TECHNOLOGY IN ACTION™

Deploying Chromebooks in the Classroom

Planning, Installing, and Managing Chromebooks in Schools and Colleges

Guy Hart-Davis

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ISBN-13 (pbk): 978-1-4842-3765-6 ISBN-13 (electronic): 978-1-4842-3766-3
https://doi.org/10.1007/978-1-4842-3766-3

Library of Congress Control Number: 2018955242

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Cover designed by eStudioCalamar

Cover image designed by Freepik (www.freepik.com)

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About the Author

Guy Hart-Davis is the author of more than 140 computer books, including several from Apress—among them *Deploying iPads in the Classroom*, *Deploying Raspberry Pi in the Classroom*, and *Pro Office for iPad*.

CHAPTER 1

Planning Your Deployment of Chromebooks in the Classroom

In this chapter, we will discuss how to plan your deployment of Chromebooks in the classroom. We will start with a quick reality check about your school's plans to add computers to the classroom and then move along to practical matters. We will then make sure you know the capabilities of Chromebooks and how they compare—both favorably and unfavorably—to alternatives, such as other laptop-style computers and tablet computers. We will then go through what you will need to do to plan the deployment: choose a deployment model, decide how to manage the Chromebooks, and ensure that your school's network and Internet connection have enough bandwidth to handle the additional traffic that the Chromebooks will generate.

One crucial decision this chapter will not cover is how to select the right Chromebook model or models for your school's students and teachers. Chapter 2 will cover this topic in depth.

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G. Hart-Davis, *Deploying Chromebooks in the Classroom*,
https://doi.org/10.1007/978-1-4842-3766-3_1

Making the Decision to Computerize Classrooms or Classes

To deploy Chromebooks or other computers successfully in your school, you should have the agreement and cooperation of your colleagues, your students, and perhaps also the students' parents. While it is certainly possible to make the decision to computerize alone and then impose the decision on others, you will typically get much better results by involving each group in making the decision and supporting its implementation.

Given that you are reading this book, you have likely progressed past this stage in the planning process. If this is the case, skip ahead to the next section, "Understanding Chromebook Capabilities." If not, you will probably want to take the following steps, not necessarily in this exact order:

- Research the costs and benefits of computerizing one or more classrooms or classes.
- Convince your colleagues of the merits of adding the computers.
- Get input from the students.
- Build a budget for a pilot scheme and get it approved.
- Select a classroom or a class for the pilot scheme.
- Run the pilot scheme.
- Review the success or otherwise of the pilot scheme and the feedback you get from it.
- Scale up your pilot scheme for what the full deployment will need.
- Create a budget for the full deployment.

- Execute the full deployment.
- Build in a review cycle to gauge successes, failures, and improvements needed.

DEVELOPING A FAQ AND ACCEPTABLE-USE POLICIES

As you plan and build out your deployment, develop a FAQ—a list of frequently asked questions—that you can make available on your school's website as an information resource for students, parents, teachers, and support staff.

The FAQ needs to cover everything from the school's purpose in deploying the Chromebooks; through straightforward issues such as startup, login, and basic skills, such as running apps and accessing resources; to more advanced topics such as understanding the restrictions the school has applied to the Chromebooks and the ways in which the school can monitor Chromebook usage. Make sure to publicize the FAQ in the school, and also provide an easy-to-use mechanism for users to submit questions to be added to the FAQ. Add a shortcut to the FAQ to each Chromebook's desktop to encourage students and teachers to use it.

You will also need to create two acceptable-use policies. The first policy should explain the rules under which students use the Chromebooks, what they are allowed to do, what is not permitted—and who is responsible for lost or broken Chromebooks. The second policy should do likewise for teachers. Students and teachers should sign the acceptable-use policies to confirm that they accept the rules. For younger students and for one-to-one deployments (in which the students typically take the Chromebooks home), the students' parents should also sign the policies.

Understanding the Chromebook's Capabilities

The Chromebook is a thin-client laptop computer concept developed by Google. Chromebooks are built by various hardware companies, including major computer manufacturers such as (in alphabetical order) Acer, Asus, Dell, HP, Lenovo, Samsung, and Toshiba. Some high-end Chromebooks, such as the Pixelbook, bear the Google brand, but the vast majority are built and sold by other manufacturers.

The following subsections will make sure you know the essentials of Chromebooks.

General Characteristics of Chromebooks

Like a typical laptop, a Chromebook is a complete computer with a built-in screen, a keyboard, and a touchpad pointing device. Most Chromebooks also include small speakers for audio output and a webcam for video conferencing. Figure 1-1 shows a Chromebook made by Asus.

Figure 1-1. *A Chromebook is a laptop computer that runs a lightweight operating system called Chrome OS*

Many different Chromebook models are available, varying considerably in size, varying greatly in power, and spanning a large range in price. We will look at the specific features of Chromebooks in detail in Chapter 2.

Typical screen sizes range from 10 inches to 15.6 inches, with the Chromebooks' body sizes varying accordingly. Some Chromebook models are ruggedized, designed for use in high-impact situations (such as schools). Chromebook weights mostly fall into the two-to-four-pound range, making the computers easily portable.

Chrome OS and Chrome Apps

Chromebooks run Chrome OS, an operating system developed by Google. Chrome OS is based on the kernel—the core part—of the Linux operating system and has an interface built around Chrome, Google's widely popular web browser. Chrome OS is a lightweight operating system that runs quickly, even on hardware that is fairly modest by today's standards. Figure 1-2 shows the Chrome OS desktop with two windows open.

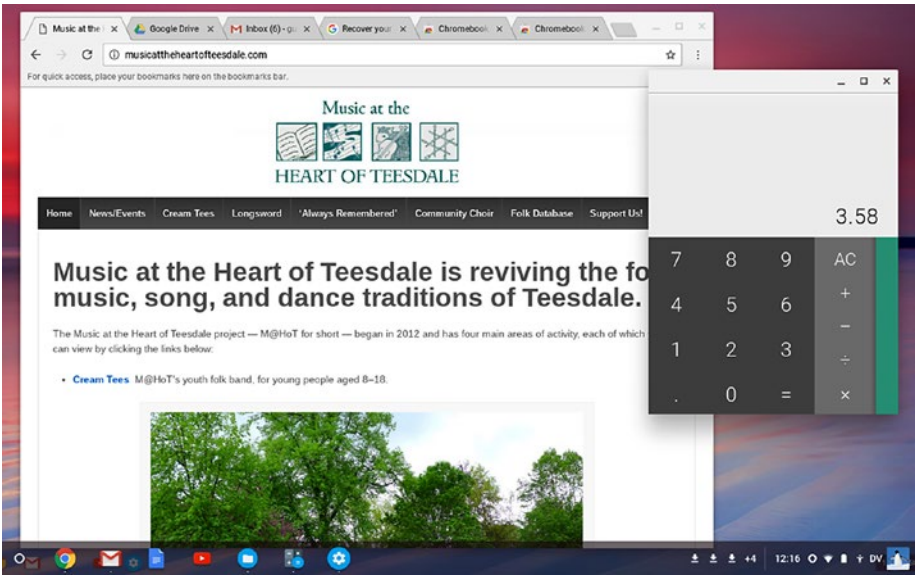

Figure 1-2. *Chrome OS performs many operations in the Chrome browser but also has several local apps, such as the Calculator app shown here*

Chrome OS is designed to store most of its data online rather than on a local drive (as most personal computers usually do). Storing data online reduces the need for storage on the Chromebook itself, so most Chromebooks have modest-size solid-state devices (SSDs) rather than spinning hard disks.

Chromebooks run Chrome apps—apps designed to run on Chrome OS. Many actions for which you would use apps on other operating systems (such as Windows) take place in the Chrome browser on Chromebooks.

Many recent Chromebook models can also run apps built for the Android operating system, which is widely used on smartphones and tablets.

Google Accounts

Chromebooks are designed to work with Google accounts, and each person who uses a Chromebook regularly needs a Google account. A Google account is free to set up and comes with 15 GB of data storage, which is enough for typical usage. Users with heavy needs can pay for extra storage—for example, 100 GB costs $1.99 per month, and 1 TB costs $9.99 per month—up to 30 TB.

Note If someone needs to use a Chromebook temporarily for browsing, you can let her use the Guest login instead of adding a user profile for her. A guest user cannot create or edit documents stored in a Google account.

Once the user has logged in to her Google account, the Chrome apps automatically store data in the account. Because the data is stored online, by logging in to her Google account, the user can access her files using any Chromebook. This flexibility is great for schools that equip classes or classrooms with Chromebooks.

Note The first person to set up a particular Chromebook becomes the "owner" of the Chromebook. Google ties the Chromebook to the owner's account so that only the owner can change important system settings on the Chromebook.

Chromebooks Support Multiple User Accounts

Like most modern computers, the Chromebook supports multiple user accounts, making Chromebooks good for use in families, businesses, and schools. Each account's data is kept separately, so no user can access another user's data.

Note You can create up to 17 user profiles on a Chromebook, enabling up to 17 different users to each have their own space. Each user profile takes up some space on the Chromebook, so it is best not to add profiles unnecessarily so as to avoid running out of storage space.

The Chromebook Works as Both a Consumer Device and a Managed Device

The Chromebook works as both a consumer device and as a managed device. As a consumer device, the owner controls the Chromebook and is the only person who can change important system settings. As a managed device, the Chromebook can be managed using the Chrome Management tools in the Google Admin console. These tools give administrators close control over the Chromebooks.

Note In your school, you will almost certainly want to treat Chromebooks as managed devices. The only exception is if your school deploys only a handful of Chromebooks, in which case managing them manually may make sense.

Comparing Chromebooks to Laptops and Tablets

In this section, we will examine how Chromebooks compare to other devices you might want to deploy in your school's classrooms: first, laptops, and then tablets, such as iPads and Android tablets. As of this writing, manufacturers have begun to release Chrome tablets, touchscreen-driven devices running Chrome OS; however, this section focuses on conventional Chromebooks, which include keyboards.

Note Unlike Android tablets, on which you can set up multiple user accounts and switch freely among them, the iPad is designed as a single-user device; only a single user account can be set up on an iPad. However, Apple provides a feature called Shared iPad that enables schools and other institutions to share iPads among students who log on using Managed Apple IDs. Essentially, when a student logs on to a shared iPad, iOS downloads the user's files across the network and stores them on the iPad so that the user can work with them.

Understanding the Advantages of Chromebooks over Other Laptops

The following list explains the main advantages of Chromebooks over other laptops:

- *Automatic updates*: Chromebooks can automatically download operating-system updates when they are available. Installing updates on Chromebooks tends to be much faster than installing updates on Windows.
- *Few viruses:* Chrome OS is largely immune to viruses, unlike conventional operating systems, such as Windows or MacOS.
- *Online storage*: A Chromebook stores all the user's files online instead of storing them locally, so the files are accessible from anywhere that has an Internet connection.
- *The user can switch Chromebooks easily*: Having the files stored online means that a user can switch from one Chromebook to another, needing to do no more than log on to another Chromebook to have his files available and ready for use on it.
- *Easy to reset*: Because each user's files are stored online, you can reset a Chromebook without having to make backups of its contents beforehand and without having to restore that content afterward. This makes resetting a useful maneuver for recovering from configuration problems. Chrome OS also offers the Powerwash, a kind of super-reset that returns the Chromebook to its original factory condition.

- *Cost*: Chromebooks tend to be less expensive than full-fledged laptops. But because the success of inexpensive Chromebooks spurred PC manufacturers to release lower-cost Windows laptops, the price difference between Chromebooks and low-end Windows laptops is not dramatic. Apple's MacBook laptops remain vastly more expensive than most Chromebooks but arguably do not compete directly with them.
- *Google Apps are included*: Chromebooks give you access to the Google Apps suite—online apps for creating documents, spreadsheets, presentations, and other widely used file types. You do not need to get a separate app suite, such as Microsoft Office. When used in schools, Chromebooks can use Google's G Suite for Education, which comprises the Google Apps suite and extra apps.
- *Android apps*: Some Chromebooks can run Android apps. This means that a vast number of apps are available, including many games—something that may appeal to students more than to teachers!

Understanding the Disadvantages of Chromebooks Compared to Other Laptops

The following list discusses the main disadvantages of Chromebooks compared to other laptops:

- *Some major apps are not available*: Chrome OS has a relatively small number of apps available, most of which are implemented via the Web. Apart from the Android apps that some Chromebooks can run, you

cannot install apps for other operating systems. For example, Chromebooks cannot run the full versions of Microsoft Office apps, such as Word and Excel. (Android versions of Microsoft Office apps have substantially fewer features than the full versions.)

- *Chromebooks require a constant Internet connection*: Because Chromebooks store all their files online, they normally need a constant Internet connection to function properly. (Chromebooks do enable the user to perform some computing offline, but being constantly online gives better results.)
- *Increased Internet traffic*: Because Chromebooks need a constant Internet connection, they cause a lot of traffic. You may need to upgrade your school's Internet connection to avoid its getting swamped by the extra traffic.

Understanding the Advantages of Chromebooks Compared to Tablets

The following list explores the main advantages of Chromebooks compared to tablet computers:

- *Keyboards*: Each Chromebook model has a hardware keyboard, enabling the user to enter text at his full speed and edit existing text easily. By contrast, it is hard to touch-type on the onscreen keyboards that most tablets provide. While you can add a keyboard to a tablet, doing so involves extra expense. You must also usually use Bluetooth, which often means connection headaches and laggy input.

- *Better for creating text-based content*: Related to the previous point about keyboards, Chromebooks are usually stronger tools for creating text-based content than tablets are.
- *Easier to manage centrally than Android tablets*: Chromebooks are easier to manage than Android tablets. For iPads, however, Apple and third-party companies provide powerful management tools that have similar capabilities to Google's tools for managing Chromebooks.
- *Less expensive than iPads*: Most Chromebooks designed for school use are considerably less expensive than iPads, especially if you have to add accessories (such as external keyboards) to the iPads. Android tablets vary greatly in cost, so Chromebooks do not necessarily have a cost advantage over them.

Understanding the Disadvantages of Chromebooks Compared to Tablets

The following list explains the two main disadvantages of Chromebooks compared to tablet computers:

- *Less easy to carry*: Because they include keyboards and touchpads, Chromebooks tend to be larger and heavier than tablets that have the same screen size.
- *Harder to use as a handheld device*: Tablet computers are—obviously enough—designed for handheld use. Chromebooks are designed for use as laptops, either on a surface (such as a table or a desk) or on the user's legs or lap. Even though some Chromebook models have

touchscreens and are convertible, changing into tablet mode by folding the keyboard back under the screen, they remain harder to use as handheld devices than pure tablets.

Also, just as when compared to laptops, Chromebooks have the disadvantage of requiring a constant Internet connection and causing increased Internet traffic.

Analyzing Your School's Needs and Making a Plan

Once you have decided that you will deploy Chromebooks rather than another technology, you will need to work out the best way to deploy them. In this section, we will discuss the main questions you should consider to establish your school's needs and to plan the deployment. These questions include the following:

- What deployment model will you use? Will you issue Chromebooks to individual students? Will you get Chromebooks to equip, say, a classroom or classbound computer carts? Will you get Chromebooks for teachers as well as for students?
- How many Chromebooks will your school get?
- Which Chromebook models will your school get?
- If you equip the teachers with Chromebooks, how will they use them?
- Will you need to train the teachers to use the Chromebooks? If so, what kind of training will you run?

- How will your school's students use the Chromebooks?
- How will you manage the Chromebooks?
- How will the Chromebooks fit into your school's IT system and connect to its resources?
- Does your school have adequate network and Internet bandwidth to handle the increased traffic that the Chromebooks will bring?

The following subsections will explore these questions in more detail but not in quite the same order.

What Deployment Model Will You Use?

Usually, your first decision is which deployment model to use for the Chromebooks. Typically, this means choosing between a one-to-one deployment model and a model based on classes or classrooms:

- *One-to-one*: In the one-to-one deployment model, you issue a Chromebook to each student in a class or other group. The student keeps that Chromebook and can store local copies of files on it for use when no Internet connection is available—for example, downloading PDF files of papers to read. Normally, the student gets to take the Chromebook home at the end of the school day so she can use it for homework and other study. However, in some cases, the Chromebook is restricted to the school's premises, so the student checks out the Chromebook at the beginning of the school day and checks it back in at the end.