

The Real Capabilities of Digital Technologies in the Learning Process: Paving the ICT Desire Paths:

Author: Andrew Douch

ICT Innovations Leader, Wanganui Park Secondary College, Shepparton.

Honorary Member of Australian College of Educators

Microsoft Worldwide Innovative Teacher of the Year 2008

Victorian Education Excellence Award recipient 2008

Contact: andrewdouch@me.com

Website: www.andrewdouch.com.au

Abstract

Embracing emerging technologies that students find engaging and have already embraced, such as Discussion boards, MSN and podcasting, has extended the classroom beyond the physical walls, and limitations of a timetable, making it accessible to students anywhere, anytime. Results on VCE examinations over three years provide evidence that teaching in this way leads to improved understanding and retention of knowledge by students. Moreover anecdotal evidence and testimonies from students indicate that students find learning this way more engaging. An enormous advantage of this approach to teaching and learning is that it achieves these great gains with very little financial cost, as it involves changing pedagogy to harness the benefits of technologies that students already own and know how to use. Moreover it saves personal time for teachers and students, and frees up class time for learning activities that make better use of face-to-face interaction.

NEW TOOLS; THE SAME OLD APPLICATIONS

Classrooms have changed very little in the last few hundred years. While schools do appear to have adopted technologies, such as desktop and laptop computers, and interactive whiteboards, they have not changed the fundamental pedagogical paradigms, on which teaching and learning are predicated. For example, classrooms are still operated between 9 AM and 3:30 PM, 5 days a week; students are grouped according to geographical proximity and the pragmatic considerations of time-tabling. A class is considered to be a single teacher responsible for 25 students, who meet at a scheduled time, in a room allocated by a time-tabler.

The adoption of technologies such as computers and interactive whiteboards has enabled students and teachers to do what they have always done better and faster, and to produce work that is more professional, but in many cases it has not allowed teachers and students to do things that are completely new.

For example, teachers tend to take their class to a computer lab rather than the library to do a research project. Most students can locate information for their research faster using computers than they were able to do using library books. They also have access to a greater breadth and depth of information. But essentially, they are doing what students have always done - locating, and using information that is collected in class time, under the direction of a teacher.

Likewise, interactive whiteboards (IWB) allow teachers to present information to their classes that is more likely to engage students than if it were written on a whiteboard, because they can incorporate multimedia, perform live internet searches, etc. But once again, teachers have always sought to engage their students using interesting visual aids that supplement the text-based learning that is taking place. All too often, teachers with interactive whiteboards are still doing what teachers have always done. The teacher is standing in front of the room, controlling the flow of information to a group of 25 students who have been timetabled to be together. The IWB makes the flow of information more efficient, more engaging, perhaps, but a teacher using an IWB in this way is not doing anything fundamentally different to what teachers have always done.

THE PROMISE AND THE THREAT OF EMERGING TECHNOLOGIES

Emerging technologies provide the opportunity, indeed the necessity for a radical re-thinking of what a classroom is and who comprises a class. It invites such fundamental questions as When and how should class members attend class? (does it need to be physically? During the school day?)

Emerging technologies such as podcasting, blogging, discussion forums, chat, YouTube, social bookmarking, social networking and the use of mobile phones mean that our students are more connected to each other and to the world than has ever been the case before. High school students now have access to the details of the human genome, up-to-date photographs taken from NASA space probes, and can watch live web-cams of thousands of places in the world. But it is not just access to information that makes the current revolution remarkable, but that our students are participating by

uploading their own data such as blogs, podcasts, videos, weather observations and reviews of products. It is that interactivity with the internet community that defines web 2.0.

In this context, the role of teacher is inevitably changing. Where a teacher was once like a tap, controlling the flow of information to students, able to hold back some information while channelling other information to students, that is no longer the case. Now teachers are standing with their students in a river of information. They no longer have control of what information their students have access to. Teachers who still see their own value as providers of information, are rapidly becoming (if they have not already become) redundant.

The role of teacher in the 21st century therefore needs to shift toward influencing the learning behaviour of students, not controlling the flow of information. Schools don't really have a choice about whether or not their students use such web 2.0 services as Myspace, Facebook, msn or YouTube. Our students are using these things. The only choice we have is whether to turn a blind eye to what they are doing and leave them to their own devices, or assume the charge that our vocation gives us, and participate with our students, influencing their use of these facilities so that they are guided in the safe and beneficial use of technologies that are morally neutral.

STUDENT ENGAGEMENT AND PAVING DESIRE PATHS

To some, the 'problem of emerging technologies' is that it is so hard to stop students from using them. They smuggle phones to school and text each other when the teacher is not looking, they spend enormous amounts of time chatting on msn and networking on Facebook, and they walk around with iPod earbuds either in their ears or hanging from their necklines. But if these technologies are so attractive to students, shouldn't we be looking at whether they have some educational benefit, and if so harnessing that fascination that our students have for these technologies. Our profession is based on the effective sharing of information and ideas. It is ironic indeed that so many schools seek to ban technologies that have become phenomenally popular among young people, precisely because they are effective conduits for the sharing of information and ideas!

There is a principle in landscape design known as "paving desire paths". All too often a landscape designer paves paths through a garden or park which he or she thinks will look nice and be functional. But months later, tracks are worn across the lawn, by human traffic taking short cuts to their desired destination. The principle of paving desire paths, reasons that it is more efficient and effective to sew a

lawn, and let people walk across it, then to see where the people walk, and pave those paths. The paths that are so paved will be more successful because they work with the desired destinations of the people who use them.

If we were to take the same approach to teaching and learning, we would watch to see how students like to communicate, and then pave those desire paths – making them the official conduits for the communication of knowledge and concepts. If we were to do this, we would find that students are more engaged with learning, and perform better.

THE AUTHOR'S EXPERIENCE

Between 2004 and 2005 I worked on a website for my year 12 biology class. In the last quarter of 2005 I introduced a podcast. In 2006 I emphasised to my class that the website and podcast were no longer 'optional extra resources' but were fundamental parts of the course delivery, and that actual class time was now to be a tutorial. This was emphasised even more strongly in 2007, and I also introduced the use of MSN messenger as a communication tool for class members outside of class time.

The following is an account of each of these tools, the use to which each was put, and the benefits that we have seen from its use.

PODCASTING

A podcast is an audio recording of a lesson, which replaces lecture-style explanations of concepts in class time. While it is still essentially a lecture, it has numerous advantages. Students have the flexibility to choose when and for how long they listen. They are able to stop and start the lesson if they find 50 minutes too long to listen in one sitting. They are able to listen to the podcast during 'down time' when they are walking to school, washing the dishes, or driving. They are able to re-listen to the lesson as many times as they want to understand the concepts being explained. They can re-listen later in the course for revision. If they are listening and their mind wanders, they can rewind just that part and listen to it again. Students who are absent from school due to illness do not have to miss the teacher's explanation of essential concepts. None of these options are available to students if the information is presented in a traditional class, during class time.

Most importantly teaching via a podcast saves actual class time for activities that are more engaging or interpersonal and truly require face-to-face interaction. Moreover they allow the flexibility to focus in class on only the most important, or difficult-to-understand aspects of a topic rather than having to cover the whole topic in class time.

Another significant advantage of teaching via a podcast is that it saves teacher time! VCE teachers spend a lot of out-of-class time re-explaining concepts that were taught in class – often to one student at a time. In contrast I find that students will go back and listen to the podcast again when they need to be refreshed. This frees up teacher time, and thereby allows the teacher more preparation time.

The podcast is accessible to students in other schools, too, because it is published via an RSS feed over the internet. My own podcast has a listening audience of over 3000 students. Many of these students from other schools interact with my students and me by sending email, or using their mobile phone to send voicemail which is played on the podcast for the benefit of everyone.

DISCUSSION BOARD

On the discussion board, conversation about biology continues asynchronously around the clock. Students post questions at any time, and receive answers from peers, past students (several who still participate, now as mentors) or a teacher. This facilitates sharing between classes, thereby eroding the walls between “our class” and “their class”. For many students the ability to ask a question at any time, anywhere and know that when they return to the discussion board there will be an answer, is very reassuring.

The provision of a class discussion board also saves teacher time as a student who does not understand something, will ask a question on the discussion board. Then the teacher’s answer can benefit all students, rather than just the one who asked. This is especially true of questions relating to assessment. There are always some students who ask questions about upcoming assessment tasks. In the past, such a question gave the asker an advantage over other students who were not privy to the conversation. But if all questions about assessment are posted on the discussion board, then all students have access to both the question and the answer. This is seen as being fair.

MSN

Most students already have effective communication networks using MSN Instant Messaging. I have taken advantage of this connectedness to provide students a convenient avenue to ask for extra help, for example, much as they might otherwise do by coming to see the teacher after class. The convenience of this opportunity, and the non-threatening forum it provides has facilitated more candid feedback from students and greater willingness to seek help.

We also use MSN for group study sessions online, which students find very engaging.

Redefining “Classroom”

Unlike many of the ways that we have used technologies in schools, this is not a special project added to the curriculum. Nor is it just a tool that allows us to do what we have always done a little faster or a little better. Rather it is a fundamental transformation of the way the class operates. It involves the use of emerging technologies to redefine “classroom” in terms of when class takes place and who a class is! All biology students at our school are involved, as well as over 3,000 students and teachers from other schools across Victoria and the World. These technologies have enabled me to facilitate a community of people who want to share in the experience of learning about biology by breaking down the geographical and temporal barriers that previously prevented convenient and rich sharing. It has also lowered barriers between groups (boy/girl, in crowd /out-crowd, Year 11/12, different classes within the school, different schools and even school sectors!)

The accessibility and flexibility of these recourses benefit students in unusual circumstances. For example one student wrote to tell me he was hospitalized for chemotherapy but was able to keep up with biology by participating in my virtual class. Another started VCE in Australia, but had to move to Bahrain with his family. He was able to complete VCE biology as a virtual member of my class, even while in Bahrain. Another was unable to do biology at her school due to a timetable clash, but persuaded her school to allow her to take biology as part of my virtual class but sit the SACs at her own school.

This generates excitement among both students and teachers who feel that they are part of something significant; an authentic learning environment – not just a class but a learning community.

Outcomes

The use of these emerging technologies has been evaluated in two main ways: objectively in terms of performance on VCE examinations and subjectively in terms of student engagement.

Performance on VCE examinations

VCE median study score data.

The median study score for this class in 2007 and 2008 was 36 (VCAA 2009). This is surprisingly good result for a Government school in a non-affluent neighbourhood. On the final exam, 50% of the class achieved A or A+. More importantly, perhaps when compared to like schools, there is a statistically significant difference between this class and other classes

VCEDS adjusted study score data.

Adjusted average study score data indicates that this class performed 6 study score points (12%) higher than expected considering the students which comprised the class. A similar result was achieved in 2006, indicating that these results may be replicable.

It is also interesting to note that in 2007, every student in the class performed higher than their VCAA predicted score for biology.

Student engagement

Most adolescents engage with technologies that allow them to communicate with others anytime, anywhere. Adopting these technologies as the primary mode of communication between class members, taps into the desires and expectations of their generation. The current trend of student disengagement with school runs contrary to their phenomenal engagement with social networking, iPods and mobile phones. This innovation is successful because it employs communication tools that make school relevant and engaging. It is “meeting them on their own turf”.

It cooperates with students' perceived need for connectedness via the Internet, but provides them with an educational platform on which to interact. In this way it establishes a genuine learning community of students and teachers, grouped, not by geography, but by interest.

In 18 years of teaching, I have not seen students so passionate about learning as in the last two years. Some students still participate in the learning community more than 12 months after graduating! We have collected ample anecdotal evidence that students learning this way view class as an experience rather than a chore. Quoting some students who sent unsolicited email best captures these sentiments:

"I'm sure at the start of the year you weren't expecting this kind of outcome. This bond between a group of people whose common factor is Biology Unit 3+4. It's just so strong. I feel the pain and happiness in everyone's achievements in the class. The way the class has grown into a hard working bunch of people who are prepared to put themselves on the line for the greater good. It is so cool. You should be so proud." - Rhiannon

"...there is so much technology and there is room to build relationships...in other classes, there is no time for that - you go in, do notes go home that is it! - there is no interaction, no special connecting WHEREAS there is in biology!" - Kathryn

I have never been in such an environment. In all honesty, being able to be a part of something as spectacular as last year has changed me in a very positive way. My complete outlook on life has changed and for that I thank you... thank you for letting me share the experience and making it so wonderful to be a part of. - Lachlan

REFERENCES

VCEDS 2009, VCE Data Service <https://vass.vic.edu.au> (Viewed 21 January, 2009)