By Brian Bouterse, Jenifer O. Corn, and Elizabeth O. Halstead

Choosing the Perfect Tools for One-to-One

6 Questions to Consider before Implementing a Portable Learning Initiative at Your School or District

From one-to-one learning initiatives to laptop carts, schools all over the country are using portable computing models to achieve flexible technology access. To maximize learning and engagement at a sustainable cost selecting the appropriate computing device is of utmost importance to best meet the needs of your teachers and students. After all, a device that is not compatible with the current or future technological infrastructure could mean disaster for an ed tech initiative. This article focuses on selecting the appropriate portable computing devices for a school- or district-level one-to-one learning initiative.

As you plan a one-to-one initiative, carefully consider both the implementation strategies (hardware/software, technical infrastructure, professional development) and project outcomes (changes in teaching and learning) that best meet the needs of your students, staff, and community. The questions considered here focus primarily on the hardware and software options—important decisions when implementing any tech initiative.

Thick, Ultraportable, and Thin

Today, devices fall into these three categories. Thick devices are traditional computers or laptops running traditional operating systems such as Microsoft Windows, Mac OS X, or Linux. Ultraportable devices use a local operating system and productivity software, but they lack the resources to handle installation of applications or educational content locally. Ultraportables can be divided into two groups: those that support Windows and those that don't. Thin devices are computers that cannot be used unless connected to a network, and they are not portable. Their lack of portability is fine for a traditional computer lab but a poor fit for portable one-to-one learning initiatives. In the future, as thin devices become portable and wireless network access is increasingly ubiquitous, the debate surrounding these devices may change.

Selecting Appropriate Devices

To successfully plan and implement a portable, technology-enhanced learning environment, schools and districts should consider six critical questions related to purpose, operating system, applications, content, peripheral equipment, and robustness. (See questions below.)

Careful consideration and thorough discussions with your technology planning team around each of these six critical questions will provide important information needed to select the most appropriate portable computing device for your particular learning context. Use the following list of questions and the matrix titled 6 Critical Questions for Comparing Ultraportable and Thick Devices on page 16 to guide your decision-making process.

Purpose. Will the computing device be used for a single purpose (word processing or graphing) or as a multipurpose machine ready to accept new software, content, or Internet capability? Single-purpose devices, such as the AlphaSmart or Texas Instruments (TI) graphing calculators, are inexpensive and easy to maintain but can only support specific word processing or graphing programs. Especially in the lower grades, consider if devices such as Neo2 by AlphaSmart or the TI graphing calculator and Navigator system can satisfy your curriculum needs. If not, then look for multipurpose devices such as ultraportable or thick devices. If your school is planning to emphasize the use of computing devices in your math or science courses, consider a tablet because of the ease of writing equations and scientific notation compared to using a traditional keyboard.

Operating systems. What operating system (OS) do you have the resources to support (Windows, Linux, Mac OS X)? OS support includes managing computer configurations, content, and applications, as well as readying a computer for the next student at the end of the semester. Consider which system your technology facilitators and technicians

1 Will the computing device be used for a single purpose or as a multipurpose machine that is software-ready and Internet-capable?

2 What operating system do you have the resources to support?

3 Do you want to install local applications, use Web applications, or both?

can manage, as well as which system your teachers feel most comfortable using. The Windows/Mac operating system is the dominant paradigm in K–12 in the United States; therefore, many teachers already have some familiarity with Windows and Mac software, alleviating the need for professional development at the introductory level. A similar familiarity exists for technology facilitators and technicians who must support these devices. Support personnel already have existing competencies in the Windows or Mac platforms. It is expected that over the next few years, more open source operating systems, such as Linux, will become a competitive choice for end-user devices.

Applications. Do you want to install local applications, use Web applications, or both? Many are transitioning to delivery via the Web; however, many still are delivered through a traditional install to the local computer hard drive using a CD. Ultraportables have limited drive space, so make sure to select a device that's able to deliver the required applications. Traditionally, applications installed locally provide access to content and collaboration functionality, but many content and collaboration services are transitioning to a Web-delivered model for simplicity and machine-independent access.

Content. Do you want to install local content (files, data, documents, presentations, and images) onto the device's hard drive, use Web content, or both? Similar to the Web-based applications movement, content was traditionally installed on the local computer, but more and more content is being stored on the Web. Ultraportables have limited drive space, so make sure to select a device capable of saving and storing the required content.

Peripheral equipment. Will you be using peripheral equipment, such as probes, microscopes, GPS units, digital cameras, printers, or projectors? At their heart, both state and national curriculum/technology recommendations, such as the Partnership for 21st-Century Skills and ISTE's NETS, place significant emphasis on rich content, collaboration, and peripheral equipment, all as vehicles to develop 21st-century skills in students. If you want to connect your device to peripherals, the main issues are availability, identification, and installation of compatible peripheral equipment drivers for the selected device. Consider a device's compatibility with probeware, printer, and projector needs and capabilities. Not all ultraportables without Windows have drivers compatible with these types of peripherals.

Robustness. What can you do to protect the computing device from the regular wear and tear of everyday use by students and staff? Other considerations related to protecting your device from regular daily classroom use are durability ratings, design of special carrying cases, battery life, virus protection software, and school- and district-level policies that carefully outline specific policies and recommendations for staff, students, and parents about acceptable use and storage for the computing device.

Additional considerations. The Consortium of School Networking (CoSN) is a national leader in identifying and evaluating effective use of technology within K–12 environments. One of CoSN's contributions is a clear articulation of the real cost of technology in the classroom through a rigorous total cost of ownership (TCO) methodology developed in partnership with the Gartner Group. CoSN identifies TCO in the book *A School Administrator's Guide to Planning for the Total Cost of New Technology* as the sum of the following expenses:

- **Device:** the initial purchase cost of a device including insurance, with no server backend
- **Support:** after devices are purchased, a school district will need people to help maintain the hardware and to help users solve the problems they encounter with their devices and software packages

4 Do you want to install local content, use Web content, or both?

5 Will you be using peripheral equipment?

6 What can you do to protect the computing device from the regular wear and tear of everyday use by students and staff?

6 Critical Questions for Comparing Ultraportable and Thick Devices



Critical Questions	XO-1	Intel Classmate PC	Asus Eee PC 4G
1. Purpose	Multipurpose	Multipurpose	Multipurpose
2. Supported Operating Systems	Open source but has no purchasable vendor support	XP Pro with standard pricing, Linux	XP with reduced pricing, Linux
3a. Install Local Applications	Only applications designed for the XO-1, less than 1GB space	Less than 1 GB install space	Less than 4 GB install space
3b. Web Applications	Nonstandard browser, limited Java support, limited Flash support	Standard Web browser, Java support, Flash support	Standard Web browser Java support, Flash support
4a. Install Local Content	Only content designed for the XO-1, less than 1GB space	Less than 1 GB install space	Less than 4 GB install space
4b. Web Content	Nonstandard browser, limited Java support, limited Flash support	Standard Web browser, Java support, Flash support	Standard Web browser, Java support, Flash support
5a. Peripheral Equipment Integration	Only peripheral equipment designed for the XO-1	Standard windows peripheral equipment	Standard windows peripheral equipment
5b. Printer	No	Yes	Yes
5c. Projector	No	No	Yes
6a. Battery Life	22 hours	4 hours	2.8–3.5 hours
6b. Durability	No rotating media, 2 degrees of screen swivel	No rotating media, 2 degrees of screen swivel	No rotating media, 1 degree of screen swivel

- **Professional development:** includes training of personnel to provide familiarization and proficiency with the operation of equipment and software to carry out school tasks, whether instructional or administrative
- **Connectivity and networking:** the costs of connecting to the Internet and the associated networking equipment to maintain the local wired and wireless network infrastructure
- **Software:** any applications or operating system purchased but not originally bundled with the device
- **Replacement:** the cost of device replacement
- **Retrofitting:** the amount that must be spent to wire an existing physical location

As devices are evaluated, initial device cost can dominate decision making, but it is extremely important to consider the implications of device selection on the total cost of ownership. TCO must be weighed against the classroom value it provides. To better understand this concept, consider this excerpt from CoSN's book on TCO:

A low TCO is not desirable if it is accompanied by low customer satisfaction or is created through draconian measures to limit access to technology resources and services. For example, the TCO for Internet access might be low because the school system severely restricts the time that Internet service is available and limits the number of users per school.

Putting a computing device in the hands of every student and teacher in school is a costly but worthwhile endeavor. Each one-to-one learning

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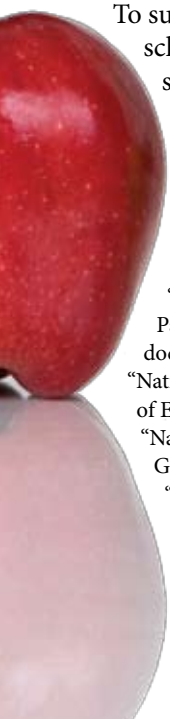
Nova 5000 (Base Model)	HP Compaq 2133	Tablet Laptop	Traditional Laptop
Multipurpose	Multipurpose	Math oriented	Multipurpose
Windows CE (included)	XP Pro & Vista, Linux	XP Pro & Vista, Linux	XP Pro & Vista, Linux, Mac OS X
Less than 128 MB install space	Installs any application	Installs any application	Installs any application
Standard Web browser, Java support, Flash support	Standard Web browser, Java support, Flash support	Standard Web browser Java support, Flash support	Standard Web browser Java support, Flash support
Less than 128 MB install space	Installs any content	Installs any content	Installs any content
Standard Web browser, Java support, Flash support	Standard Web browser, Java support, Flash support	Standard Web browser, Java support, Flash support	Standard Web browser, Java support, Flash support
Nova offers a rich set of peripheral equipment designed specifically for the Nova 5000	Standard Windows peripheral equipment	Standard Windows peripheral equipment	Standard Windows or Mac peripheral equipment
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
8+ hours	2 hours—2 cell battery 4 hours—6 cell battery	3.5 hours—4 cell battery 7 hours—8 cell battery	4.5 hours—9 cell battery
No rotating media, no swivel screens	Internal hard drive, 1 degrees of screen swivel	Internal hard drive, 2 degrees of screen swivel	Internal hard drive, 1 degree of screen swivel

initiative is set in a specific context made up of the student and staff technology needs and the existing resources and infrastructure of the school or district. To successfully plan and implement a one-to-one initiative, schools and districts should consider purpose, operating systems, applications, content, peripheral equipment, and robustness.



Resources

"A School Administrator's Guide to Planning for the Total Cost of New Technology" (2001) by CoSN: http://www.classroomtco.org/tco2class.pdf

"Framework for 21st Century Learning Overview" (2006) by the Partnership for 21st Century Skills: www.21stcenturyskills.org/documents/Frameworkflyer092806.pdf

"National Education Technology Plan" (2004) by the U.S. Department of Education.

"National Educational Technology Standards for Students: The Next Generation" (2007) by ISTE.

"Why Total Cost of Ownership (TCO) Matters" (2003) by Gartner Inc.: https://k12tco.gartner.com/home/homepagepromo/files/TCO_Overview.pdf

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