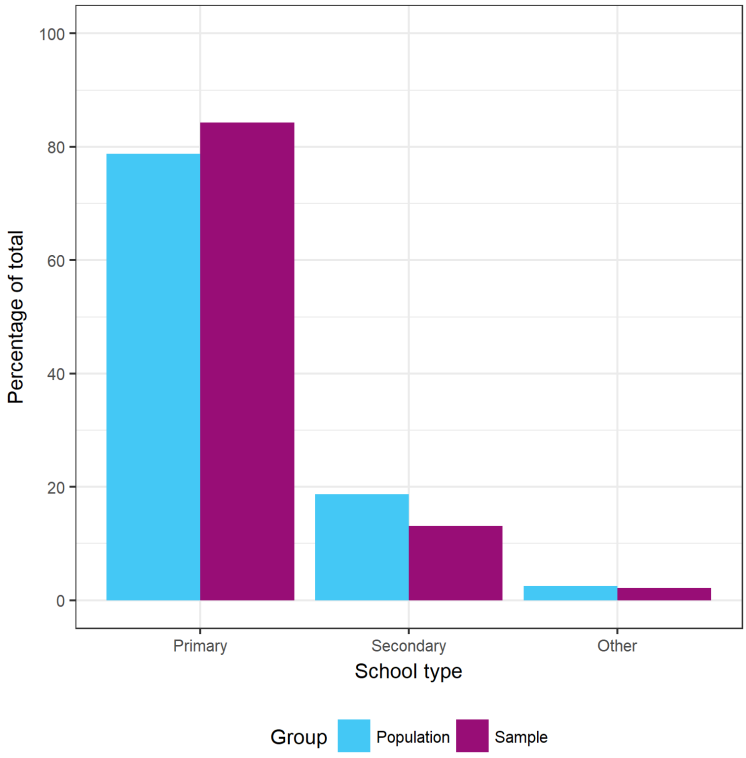
10 Appendix A: Overview of Survey Respondents

Figure 6: Proportion of each school type in the school population compared to the survey sample.



In 2018, N4L's Touchpoint survey was successfully delivered to 2,342 schools and 500 schools provided full or complete responses, with 459 of these schools fully completing the survey. This means there was a completion rate of 19.6%. Only schools connected to N4L's Managed Network[18] received this survey, provided they had not unsubscribed from our email communications. This means principals that do not receive our emails are not represented in the sample, which may cause some bias in the responses to questions related to the customer experience, such as how well-informed principals feel. In addition, principals may forward the survey onto another member of staff to complete; 85% of respondents were principals or deputy principals, while the remaining 15% were in a range of positions, including IT leads and senior teachers.

When analysing the sample for school demographics, it is representative across decile and geography. However, primary schools were more likely to respond than secondary schools,

[18] Note more than 99% of New Zealand's state and state-integrated schools are connected to N4L's Managed Network.

leading to them being overrepresented in the sample. The distribution of school type in the sample was significantly different than the population, and for this reason weighted percentages are also reported in the tables to correct for the underrepresentation of secondary schools. Secondary schools make up 18% of the population, but 13% of the sample. Small schools were also slightly overrepresented in the sample, likely due to the high response rate of primary schools, but the distribution was not significantly different from that of the population, and so this has not been incorporated into the weightings.

11 Appendix B: Supplementary tables - Additional details for overall responses

11.1 Planning for costs of maintaining or upgrading network infrastructure

Table 2: Do schools plan for the costs of maintaining or upgrading network infrastructure

	Yes	No
Frequency	255	204
Percentage	55.6%	44.4%
Weighted percentage	56.6%	43.4%
Confidence interval	±4.7%	±4.7%

11.2 Confidence in school budget covering the costs of network upgrades

Table 3: Confidence in school budget covering the costs of network maintenance and upgrades

	Very confident	Confident	Somewhat confident	Not confident at all
Frequency	19	58	120	58
Percentage	7.5%	22.8%	47.1%	22.8%
Weighted percentage	7.6%	22.5%	46.5%	23.5%
Confidence interval	±6.4%	±6.4%	±6.4%	±6.4%

11.3 How frequently schools seek external IT support

Table 4: How frequently schools seek external IT support

Number of support calls	Frequency	Percentage	Cumulative percentage
0	17	3.8%	3.8%
1 - 5	171	38.1%	41.9%
6 - 10	93	20.7%	62.6%
11 - 20	64	14.3%	76.9%
21 - 50	78	17.4%	94.3%
51 - 100	24	5.3%	99.6%
101 - 160	2	0.4%	100%

11.4 Summary of projects being planned by schools

Table 5: IT projects being planned by schools

Project	Frequency	Percentage	Weighted percentage
Additional network security	65	14.4%	13.4%
Community wireless	51	11.3%	10.2%
Moving records or data to the cloud	165	36.7%	34.0%
One-to-one student devices	177	39.3%	35.9%
Other	100	22.2%	19.8%
None	77	17.1%	14.8%

11.5 Student internet access at home

Table 6: Proportion of students with internet access at home

	0-24%	25-49%	50-75%	75-100%
Frequency	26	70	145	219
Percentage	5.7%	15.2%	31.5%	47.6%
Weighted percentage	5.6%	14.8%	32.0%	47.6%
Confidence interval	±4.8%	±4.8%	±4.8%	±4.8%

11.6 Does student home internet access impact teaching and learning practices?

Table 7: Does home internet access impact teaching and learning practices

	Yes	No
Frequency	168	289
Percentage	36.8%	63.2%
Weighted percentage	36.8%	63.2%
Confidence interval	±4.5%	±4.5%

12 Appendix C: Supplementary tables - Responses segmented by school characteristics

12.1 Planning for costs of maintaining and upgrading wireless network infrastructure

Table 8: Planning for costs segmented by school type

School type	Measure	Yes	No
Other	Frequency	8	2
	Percentage	80.0%	20.0%
Primary	Frequency	255	204
	Percentage	51.9%	48.1%
Secondary	Frequency	46	16
	Percentage	74.2%	25.8%

Table 9: Planning for costs segmented by school size

School size	Measure	Yes	No
0-100	Frequency	63	89
	Percentage	41.5%	58.6%
101-400	Frequency	135	92
	Percentage	59.5%	40.5%
401+	Frequency	57	23
	Percentage	71.3%	38.8%

12.2 Confidence in being able to cover wireless internet maintenance and upgrade costs

Table 10: Confidence in covering upgrade and maintenance costs segmented by school type

School type	Measure	Very confident	Confident	Somewhat confident	Not confident at all
Other	Frequency	1	4	2	2
	Percentage	11.1%	44.4%	22.2%	22.2%
Primary	Frequency	14	47	99	40
	Percentage	7.0%	23.5%	49.5%	20.0%
Secondary	Frequency	4	7	19	16
	Percentage	8.7%	15.2%	41.3%	34.8%

12.3 IT-related projects being planned in the next 12 months

Table 11: IT-related projects being planned in the next 12 months segmented by school type

School type	Measure	Moving records or data to the cloud	One-to-one student devices
Other	Frequency	3	2
	Percentage	30.0%	20.0%
Primary	Frequency	123	140
	Percentage	32.5%	36.9%

Secondary	Frequency	39	35
	Percentage	63.9%	57.4%

Table 12: Community wireless projects planned in the next 12 months segmented by decile

Decile	Measure	Community wireless
1-3	Frequency	27
	Percentage	19.7%
4-7	Frequency	16
	Percentage	8.8%
8-10	Frequency	6
	Percentage	4.8%

12.4 Student internet access at home

Table 13: Percentage of students with a home internet connection segmented by decile

Decile	Measure	0-24%	25-49%	50-74%	75-100%
1-3	Frequency	23	55	42	21
	Percentage	16.3%	39.0%	29.8%	14.9%
4-7	Frequency	1	11	84	90

	Percentage	0.5%	5.9%	45.2%	48.4%
8-10	Frequency	0	3	17	107
	Percentage	0	2.4%	13.4%	84.3%

Table 14: Percentage of students with a home internet connection segmented by school size

School size	Measure	0-24%	25-49%	50-74%	75-100%
0-100	Frequency	17	30	45	62
	Percentage	11.04	19.48	29.22	40.26
101-400	Frequency	9	32	74	110
	Percentage	4	14.22	32.89	48.89
401+	Frequency	0	8	26	47
	Percentage	0	9.88	32.1	58.02

Table 15: Percentage of students with a home internet connection segmented by school type

School size	Measure	0-24%	25-49%	50-74%	75-100%
Primary	Frequency	23	64	115	185
	Percentage	5.94	16.54	29.72	47.8
Secondary	Frequency	2	4	24	32

	Percentage	3.23	6.45	38.71	51.61
Other	Frequency	1	2	6	2
	Percentage	9.09	18.18	54.55	18.18

12.5 Does a lack of home internet access impact teaching and learning practices?

Table 16: Whether a lack of home internet access impacts teaching and learning practices, segmented by decile

Decile	Measure	Yes	No
1-3	Frequency	78	62
	Percentage	55.7%	44.3%
4-7	Frequency	65	121
	Percentage	35.0%	65.1%
8-10	Frequency	23	103
	Percentage	18.3%	81.8%

Table 17: Whether a lack of home internet access impacts teaching and learning practices, segmented by percentage of students with internet access

Percentage of students with home internet	Measure	Yes	No
0-24%	Frequency	17	8

	Percentage	68.0%	32.0%
25-49%	Frequency	42	28
	Percentage	60.0%	40.0%
50-74%	Frequency	67	77
	Percentage	46.5%	53.5%
75-100%	Frequency	42	176
	Percentage	19.3%	80.7%