



Choosing the Right Digital Device



Image: Core Education

This guide will provide you with information that will help you as you decide which devices to choose for your school. It is important to consider not just the devices but how your students and teachers use them and which device is best for which sorts of activities for effective teaching and learning. It will also be useful for schools providing advice to parents about which type of device to purchase for a BYOD environment.

This guide is intended for School Leaders, e-learning leaders and technical support staff. It is not necessary to have a background in technology but it is important to have a good pedagogical understanding of why you want to use digital devices and what your learning outcomes are. Overall, to make a choice, you should:

- 1 - Be clear about purpose
- 2 - Weigh up options and make decisions
- 3 - Implement, support and evaluate

Contents

[Are you clear about the purpose?](#)

[What features do you need?](#)

[Health considerations](#)

[How will you implement, support and evaluate ?](#)

[Useful Links](#)

[Appendix - Shared Use of Devices](#)

Once you have read this guide you are welcome to contact the Connected Learning Advisory to get more personal assistance. We aim to provide consistent, unbiased advice and are free of charge to all state and state-integrated New Zealand schools and kura. Our advisors can help with all aspects outlined in this guide as well as provide peer review of the decisions you reach before you take your next steps.

For more information visit www.connectedlearning.org.nz

Check out our resources at resources.connectedlearning.org.nz

Call us for personalised service on 0800 700 400

Make a personal inquiry via our online form at query.connectedlearning.org.nz

Email info@connectedlearning.org.nz

Are you clear about the purpose?



Weighing up which devices best meet students and teachers needs can be challenging given the range of different devices available.

“Adding a digital device to the classroom without a fundamental change in the culture of teaching and learning will not lead to significant improvement.”

Alan November, 2013

Decisions should, first and foremost, be driven by the New Zealand Curriculum or Te Marautanga o Aotearoa and your school's vision for learning. What educational and functional purposes are the devices expected to support?

Below are some key considerations when choosing devices for learning and teaching. Try to identify what the priorities are for you and find a good fit between your needs and the devices you choose. Find out what your teachers and students think they need and why.

How will the device:

- be used to support achievement of the school's, and its students', goals and vision for learning in an inclusive way?
- impact on professional learning and technical support needs?
- facilitate flexibility and personalisation?
- fit into the current pathway for students from new entrant to year 13 in your community?

The Enabling e-Learning [Learning with 1:1 Digital Devices](#) page provides stories from schools and further information and will help keep the "Why" at the forefront of your mind as you make your decisions. [Consultation with the wider school community](#) when considering devices is important.

What features do you need?



As well as the pedagogical considerations outlined above, these practical aspects may be useful to consider when you start to look at which devices to choose:

- **Mobility & Portability** - if devices are to be used in different places then weight and screen size will be important, especially if devices are being carried to and from school.
- **Operating system** - There are a few key operating systems that run on devices. Choosing a device goes hand-in-hand with choosing an operating system:

Microsoft's Windows is a fully-featured operating system that can run on many different manufacturers' hardware. New Zealand state and state integrated schools are able to use the [Microsoft Schools Agreement](#) to install upgraded versions of Windows on devices that already have a licence for an entry-level version.

Apple's MacOS is a fully-featured operating system that can run on specific Macbooks and iMacs. MacOS is purchased as part of the purchasing the device itself.

Google's ChromeOS is a lightweight operating system that delivers functionality very similar to the Chrome web browser. It ships with Chromebooks at no cost and can be

installed on other devices at a cost using Neverware's [CloudReady software](#).

Apple's IOS only runs on iPads and iPhones. There is a very well developed ecosystem of apps for education and the limited types of iPads and iPhones means that they can more easily be managed.

Google's Android runs on Android tablets and phones. There are many versions of Android which tends to make it more difficult to manage this ecosystem.

Linux / Open Source operating systems like Ubuntu or Debian are free to download but tend to require specialist expertise to install and maintain and likely to be unfamiliar to most people.

- **Initial deployment, customisation and on-going management** - what technical systems, expertise and time is required to get the devices up and running and to make changes later on? How are the devices configured to provide personal experiences for end-users with specific settings and software / apps in place?
- **Apps / Software** - investigate the range available to use with the device: will the device run what you need it to?
- **Accessories, peripherals and ports** - consider what you require in addition to what the devices come with such as covers to protect a tablet from damage or wireless mice for laptops. Will you be using the device to connect things like programmable circuit boards (like Raspberry Pi's or Arduinos or MicroBits), digital microscopes, robotics, 3D printers etc.? How can the device be connected to your school's projectors or TV's?
- **Charging** - how will you manage charging devices? Is the power adapter and cable universal or proprietary?
- **Build quality and technical specification** - a very low-priced device is likely to be underspecified in terms of performance, battery life, touch screen performance, camera, storage, Wi-Fi capability, reliability, robustness etc. Determine the minimum level of quality and specification you will accept - don't choose on low price alone.
- **Accessibility** - will the devices support students with particular learning needs? Common accessibility options

such as magnification, colour schemes and text to speech are now available on all the main operating systems but different devices have different capabilities and each has strengths and weaknesses. Accessibility options are outlined by [Apple](#), [Microsoft](#) and [Google](#) for each of their products. Schools and/or individual students should consider the accessibility options available in each device and select the device that is most appropriate for them. Consider also any software which may need to be loaded or enabled on devices to support learning such as text-to-speech, captioning and voice command.

- **Future Expansion** - What options, if any, are there for future expansion such as to the devices' memory or storage? With files increasingly being stored in the cloud, storage may not be a key concern but you should consider how much will be required as it tends to be costly and inconvenient to upgrade later.
- **Replacements and Consumables** - How available and expensive are replacement parts such as screens or keyboards and consumables such as batteries?
- **Compatibility** - what other products and software does the school already use that need to integrate with the devices? The rapid and increasingly important move towards cloud connectivity means that this is likely to be a key factor in your choice of devices. The biggest players in the device market are also the biggest players in the cloud platforms - Google, Apple and Microsoft. Each vendor's cloud tools work best on their own platforms. If you are considering using multiple devices you may need to consider, for example, how well Google Apps works on an iPad or whether Office 365 works well enough on a Chromebook. While there is likely to be some level of compatibility between systems there are also likely to be some compromises. Although compatibility between devices/platforms is improving all the time, the only sure-fire way to determine it is to get hands-on and do some trials.
- **Shared Use** - an issue particular to schools is that a device could be used by many different people during the day. It tends to be easier if the experience is particular to the person logged-in e.g. they can get their email, files, apps, settings, passwords, shortcuts etc. Generic user set-ups tend to be a

little more limited because the environment is not configured optimally for the particular needs of each individual.

- **Knowledge and Support** - what is available for the specific device and its ecosystems in the education community?
- **Touch screen and stylus support** - this might come as standard for some devices or be available at an increased price for others. Consider the benefits that a touch interface will bring against the additional cost. There is increasing research about the importance of 'inking' in learning, such as students' ability to write directly onto their device or to annotate notes and diagrams. For any screens that are touched, think about how to keep them clean. For styluses, think about how to ensure they are not lost along with potential replacement costs if they are.
- **Creating and editing multimedia** - consider the capability and ease of use of capturing photos, taking videos and recording sound. Not all cameras and microphones are created equal: if high quality outcome is important then the device needs to be of a sufficiently high specification. Some devices lend themselves better than others for editing multimedia once it has been captured.
- **Offline capability** - how effective is the device if an internet connection is not available?
- **Form Factor** - the different types of device commonly available are:

Tablets



Photo by Patricia Prudente on Unsplash

Tablets are light, mobile, tactile and relatively simple to use for all age groups and are great for capturing photos, videos and making sound recordings. The simple interface and available apps tend to make tablets particularly suitable for junior students but they can be versatile enough, particularly if used with a separate keyboard, for senior students. A simple stylus can be used to write or draw on tablets but [bluetooth styluses](#) are increasing in popularity to give more precise writing and drawing capabilities. Tablets tend to be robust as they have no moving parts but their screens can be broken so some kind of protective cover is recommended.

Tablets are a good choice if:

- You'd like the benefits of an easy to use touch interface without having to type
- You'd like to encourage students to create using photos, videos and sound recordings rather than just consume digital content
- You'd like the devices to be very mobile, robust and have a long battery life
- You'd like a range of purpose-built apps to integrate into teaching for personalising learning

Laptops



Image: Core Education

Laptops have the benefit of an integrated keyboard that tablets lack. Their portability means that they can be used in different environments within the school but if people are carrying them to

and from school weight should be a purchase consideration as they can be heavy.

Laptops are a good choice if:

- You need to run particular software that only works on MacOS or Windows.
- You do not need to often take photographs or videos using the device as holding up a laptop to use its camera tends to be difficult. Note, though, that laptops provide more options for editing photos students may have taken on other devices and creating content from them.
- A keyboard and mouse interface is suitable for whoever is going to be using the laptop.
- You are prepared for some breakages, replacements or wear and tear - particularly on keyboards, hinges, power supplies and screens.

Desktops



Image: png.com

The full keyboard and larger screen size of desktops is more conducive to extended tasks and to students being able to work together around them. They are usually plugged directly into the power so battery life is not an issue and they can work with a cabled connection rather than being reliant on Wifi so network-intensive tasks like transferring large files can be faster. Desktops tend to last longer than other devices because they don't experience the wear and tear of being moved around, have fewer moving parts and it is easier to keep their internal electronic

components cooler. For the same price, a desktop is likely to have a higher performance than a tablet or laptop.

Desktops are a good choice if:

- You are looking for a device to last a long time
- You need to do intensive tasks like video editing, computer assisted drawing and photo editing
- You have plenty of physical space available
- You have network outlets available where you'd like the desktop to be placed

Hybrids



Image: pixabay.com

Hybrids attempt to combine the best of both worlds, giving users the mobility and touch interface of a tablet as well as the productivity of a laptop.

In a '**detachable**', a separate keyboard is plugged into the screen. Some detachable keyboards also provide things like an additional battery and additional connections.

In a '**convertible**', a fixed keyboard swivels from the screen and folds out of the way.

Choosing a hybrid will add weight and more moving or connecting parts to go wrong but could be a good choice to make your devices more versatile, particularly to make it easier to capture photos and videos.

Health considerations



“Most schools have strategies in place to deal with the most obvious risks of cyberbullying and access to inappropriate content, but the risks to students’ physical health may be overlooked because the effects are less immediate”

[Straighten Up, an article from the Australian Council for Educational Research](#)

Children are susceptible to physical disorders as a result of poor use of devices. The biggest problems are:

- eye fatigue and eye strain
- wrist aches and pains
- back and neck ache
- leg restlessness

These are caused by poor lighting, poor seating, and inefficient setup of keyboard, mouse and computer. To support your students’ health and wellbeing when choosing devices consider the following:

Device/screen size and position

Whilst the size of the screen is important when thinking about eye strain, the lighting in the room or the type of screen is more important. Excessively bright light either from sunlight coming in through a window or from harsh interior lighting will impact on how the user can see the screen and then on their eyes. Ambient lighting should be about half as bright as that typically found in most offices.

You can alleviate these effects by:

- Closing curtains or blinds.
- Use fewer light bulbs or fluorescent tubes, or use lower intensity bulbs and tubes.
- Position computers so that the light comes from the side rather than directly in front or behind.
- Use LCD screens as they are easier on the eyes and usually have an anti-reflective surface.

Sanitation

Computer keyboards and mice are potential vehicles for the transmission of bacteria. Shared computers, such as those used in classrooms are readily contaminated by many common bacteria. Cleaning and hand hygiene are useful to reduce the risk of cross-contamination. [This paper from the American Journal of Infection Control](#) recommended “thorough hand washing before and after keyboard contact.”

Posture



Image: Core Education

Giving students flexibility of space is an important part of today's learning environments. The types of furniture available for children to use when they are working on their devices is therefore an important consideration. Provide a variety of sizes of ergonomic chairs and variable-height work surfaces to enable all students to sit at the right height and distance from the computer.

Computer accessories such as mice if used incorrectly, or if the incorrect size for small hands, can also cause injury. There are also a number of assistive positioning options to meet specific needs such as mounting arms for tablets and slope desks for laptops.

[Straighten Up, an article from the Australian Council for Educational Research](#), provides further information about posture and device use.

Balancing time spent using devices vs other activities

It is important to design activities that mean children get an opportunity to change posture regularly so they are not using a device for long periods of time.

Some suggestions to support good habits:

- Don't sit too close to the monitor
- Take frequent rest breaks and "eye breaks"
- Stand up, stretch, and wiggle often

	<ul style="list-style-type: none"> • Blink frequently • Avoid using the mouse for long periods of time <p>Developing understanding about ergonomics</p> <p>Research suggests that if children are not taught good posture habits at an early age, they will never learn. Patterns of posture begin around the age of 7 so learning about posture and safe use of digital devices should be embedded into your programmes.</p>
<p>How will you implement, support and evaluate ?</p>  <p><i>“...successful integration of technology in education is not so much a matter of choosing the right device, the right amount of time to spend with it, the best software or the right digital textbook. The key elements for success are the teachers, school leaders and other decision makers who have the vision, and the ability, to make the connection between students, computers and learning.”</i></p> <p>OECD (2015), Students, Computers and Learning: Making the Connection</p>	<p>Implementation</p> <p>You will need to consider how devices will be customised, rolled out and managed. Each type of device, and potentially then particular products within a device type, will have different requirements when it comes to getting them implemented effectively.</p> <p>The appendix includes an outline about how each type of device could be implemented to if they are being shared.</p> <p>Support</p> <p>Professional Learning</p> <p>Exploring how technology can be used to enhance effective pedagogy as part of a professional learning programme with all teachers is essential. Engagement in the effective use of digital technologies will only happen if teachers believe that it will improve student learning and there is a shared understanding of the vision.</p> <p>Using digital technologies per se will not necessarily lead to the collaborative, innovative practice which is part of the NZ Curriculum vision of learners. Focussing on the 7 Principles of Learning as outlined in the OECD Report The Nature of Learning will assist in maintaining the vision of the learner at the heart of learning as you explore the use of digital technologies.</p> <p>Policies and Procedures</p> <p>Ensure that policies and procedures regarding appropriate use, classroom management, digital citizenship and technical support are in place.</p>

	<h3>Technical Support</h3> <p>Technical support is often a considerable part of the overall cost of owning a device.</p> <p>Our guide to Structuring effective technical support will help you to consider how to provide the appropriate types of support.</p>
	<h3>Evaluation</h3> <p>Once your devices are chosen and in place, try to evaluate how successful your decision and actions have been. This could be in the form of:</p> <ul style="list-style-type: none">- Surveys or focus groups- Statistics around time spent in training or technical support- Metrics around device usage or downtime due to repairs

Useful Links



The following [CLA Guides](#) provide advice as you make decisions about things like total cost of ownership, leasing or buying and BYOD readiness:

- [Procuring Digital Technologies](#)
- [BYOD Checklist](#)

You may find our [BYOD or School Owned Decision-making Framework](#) useful in the consultation process to guide your thinking around the school providing devices or asking students to bring their own.

When you come to the point of purchase, the Ministry of Education recommends exploring [All of Government](#) as a way to bulk purchase at competitive prices.

This guide has been produced in response to a number of specific queries about choosing devices from schools. It should not be read as a recommendation or endorsement of any specific product. The Connected Learning Advisory is a Ministry of Education supported service that provides schools with technology information relevant to their queries and does not recommend one product over another.



This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/). Produced for the Ministry of Education's [Connected Learning Advisory](#) by [CORE Education](#)

Last Updated: 5/7/18

Appendix - Shared Use of Devices

Operating System	Devices	Shared Use
Google Chrome OS	Chromebooks Chromeboxes	Each person who logs-in to the device gets their own personalised environment as long as the school has G Suite accounts set up
Microsoft Windows	Desktops Laptops Hybrids Tablets	Each person who logs-in to the device gets their own personalised environment as long as the school has a server running a Microsoft Windows Domain or the cloud-based Azure platform.
Apple's Mac OS	iMacs Macbooks	Possible but more difficult to configure with multiple users' accounts so a generic student account is typically used.
Apple's IOS	iPads	iPads were originally designed to be single user devices with a single associated AppleID but they can now be used without an associated AppleID in a shared situation by using 'Supervised mode'. Students can then log in to services or apps such as G Suite or Office 365. 'Shared iPad' is also an option on newer iPads to enable a personal experience for students.
Google's Android	Tablets	Some Android devices support multi-users but this is very specific to particular devices and the version of Android they run
Linux	Desktops Laptops	Will require specialist management software