ICT for teaching and ICT for learning: They are not the same

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Overview

In 2010 I suggested that ICT in schools can be considered as having three distinct but overlapping roles. These are ICT for school administration, ICT for teaching and ICT for student learning (Douglas, 2010). However, developments in technology, and particularly the rise in ‘smart phones’ and tablet-based technologies such as the iPad, have magnified the difference between ICT for teaching and ICT for learning. Schools need to fully understand the difference between the two and how this will impact both their ICT infrastructure, and also how they may wish to provision the school with devices.

ICT devices

Before we begin, a discussion of the nature of ICT devices available is in order. These can be broadly categorised as follows:

- **Desktops**: Computers that are not inherently portable and are designed to sit on a desk.
- **Laptops**: Larger portable devices with screens ranging from 13” and upward, normally fully configured with DVD drives.
- **Tablet PCs**: Laptop devices with swivel screens that can be rotated over the keyboard and written on using a stylus.
Netbooks

Lower power laptops, usually without a DVD drive and with a smaller screen, usually 10”. These devices are characterised by lower prices and lesser performance compared to that of laptops.

Tablets

Characterised by a smaller form with touch screens, using mobile-derived operating systems. These devices are ‘instant on’ and generally have wireless, 3G or both forms of connectivity. iPads are the ultimate example of these devices and have essentially created this market space.

Smart Phones

These are cellular phones that have significant computational capability such as web browsing, text-based note taking, static and moving image display and a raft of downloadable custom applications.

Smart Devices

Such devices as the iTouch, PSP and Nintendo DS which, whilst they do not have telephony capabilities, they have much of the computational capabilities of the smart phones.

(Based in part on Binning, 2011)

These are very broad categories with much overlap between them. To avoid ponderously listing all of these devices, the phrase ‘computational device’ will be used to collectively refer to all of these different devices.

The key premise of this paper is that the range of computational devices available to schools and their students has significantly widened the gap between ICT for teaching and ICT for learning.
ICT for teaching

I define ICT for teaching as those technologies that support the teacher in their teaching of students. This would include a teacher computer (laptop, desktop or other device) that can be connected to a data projector and sound system to provide rich media to the entire class. It may also include a partial or full class set of computational devices for in-class tasks, and may also include the use of computer laboratories for whole class tasks. This ICT is teacher-centric and revolves around the outcomes that the teachers wish to achieve.

A key feature of ICT for teaching is the expectation of the teacher. The teacher will anticipate that whatever numbers of computational devices are used – one to one, or one to many – they will all function as the teacher anticipates. This means that all devices will probably have the same operating system, with the same set of software and drivers loaded, they will have the same levels of access to school infrastructure and will all function at a comparable level of speed. An example will help illustrate this.

A science teacher is teaching a class on acids and bases. They have explained the nature of these and now wish students to test various substances using a USB-attached pH meter. They hand out a netbook and pH probe to each group so that they can record the pH of a variety of substances.

In doing this, the teacher anticipates that all of the devices are fully charged and working normally. They anticipate that all netbooks will have USB ports and have the relevant software loaded to drive the pH probes. The teacher expects that the same software for recording notes will be available on all the netbooks and perhaps, most importantly, the same limitations will be in place on each netbook to control students’ login, access to the school network and the internet.

Characteristics of ICT for teaching

Using the example above as a starting point it is clear that ICT for teaching is, by its very nature, controlled by the school. It is managed by the schools’ ICT support so as to
provide appropriate levels of access and control for the school. There appears to be some shift in moving ICT for teaching from the ‘computer laboratory’ to the classroom. For example Wright (2010) noted that students “liked being able to access the internet from their classroom, rather than having to move to a computer suite” p.4). She went on to comment that the students did not like the interruption of their learning that moving to a computer (laboratory) represented and that they found ICT in the classroom to be more responsive to their learning. To this end, I contend that ICT for teaching now refers to ICT that is owned and managed by the school for the purposes of teaching. It is becoming more and more typified by mobile pods of ICT that can be taken to the learning environment.

**ICT for learning**

ICT for student learning is characterised as being student-centric. It is ICT focused upon the needs of the student to continue their learning and as such this ICT needs not only to suit the learner but also to be available to the learner when they require it. In reviewing the use of mobile technologies at Howick College, Wright (2010) noted the following:

- Having files available on their mobile devices tends to lead students to accessing and reviewing more often than textbook / notebook information
- Students were more likely to show their parents files on their mobile devices than any other school work.

Whilst these comments were made regarding the use of mobile devices in the classroom, it is pertinent to note that a key outcome was that the learning continued outside of the classroom. One student participant (Campbell Live, 2010) stated that when they were bored they would pull out their cell phone and review their work. Further evidence has also been noted by a teacher of Japanese at Howick College, who developed video materials on tense construction using the weather as an example, and deployed these to the students’ mobile devices. At the start of the following school year one student had
missed this segment of work at school but was not behind because they had worked their way through the teacher-provided material in the holidays, whilst another student discovered they could enter hiragana text on their iPhone and used this for their note taking and revision (Personal communication, 2009).

**Characteristics of ICT for learning**

Thus, ICT for learning is student-centric and is always available to the student. It is characterised by being ‘personal’ to the student and not teacher-directed. However, this ICT crosses the boundary between the home and school. Use at home is managed by the home environment and it is not anticipated that the school would endeavour to mandate how this may occur by prescribing devices, software or methods of internet access (wireless or 3G, restrictions and so forth). However, within the school, these devices can be leveraged to provide one-to-one classroom computing. To achieve this schools need to provide appropriate infrastructure to support the devices, which typically means a robust wireless network and internet access that is bandwidth and content controlled. It should be noted that giving student-owned devices access to the school server infrastructure is highly problematic at best.

Further, to be truly student-centric, the device needs to be a ‘device of choice’. This means that it is the type of device the student actually prefers to use (or at least own). This could be an iPad, smart phone, iTouch, PSP, netbook or any of the plethora of personal devices now available. It is the nature of the more ‘personal’ device that has helped to highlight the differences between the two forms of ICT.

Using the previous example of teaching about acids and bases, in the last portion of the lesson the teacher may then set the students a task to review public perception of the word acidic by exploring which products are marketed as pH neutral, alkaline or acidic or ‘non-alkaline’. The task is available to the class on the school’s learning management system (LMS) and students must submit the results of their research via the same portal. ICT for learning will allow students to download the task to their own computational device and then use that device to review advertisements on the internet, use the camera
function to record images in shops or papers and even potentially write up the report and submit it.

The key difference here is that the student is not limited to performing the task in the classroom, but can also carry on the learning exercise wherever they are at times that suit them. It will also enable serendipity learning, where students can capture materials and thoughts at any time, in and out of school, as they have the task and capability with them.

Thus I contend that ICT for student learning now refers to ICT that is owned by the student and is their device of choice. The school may suggest the capabilities such a device should have and should also endeavour to empower these devices within the school campus.

**Tension in the classroom**

This now brings us to the nub of this discussion with two very significant questions:

1. How do schools deal with the varying capabilities of student-owned devices?
2. How can we use such diverse device capabilities in the classroom?

The second question is easier to answer and leads us into the first so we will start there.

**Using diverse devices in the classroom**

The somewhat factious sounding answer is that you do not use these devices in class; at least not for structured tasks such as the pH task in 3.0. The teacher must be aware that it is not reasonable to expect thirty different devices to perform in the same way on the same task. Should a teacher embark on this approach they will spend the entire lesson performing ICT problem-solving tasks and student learning will be minimal at best.

However, what such one-to-one computing does give is the ability for students to independently access other sources of material such as through the internet or the school’s managed learning environment (MLE). It provides an opportunity for teachers to set self-paced or extension work that is supported by ICT without having to leave a
classroom. However, a note of caution must be interjected. The teacher must develop and communicate an appropriate protocol for the use of such devices that clearly stipulates the circumstances under which such technology can be used and the responsibilities of the user.¹

If a task requires specific capabilities or software then ICT for teaching is required.

**Varying capabilities of the student’s device of choice**

This really raises the question of the difference between a school laptop programme (or netbook or iPad or iTouch) programme and a student’s device of choice. Schools have often mandated the device to be used because they have wanted a device that would be suitable for both ICT for teaching and ICT for learning. To this end they may have stipulated a certain model of netbook and software that the school then pre-images on the unit before passing it to the student. From a school standpoint this is fine as the teachers now know the device has certain capabilities and will be available in class when required. Or will it?

From the student perspective this device is mandated so it is part of school, not their life. Typically students modify their personal devices by loading additional software, personal content (music and video), possibly eBooks and personalisation via themes, backgrounds and downloaded utilities. Often this can cause disruption with the school-loaded software and the device becomes less capable than anticipated.

Alternatively, schools may choose to lock the unit down so that the student has no ability to customise it and disrupt its functioning. I contend at this point it has become a school-‘owned’ device and is no longer student-centric.

The choice of device is also critical here. Schools tend to opt for devices appropriate to classroom needs such as laptops, netbooks or iPads. These are not devices that students carry with them but rather they are devices the students must go to in order to continue

¹ Such responsibilities need to be strongly implemented and clearly modelled so that the students can take them forward in to the workforce when they enter it.
their learning. Truly student-centric computing is about devices the students carry with them and which deliver the learning to them. Further, it raises the question as to why schools would require parents to purchase a computational device for their child and then attempt to exert control over it.

A further issue around school-mandated devices is that it then becomes expected that the school provides technical support for them. The notion of ‘swap out’ units and reimaging appears acceptable in theory but again there are significant issues around some technologies in terms of data portability from student to the loan device, issues around the school having sufficient knowledgeable staff and having available support staff. It becomes an ongoing cost for the school with arguably less than anticipated returns.

**Conclusions**

Schools need to be very clear in their thinking and communication regarding ICT for teaching and ICT for learning. Their communication to the students’ parents and the wider community must be very clear on the form of ICT that is envisaged. A New Zealand Herald article (Binning, 2011) suggests that in fact Orewa College is wanting its Year 9 students to be provisioned with IT for Learning yet the nature of the device is required is more ‘personal’ in nature, suggesting a move toward ICT for Learning. It is conceded that it may not be easy but every effort should be made by schools to ensure their communication clearly identifies the intended use the ICT in question.

I contend that schools need to decide very carefully what capabilities they desire in student-centric devices and publish these widely among the student and parent communities. This set of capabilities must be relatively simple and easy to achieve on a wide range of cheap devices. Ability to access wireless networks would be a fundamental to reduce costs to the student and enable functionality in the school. Such things as the ability to display 3G video and take text- or voice-based notes would be appropriate whilst ‘must be able to display PowerPoint presentations’ may well not be.
Once communicated, students and their parents can make their own choices around the device and the school will have a baseline capability to work with.

The school may also suggest a suite of applications that the students are to have loaded on their device. Obviously this would imply that the students own a device that runs a specified operating system however with the rise in Android and Windows-based devices, as well as the iPhone, there exists a strong potential for a range of applications in appropriate formats to be made available to the students. This may well increase the anticipated capability in the classroom and provide some crossover to ICT for teaching. Careful selection of cheaper or free applications would limit the cost.

If schools require or wish to empower ICT for learning they will need to have a suitably robust infrastructure to do so. This will mean robust, high capacity wireless access that is carefully managed to avoid abuse by students. ICT for teaching will also be further enabled by such infrastructure.

Schools must be very clear about when ICT for teaching is appropriate and how to provision this in the school. This suggests that schools need to consider the nature of the computational devices they own and how these may be empowered for use in the classroom to support the teachers in their teaching.

ICT for teaching and ICT for learning are not mutually exclusive. Rather, each enhances the other and creates a strong learning environment for students when they can perform tasks as directed by teachers, then take the learning with them out of school and continue working with the task at times and locations that suit them.

Widely communicated and enforced protocols on the use of ICT for learning are a must.

I suggest that schools will not cease to own computational devices but rather will start to purchase specifically targeted devices to facilitate teaching whilst preserving teacher sanity. Teachers should be able to use school owned and managed devices with confidence that they are provisioned for the task intended.
Final comments

The recent controversy regarding Orewa College’s requirement for students to have an iPad or other computational device (Binning, 2011; New Zealand Herald, 2011) and the media publicity it gained showed how important it is for schools to consider carefully what they wish to achieve and to communicate this clearly to parents.

Schools that attempt to provide a crossover device that is both learning and teaching centric run the risk of achieving neither. In class use will be problematic with equipment failures from flat batteries to software corruption to physical failures. Student use may be hampered by the way the device is prescribed by the school and locked down to facilitate easier management.

Finally, it should be noted that ICT for learning and ICT for teaching are device neutral in that it is not the device that is important, rather, it is the use to which the device is to be put that categorises the ICT. Schools need to be very aware of how they wish to use ICT and to provision and resource the ICT accordingly. Great pains must be taken to ensure that parents understand what the school is endeavouring to achieve.

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