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## Economic Value Highlights

**61%**

Lower three-year TCO

**49%**

Lower device cost

**93%**

Faster deployment

**68%**

More efficient ongoing device support

**91%**

Fewer reboots

# The Economic Value of Chromebooks for Educational Institutions

## EXECUTIVE SUMMARY

Adoption of technology in schools has shifted into high gear as hardware costs have declined and a new generation of applications geared toward education has sprung into existence. This convergence of software and devices has led educators to more fully embrace technology and has led students to become more engaged in their education. In school districts across the United States, the end result has been measurably improved student outcomes.

The range of devices available to schools has increased significantly while the average cost per device and the average cost of the associated apps have declined at a rapid pace. Despite the positive momentum around the cost of devices and software, two areas that have remained stubbornly resistant to such progress are the time and the cost associated with the deployment and management of devices. Recently, however, significant improvements have been made in these areas thanks to the increasingly widespread deployment of Google's Chromebooks in education. Chromebooks offer low hardware costs, with devices that start at \$149. Chromebooks include a full suite of integrated education apps, plus access to more apps in an easy-to-access online store. And equally important, they offer low-cost, built-in deployment and management features thanks to Google's Admin Console. The result: devices that teachers and students like to use and a lower total cost of ownership (TCO) that allows schools to put the devices into more classrooms.

IDC conducted interviews with 10 school systems located worldwide that are using Chromebooks to support teaching and learning. According to these schools, they are benefiting from the cost and operational efficiencies Chromebooks provide while more of their students are able to take advantage of productive, web-enabled learning tools. Analysis

of interviews with these school systems demonstrates that Chromebooks offer a 61% lower total cost of ownership than the devices they replaced or would otherwise have purchased because:

- » Chromebooks are cost effective.
- » Chromebooks are operationally efficient, requiring substantially less time to deploy, maintain, and support.
- » Chromebooks are reliable, which saves students — as well as teachers and administrators — time that would otherwise be spent on device-related problems.

In addition to these benefits, interviewed schools described how Chromebooks have enabled them to put devices and learning applications in the hands of more students. As a result, teaching and learning are enhanced through greater collaboration, engagement, and access to learning materials.

## Situation Overview

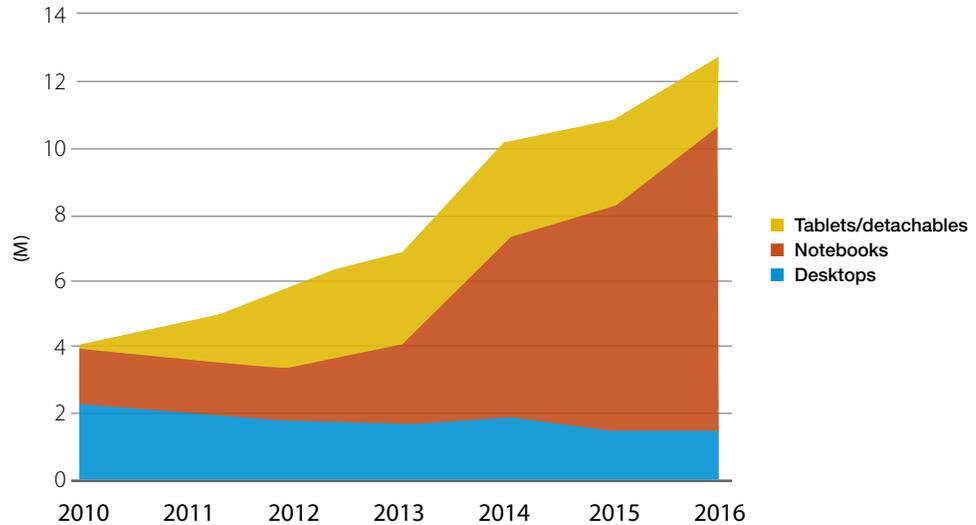
### Embracing Technology in the Classroom

In recent years, there has been a dramatic shift in how schools approach technology. The increasing tech savviness and changing expectations of teachers, administrators, parents, and students, combined with a wave of new, more affordable, and easier-to-use devices and internet-based services, have led to a dramatic rethinking of how teachers and schools use devices within the classroom. Instead of using technology to supplement more traditional means of instruction, many schools today are using technology to drive new ways to teach. And instead of using devices before or after class, teachers and students are using them during class to drive interactions and better outcomes.

Recent technology innovations have helped hasten the adoption and use of technology in the classroom to drive learning and engagement. Over the past five years, the number of computing devices shipped into U.S. K–12 deployments per year has more than doubled, increasing from 4.7 million units in 2011 to 12.8 million units in 2016. Tablets drove the early surge in 2011 and 2012, and these touch-first products still play a crucial role in introducing technology to early grades that do more consumption than creation. But in more recent years, the biggest growth has come from a radical increase in traditional notebook and touch-enabled convertible notebook shipments, driven by the requirement of older students who require a keyboard for more creation-focused work. Figure 1 shows K–12 education device shipment totals in the United States for 2010–2016.

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**FIGURE 1**  
U.S. K–12 Education Device Shipments, 2010–2016



Source: IDC, 2017

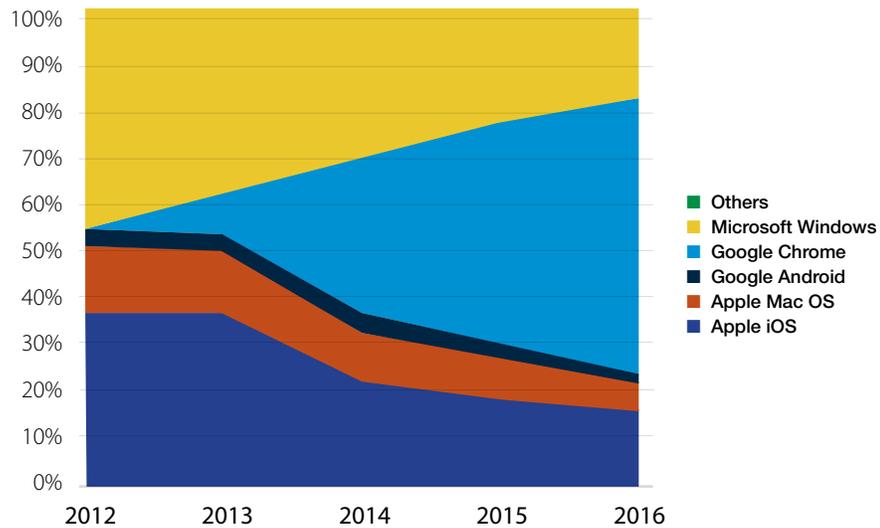
### Chromebooks Take Off

The key driver of notebook growth in the U.S. K–12 education market has been the ascension of the Google Chromebook. Based on Google’s always-updated Chrome OS, Chromebooks offered an easy-to-use operating system (OS) in a notebook or convertible form factor with a built-in keyboard, integrated security, a suite of included apps, and simple deployment and manageability features. Introduced in 2011 by Google and several hardware partners, the products didn’t make much of a splash at launch. However, by 2013, educators began to warm to the new product, and an increasing number of hardware partners signed on to manufacture them. Today, all the major personal computer (PC) vendors offer Chromebooks focused on the education market.

In 2013, Chromebook shipments into U.S. K–12 education increased from a few thousand units to 600,000 units. In 2016, shipments increased to 7.5 million units, propelling the platform’s market share to the head of the class well in front of both Microsoft’s and Apple’s venerable platforms. IDC expects 2017 to be another record-breaking year for Chromebooks as the devices address many of the key challenges that have plagued personal computers in education since the beginning. Figure 2 shows Chromebooks’ increasing market share in the U.S. K–12 education market.

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**FIGURE 2**  
U.S. K–12 Education Device Shipment Share  
by Operating System, 2012–2016



Source: IDC, 2017

Chromebooks also deftly address several other key areas that have become increasingly important to schools, including ease of use and management and the need for a wide range of different, highly versatile devices that fulfill the needs of different age groups and use cases.

## Chromebook Technology

The casual observer might attribute the entirety of Chromebooks' success in education to the low cost of the technology. While low cost is one key factor that gets the attention of educators, Chromebooks also represent a high-impact addition to any classroom that helps teachers drive student engagement thanks to a large and growing suite of Google apps and services. Chromebooks also deftly address several other key areas that have become increasingly important to schools, including ease of use and management and the need for a wide range of different, highly versatile devices that fulfill the needs of different age groups and use cases.

### Easy to Use: The Browser Is the OS

Chromebooks run Chrome OS, Google's always up-to-date operating system. Chrome OS is familiar to anyone who has used a browser to surf the web. Chrome is built to be fast and agile, with updates that happen frequently and silently in the background. Unlike more traditional PC operating systems that tend to slow down as programs are added and removed and update after update is applied, apps running on Chrome can't impact the underlying OS, so performance doesn't decline over time. Plus, most Chromebooks boot in 10 seconds or less. And while legacy PC operating systems require additional software to

Inside Chrome, Google offers a long list of free apps for teachers and students called the G Suite, and the suite is headlined by an app called Classroom. Google Classroom is the mission control for teachers and students.

keep viruses and malware at bay, Chrome has integrated security software that doesn't slow down the system and is always current.

Inside Chrome, Google offers a long list of free apps for teachers and students called the G Suite, and the suite is headlined by an app called Classroom. Google Classroom is the mission control for teachers and students. It lets teachers organize their digital classroom, create and grade assignments, share content with students and colleagues, and send feedback to students, all in one place. In addition to Classroom, the other G Suite apps that are free for schools and do not have any ads included in the education suite are Gmail (email), Drive (online storage), Talk/Hangouts (real-time chat), Forms (online information gathering forms), Calendar, Contacts, Groups, Docs (word processing), Sheets (spreadsheets), Slides (presentations), Vault, and Sites (intranet and project management). Because each app has an online component, it is easy and straightforward for students and teachers to create, share, and collaborate on projects. Students can also submit private work to teachers and receive individual feedback.

While the most holistic Google for Education experience happens on a Chromebook, Google realizes that many schools have legacy hardware and student bring-your-own-device (BYOD) programs. In these instances, educators can still utilize Google apps since all the apps run in a browser. This means they work on Chrome browsers running on other devices or even non-Chrome browsers such as Apple's Safari, Mozilla Firefox, and Microsoft's Internet Explorer. This is key for schools that have a mix of hardware, including Windows and Mac OS desktops and notebooks and Android and iOS tablets. As long as the device can access the web, the student can access the G Suite for Education.

### ***Easy to Manage: The Magic of the Admin Console***

As more schools have moved to embrace technology in the classroom, the complexity and the cost associated with deploying and then managing devices for use by students and teachers have been crucial and ongoing inhibitors. Most other devices are time consuming to set up and difficult to manage; Google's Admin Console allows schools to handle these tasks remotely, easily, and quickly through a simple web-based interface that costs just \$30 per device to maintain.

The Admin Console gives educators access to over 200 policy settings, which can be pushed to an unlimited number of devices — and users — instantly. The policy settings fall into two major categories: user settings and device settings. User settings are applied to a group of

users, regardless of the end device. Key categories include policies on what apps, extensions, and features a user is allowed to access. A long list of configurable security features is also available within the user settings. Device settings allow the administrator to set policies for a specific Chrome device, regardless of who is using the device. Best of all, the integrated nature of the Google solution prevents students from circumventing the managed state.

One of the key benefits of Chromebooks and the Admin Console is that an unlimited number of students can use a single Chromebook over the course of a day. Students sign in to a Chromebook and gain access to all their apps, files, and settings. Later, when they log out of the device, everything is saved to the cloud, and the device returns to its original state. Privacy is maintained, and the device is immediately ready for the next student.

### ***Low Cost and Extreme Versatility***

Ease of use and ease of manageability are crucial elements of Chromebooks' success in education, but there is simply no denying the fact that the low cost of hardware has been a fundamental driver. When Chromebooks began to gain traction, most of the devices shipping into education sold for \$250–300. That's a remarkable price for a durable solid-state device with a keyboard, integrated security and apps, and easy manageability.

Today, the starting price for a Chromebook notebook is just \$149. In addition, screen sizes have proliferated — today, you can find Chromebooks with a wide range of screen sizes. More recently, several vendors have brought to market touchscreen notebooks and convertible notebooks, some with world-facing cameras that allow students to capture and then edit their own multimedia. A recent exciting addition to some next-generation Chromebooks is support for low-cost pens, which make it possible for students to do free-form writing as well as interact with apps where a keyboard or standard touch is less than optimum. Furthermore, Google has pushed Chrome onto traditional desktop form factors (Chromeboxes), all-in-one desktops (Chromebase), and even \$99 USB-sized keys that plug into a monitor or TV (Chromebits). When Chromebooks first launched, only a few hardware vendors offered products. But today, all the major PC vendors offer Chromebooks, as do a growing numbers of mobile device makers.

Finally, it's worth noting that Chromebooks offer one additional benefit: a highly secure, locked down testing environment for schools. A school can administer student assessments, including state standardized tests from the Partnership for Assessment of Readiness for College and Careers (PARCC) and the Smarter Balanced Assessment Consortium (SBAC), through the Admin Console.

# The Economic Value of Chromebooks for Educational Institutions

## Study Demographics

In spring 2015, IDC interviewed 10 school systems in 7 countries regarding their experiences supporting teaching and learning with Chromebooks. The interviews consisted of a variety of quantitative and qualitative questions designed to obtain information about the economics of deploying Chromebooks for these school systems as well as the impact of using Chromebooks on their students and faculty. These school systems ranged significantly in size and scope of operations, from large U.S. public school districts to smaller school systems supporting only middle- and high-school students. Interviewed school systems had average enrollments of 29,462 students, with the range of enrollments being 620–145,000 students (see Table 1).

**TABLE 1**

Demographics of Interviewed Educational Institutions		
	Average	Range
Number of teachers	2,034	45–9,000
Number of administrators	543	5–1,900
Number of students	29,462	620–145,000
Number of elementary schools	24	0–70
Number of middle schools	10	0–43
Number of high schools	10	0–31
Number of Chromebooks — total	13,735	320–55,000
Number of Chromebooks — teachers	320	0–1,520
Number of Chromebooks — administrators	92	0–824
Number of Chromebooks — students	13,323	320–55,000
Countries	United States, Canada, United Kingdom, Sweden, Denmark, Australia, and New Zealand	

Source: IDC, 2015

The size of the school systems' Chromebooks deployments also varies, ranging from 320 to 55,000, with an average of 13,735 at the time interviews were conducted.

The 10 school systems interviewed by IDC for this study represent a diverse group of institutions in terms of not only size but also geography. Of the 10 schools, 4 are located in the United States, with the other 6 domiciled in Canada, the United Kingdom, Sweden, Denmark, Australia, and New Zealand. The size of the school systems' Chromebooks deployments also varies, ranging from 320 to 55,000, with an average of 13,735 at the time interviews were conducted.

These school systems have taken significant steps toward making Chromebooks their device of choice to support student learning. As shown in Table 2, over half of all devices (56.3%) used by students in a classroom setting in these school systems are Chromebooks. For these school systems, Chromebooks have both replaced legacy devices and served as supplemental devices. These schools have deployed an average of 39.9% of their Chromebooks to replace other devices. While Chromebooks have replaced substantial numbers of desktops and laptops for student use in the classroom, PC laptop use remains most common for teachers and administrators.

**TABLE 2**

### Average Device Bases (%)

Device Type	Students	Teachers	Administrators
Chromebooks	56.3	9.4	3.3
Desktops	21.3	6.3	18.8
Macs (desktops and laptops)	1.8	1.9	7.6
PC laptops	9.5	70.2	56.1
iPads	10.5	11.9	13.6
Tablets (non-Android)	0.0	0.2	0.4
Android tablets	0.5	0.2	0.4

Source: IDC, 2015

### Economic Benefits Analysis

Interviewed organizations have achieved substantial economic efficiencies with Chromebooks by reducing spending on devices, needing less staff time to deploy and manage devices, and reducing inefficiencies associated with lost productive time due to device reboots, outages, and other problems. IDC calculates that Chromebooks have an average *61% lower three-year total cost of ownership* compared with devices replaced or alternative devices considered:

Chromebooks require less effort to manage (67.9%), troubleshoot (91.9%), and apply security settings (74.6%). This saves time worth an average of \$602 per Chromebook over three years.

- » **Cost efficiencies.** Chromebooks cost an average of 45.8% less than the devices they replaced or alternative devices, and schools are realizing overall device-related savings of 49.2% when taking into account server, licensing, and other cost savings enabled by Chromebooks. This saves an average of \$317 per Chromebook over three years in device-related costs.
- » **IT efficiency benefits.** Chromebooks are easy to deploy, taking less than 10 minutes on average per device compared with 1.8 hours with a replaced or an alternative device. In addition, Chromebooks require less effort to manage (67.9%), troubleshoot (91.9%), and apply security settings (74.6%). This saves time worth an average of \$602 per Chromebook over three years.
- » **Improved device reliability and performance.** Chromebooks minimize interruptions to students and potential lost productive time for teachers and administrators with their reliability and durability. On average, Chromebooks experience only minutes of unavailability per year per device due to reimaging, reboots, unplanned downtime, and hardware failures.

### **Cost Efficiencies**

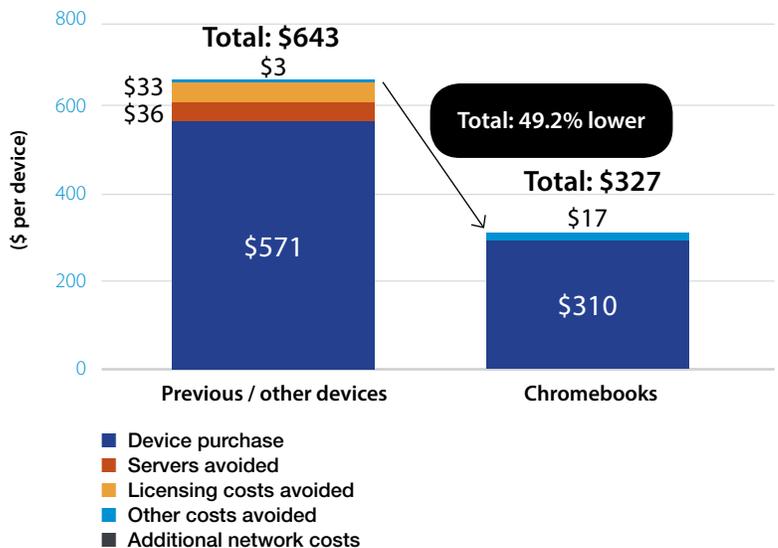
School districts interviewed for this study reported seeking cost-effective device solutions that would help them extend device use to as many students as possible. Typical of educational institutions, they face challenging decisions about how to spend most efficiently and effectively. Several of the interviewed organizations brought Chromebooks into their classrooms as a supplementary or additional device for students to use, but more have replaced existing devices — typically desktop and laptop PCs — with Chromebooks. They credit the price of Chromebooks with helping them expand their device bases and provide devices to more students.

On average, these school districts have paid \$310 per Chromebook and the accompanying Chromebook Management Console compared with an average price of \$571 per device they replaced. In addition, school districts required server resources to support applications running on their legacy devices, whereas they do not need servers to support cloud-based Google Apps. They have also avoided the licensing costs associated with legacy devices and applications, which can be quite costly when taking into account the thousands of devices at many of these school systems. This means that these organizations are now paying an average of \$327 per Chromebook over three years — including some additional costs for networking that results from “our students actually using them,” as one school district told IDC — compared with \$643 per legacy device. This translates to 49.2% lower spending per device over three years for these organizations (see Figure 3).

“The number of devices that we can put into the system with Chromebooks significantly outstrips what was there before.”

According to interviewed school systems, these cost advantages of Chromebooks directly impact the ability of the school systems to support more of their students with web-based learning devices. As one school system explained, “The number of devices that we can put into the system with Chromebooks significantly outstrips what was there before.” According to another school district, Chromebook’s price point has enabled the school system to reach a 1:1 user-device ratio, something it never could have done given the cost of its previous devices: “We now have a 1:1 device solution with Chromebooks ... Without Chromebooks, either we would have fewer devices or we would have had to spend four times as much to get to the same point.” For these school systems, being able to expand the number of students who have daily or consistent access to educational applications on Chromebooks represents a substantial advantage and supports their core missions.

**FIGURE 3**  
**Cost per Device Comparison**



Source: IDC, 2015

**IT Efficiency Benefits**

School systems using Chromebooks in the classroom reported that they have dramatically reduced the time burden per device on individuals supporting device deployment, management, troubleshooting, and applying security. These institutions traced these efficiencies to their ability to apply policy and rules remotely to any number of devices at the same time through the Chrome Management Console as well as the reliability and ease of using Chromebooks.

“I would say that we are saving more than 70% of our time on managing the devices. If we were going to do this with another device, we’d have to almost double our staff ... [W]e have all of these devices now, but we don’t hear people talking about managing them.”

Time savings for these school systems started with their Chromebook deployments. The time it took these school systems to deploy Chromebooks varied substantially; perhaps not surprisingly, those that opted to migrate legacy applications into the Google Cloud at the same time as they deployed Chromebooks required more time and staff effort. Still, even those organizations reported needing less time than with their previous devices. Many school systems described putting Chromebooks into use as requiring little more than taking them out of the box and starting them, thanks to centralized configuration and deployment. These school systems reported spending an average of 57.3% less time per device on deployment. One school system described the ease of deploying Chromebooks as follows: “Deployment of Chromebooks doesn’t take weeks — it takes hours. No testing. Just roll them in with the Google Console, which takes seconds per machine, and then take them out.”

Once deployed, Chromebooks require much less time to manage, troubleshoot, and secure than replaced devices. The ability to manage fleets and apply security policies through the Chrome Management Console means that interviewed organizations now spend 67.9% less time managing Chromebooks than previous devices and 74.6% less time managing security. Meanwhile, the strong reliability of Chromebooks has reduced the amount of time these school systems must devote to troubleshooting by an average of 91.9%. Complex operations that used to add up to significant time across large device bases, including patching, adding applications, and setting policy, now take far less time and are much less burdensome with Chromebooks (see Table 3).

School systems using Chromebooks provided several examples of these types of efficiencies:

- » **Ease of management:** “I would say that we are saving more than 70% of our time on managing the devices. If we were going to do this with another device, we’d have to almost double our staff ... [W]e have all of these devices now, but we don’t hear people talking about managing them.”
- » **Ease of adding applications:** “With Chrome, you can add applications via the Admin Console. With Chrome, for 3,000 devices, it would take ... an hour. With [our previous devices], for the 3,000, I’d say that it would take 300 hours.”
- » **Ease of security and updates:** “We selected Chromebooks for the security, for the included software updates, the sustainability, [and] not having to actually touch the devices very often for updates.”

TABLE 3

## IT Efficiencies — Chromebooks for Education

	Previous/Other Devices	Chromebooks	Change (%)
<i>Deployment (hours per device)</i>			
Time to deploy	1.82	0.12	93.2
Hours of FTE time for deployment	4.38	1.87	57.3
<i>Ongoing (hours per device per year)</i>			
Time to manage	4.26	1.37	67.9
Time to troubleshoot	1.43	0.12	91.9
Time to apply/manage security	0.06	0.02	74.6
<b>Total ongoing</b>	<b>5.76</b>	<b>1.50</b>	<b>73.9</b>

Source: IDC, 2015

“Chromebooks are extremely user friendly. They work no matter where they are, teachers can understand them without having one, and the Chrome browser can be used on any device with the same experience.”

### Improved Device Reliability and Performance

Interviewed school systems also reported benefiting from the reliability of Chromebooks. They said that their Chromebooks experience fewer problems and other issues that impact users, including reboots (90.4% fewer), file losses (86.4% fewer), requiring reimaging (99.6% fewer), and hardware failures (27.0% fewer). Further, when these types of issues do occur with Chromebooks, their resiliency and speed of restarting mean that the impact on users is minimized. One interviewed school described the impact of Chromebook’s reliability and ease of use on students’ perceptions of Chromebook technology as follows: “Students are so much happier now because availability is so much better, and it takes a couple of seconds rather than 5 minutes to fix a problem. We measured their happiness using a five-level graded scale where 5 is the best and 1 is not good. Prior to Chromebooks, the students rated IT support at our schools 2.1, and after, it was 3.8.” Another school system explained how Chromebook’s ease of use is enabling: “Chromebooks are extremely user friendly. They work no matter where they are, teachers can understand them without having one, and the Chrome browser can be used on any device with the same experience.” The result is that Chromebooks provide students with a more consistent learning experience with fewer device-related interruptions and problems while teachers and administrators who are using Chromebooks lose less productive time to unavailability of applications and trying to sort out problems when they occur (see Table 4).

IDC calculates that, over three years, the TCO of Chromebooks will be 61% lower on average than the TCO of these alternative devices because Chromebooks are cost effective, require less staff time to deploy and manage, and suffer fewer outages and other problems that take time to remedy.

**TABLE 4**

### Reliability KPIs - Chromebooks for Education

	Previous/Other Devices	Chromebooks	Change (%)
<i>Frequency per device per year</i>			
Reboots	135.14	12.86	90.4
File losses	6.10	0.83	86.4
Reimaging	2.66	0.01	99.6
Hardware failures	0.09	0.07	27.0

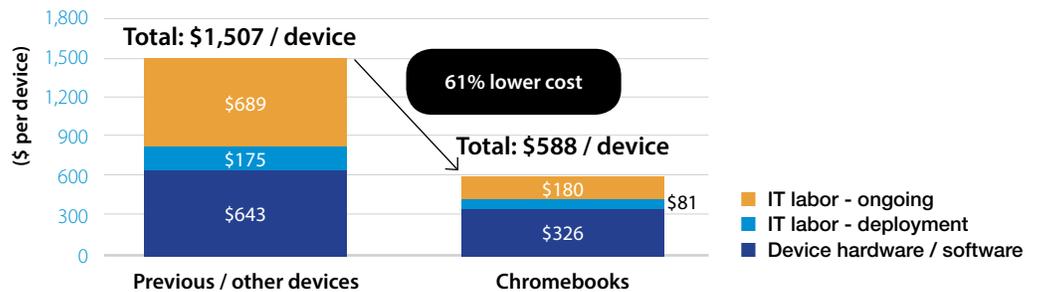
Source: IDC, 2015

### Total Cost of Ownership of Chromebooks for Education

The TCO of Chromebooks is much lower than the TCO of the devices that the school systems replaced or otherwise would have purchased. IDC calculates that, over three years, the TCO of Chromebooks will be 61% lower on average than the TCO of these alternative devices because Chromebooks are cost effective, require less staff time to deploy and manage, and suffer fewer outages and other problems that take time to remedy. For interviewed school systems, reducing device-related TCO from a three-year average of \$1,507 to \$588 creates cost and staff efficiencies that can be reinvested in providing more devices to support teaching and learning (see Figure 2).

**FIGURE 4**

### Three-Year TCO Comparison — Chromebooks Versus Other Devices for Education



	Previous / Other Devices (\$)	Chromebooks (\$)	Cost Savings / Avoidance (\$)	Cost Savings / Avoidance (%)
Device cost	643	326	317	49.2
Deployment cost	175	81	93	53.4
Device management and support cost	689	180	509	73.9
<b>Total</b>	<b>1,507</b>	<b>588</b>	<b>919</b>	<b>61.0</b>

Source: IDC, 2015

“We’ve done an extensive evaluation of the impact of giving more students access to devices with Chromebooks. We’ve got increased student engagement. We have students collaborating more and fewer disciplinary issues in class ... Statistically, student engagement has increased ... [and] the natural decline from K to 12th grade has been mitigated, so student engagement is not decreasing, which it would without devices.”

## Benefits of Chromebooks for Education for Teaching and Learning

### *Improved Student Engagement and Experience*

Interviewed school systems provided a number of examples of how they believe Chromebooks are supporting teaching and learning in their schools. One school system reported increased collaboration and ultimately engagement in the classroom with Chromebooks: “We’ve done an extensive evaluation of the impact of giving more students access to devices with Chromebooks. We’ve got increased student engagement. We have students collaborating more and fewer disciplinary issues in class ... Statistically, student engagement has increased ... [and] the natural decline from K to 12th grade has been mitigated, so student engagement is not decreasing, which it would without devices.” Especially for students who might have had to use devices in computer labs or at specific times, having more consistent access to learning applications can be very advantageous. Another school district noted that students save several minutes when opening and closing Chromebooks, improving the classroom experience for students: “The difference is that the Chromebook, if you open it up, it instantly comes on, whereas with a laptop, if it’s asleep or you close it, you lose those 3-5 minutes per period 6 times per day.”

### *Closing the Gap to One-to-One Device Targets*

Several school districts referenced the fact that the lower cost of ownership of Chromebooks in and of itself enables them to provide web-based learning devices to more students. One school district explained that Chromebook’s price point and lower overall cost of ownership were enabling the school district to provide more comprehensive support to students who need it. The school district explained that it could not afford to provide devices to all students with special needs who can sometimes benefit substantially from having access to web-based applications and programs. As the school district explained, “We have thousands of claims from children with special needs in our system ... We couldn’t afford very much and could only support hundreds of claims per year ... With Chromebooks, almost every kid has access. Chromebooks has transformed how we look at special education and how we support these kids ...”

While not all interviewed school systems have a defined objective of reaching 1:1 student-device ratios, there was consistent agreement that putting devices in the hands of as many students as possible is beneficial. These schools said that Chromebooks are helping them reach one-to-one device environments or at least significantly reduce their student-device ratios. As one school explained, “We’re now at 100% one-to-one device ratios with Chromebooks in 6th, 7th, and 8th grades. And we are working up to higher grades and down to 5th grade in the next year. It’s about a third of the students overall. Before Chromebooks, it was lower — let’s say 5%.”

Based on device cost and the time needed to deploy and manage Chromebooks compared with interviewed schools’ previous or alternative devices, IDC has calculated the net cost for a

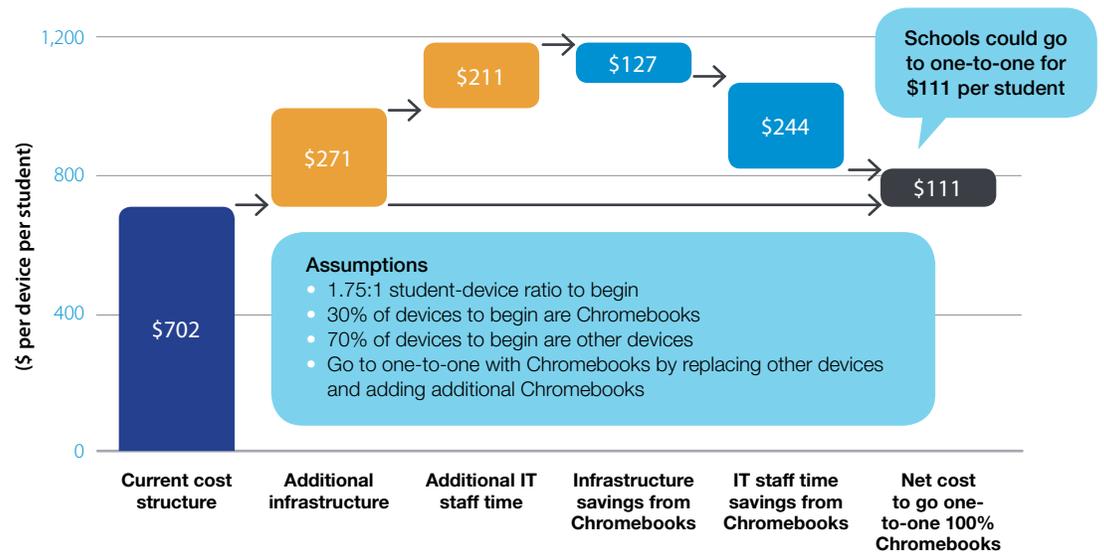
hypothetical school to move to a one-to-one device ratio with Chromebooks under the following assumptions:

- » 1.75:1 current student-device ratio, with 30% of these devices being Chromebooks and 70% being other types of devices
- » Go to one-to-one device ratios by replacing other types of devices with Chromebooks and adding Chromebooks

As shown in Figure 3, this hypothetical school could replace other types of existing devices with Chromebooks and save \$127 and \$244 per student on infrastructure and labor costs, respectively. As a result, given the assumptions discussed previously, this school could move to a one-to-one device environment at a net cost of \$111 per student, including all infrastructure and labor costs.

**FIGURE 5**

### Cost Analysis for Going to a One-to-One Student-Device Environment



Source: IDC, 2015

## Challenges and Opportunities

Despite the clear value proposition of Chromebooks, challenges persist. Key among them are the persistent suggestion that all students must learn Microsoft Office to be job worthy, the perception that Chrome’s inability to run Windows applications means valuable legacy software must be left behind, and the ongoing fallacy that all Chrome applications require a persistent internet connection that not all students have.

While Microsoft is ubiquitous in the workplace today, Google presence has grown, with more than 5 million businesses using G Suite for Work today. And use of Google's suite of apps, the G Suite, is growing quickly at colleges and universities; the majority of the U.S. News & World Report's top 100 universities in the United States use the G Suite. In fact, Google's success in this area has forced Microsoft to evolve its suite and act more like the upstart. Students using Google Apps will not enter the workforce at a disadvantage. While it is true that Chrome won't run legacy Windows applications, today it is exceptionally easy to find a comparable app on Chrome. Plus, Google has now made it possible to access Android apps on Chrome, making available literally millions of additional applications to Chrome users.

Finally, it's true that in the early days of Chromebooks, Chrome Apps, and Google Docs, there were serious limitations around what you could accomplish offline, without an internet connection. But Google has made massive strides in this area. Critical apps work in offline mode, syncing changes once the device is back online.

In addressing the key challenges outlined previously, Google has opened a world of opportunities within education for Chromebooks. The low cost of buying, deploying, and managing the devices means schools can outfit more classrooms with the technology. As more schools embrace both Chromebooks and the Google ecosystem, more app developers will support the platform, offering ever improving software and services geared toward education; better apps and services will drive schools to outfit more classes; and so on. This virtuous circle creates dramatic opportunities for all involved, from students and teachers to developers to hardware providers.

## Summary And Conclusion

Increasingly, school systems must find ways to leverage technology to support their teaching and learning environments to meet expectations of parents and students. However, many school systems have struggled to overcome budgetary and staff limitations as they seek to extend device deployments. Through its Chromebooks for Education offering, Google has sought to provide schools with a device that can help them overcome these limitations while still providing strong functionality for the classroom. Based on interviews with 10 school systems that have Chromebook deployments ranging from several hundred to tens of thousands, IDC's analysis shows that these school systems are achieving substantial cost savings and operational efficiencies while still benefiting from the reliability and ease of use of Chromebooks. According to these schools, the net result is that the TCO of Chromebooks is much lower than the TCO of the devices they replaced or otherwise would have used. These efficiencies have allowed the schools to put devices in the hands of more students and teachers, which is creating a more robust learning and teaching environment for the students they serve.

## Appendix

IDC's standard ROI methodology was utilized for this project. This methodology is based on gathering data from educational institutions as the foundation for the model. Based on these interviews, IDC performs a three-step process to calculate benefits and investment costs:

- » Measure the savings from reduced IT costs (staff, hardware, software, maintenance, and IT support), increased user productivity, and improved revenue over the term of the deployment.
- » Ascertain the investment made in deploying Chromebooks and the associated training and support costs.
- » Project the costs and savings over a three-year period and calculate total costs associated with Chromebooks ownership.

IDC bases the financial calculations on a number of assumptions, which are summarized as follows:

- » Time values are multiplied by burdened salary (salary + 28% for benefits and overhead) to quantify efficiency and manager productivity savings.
- » Downtime values are a product of the number of hours of downtime multiplied by the number of users affected.
- » The impact of unplanned downtime is quantified in terms of impaired end-user productivity and lost revenue.
- » Lost productivity is a product of downtime multiplied by burdened salary.
- » Lost revenue is a product of downtime multiplied by the average revenue generated per hour.

Because every hour of downtime does not equate to a lost hour of productivity or revenue generation, IDC attributes only a fraction of the result to savings. As part of our assessment, we asked each school system what fraction of downtime hours to use in calculating productivity savings.

*Note: All numbers in this document may not be exact due to rounding.*

## About IDC

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