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ultranet

Assessment in online learning environments

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Foreword

The Melbourne Declaration on Educational Goals for Young Australians (MCEETYA, 2008) has two clear goals:

- Australian schooling promotes equity and excellence.
- All young Australians become successful learners, confident and creative individuals, and active and informed citizens.

How do we help young people to make progress towards these goals? We know that the most powerful single influence affecting achievement is feedback. Not only do teachers need to give useful feedback to their students, it is most important to create situations for teachers to receive more feedback about their teaching. Professor John Hattie and his co-researcher, Professor Helen Timperley, have shown that this in turn benefits students.

This paper, the third in the *Digital Learning Platforms Research Series*, reports on research evidence from Australia and international sources, with a focus on assessment. Computers, handheld devices and digital learning platforms like the Ultranet make it possible to give and receive feedback in many ways, and to keep records for reflection and review. They also support student transitions and detailed ongoing communication with parents.

Victoria now has a safe, secure state wide repository for individual student data on skills, achievement and attendance that can be built up over time. With educational data mining becoming increasingly important for individual learners, parents, teachers, schools and systems as a way of monitoring and understanding progress, we are in an era of rich possibilities for assessment.

I trust you will find this paper helpful in making the most of the many digital resources available to support teaching and assessment in Victoria.

Chris Wardlaw

Deputy Secretary
Office for Policy, Research and Innovation

Contents

Overview of Digital Learning Platforms research series

Expanding horizons (2010) provides an introduction to digital learning platforms and their functionality, making specific reference to the Ultranet. It presents a model showing the elements within a learning platform and highlights some of the ways these elements can be used to enrich teaching and learning.

Connecting people (2010) examines the communication functionality of learning platforms, and explores the benefits and challenges in supporting independent learning and collaborative practices. The value of learning platforms includes their ability to enable social networks and educational communities to be fostered in ways where there is an emphasis on creation rather than consumption, and on the decentralisation of content and control. This paper explores the connectivity offered through Web 2.0 technologies in learning platforms (such as chat, messaging, blogs, wikis and forums), and discusses the implications of these for the educational opportunities of students, parents, teachers and the broader community.

Flexible learning looks at how learning platforms can support a variety of approaches to teaching and learning, in and beyond schools. With new conceptions of time and space, flexible learning recognises that learning experiences can be planned and organised, or spontaneous and opportunistic. This paper explores evidence showing how the resources, tools and flexibility to access the learning platform at any time and from anywhere, along with the development of teachers' and students' capabilities, catalyse changes in learning and teaching.

Professional learning and practice reviews approaches to professional learning that support educators to learn through technologies in order to use them effectively to create a range of learning environments. It recognises that learning platforms themselves do not bring about improvements in educational quality, simply through their installation. It is the strategic and thoughtful use of the tools that brings benefits to both learning and teaching.

1 Introduction

Digital learning platforms provide an online environment that integrates resources for teaching and learning with the communication and publications functions of Web 2.0 technologies.

Assessment is the ongoing process of gathering, analysing and reflecting on evidence to make informed and consistent judgments to plan for and improve future learning and development (DEECD, 2008). Students, teachers and peers are constantly involved in formal and informal assessment activities.

This paper outlines research into the use of digital assessment tools (also known as e-assessment in the UK and USA), that shows they improve the quality and variety of assessment information. They enable students to self-regulate and monitor their own learning, which is recognised as a means of prompting deeper and more effective learning (Joint Information Systems Committee (JISC), 2010). Digital learning platforms and their associated tools enable students to individually store their own evidence, give and receive feedback, reflect on their progress and present selected evidence for particular purposes.

Effective assessment requires clarity of purpose, goals, standards and criteria, achieved through alignment with an engaging and challenging curriculum. Effective pedagogy requires knowledge of where each child is up to in their learning and development to enable decisions about the best way forward to promote further learning and development (Masters, 2010).

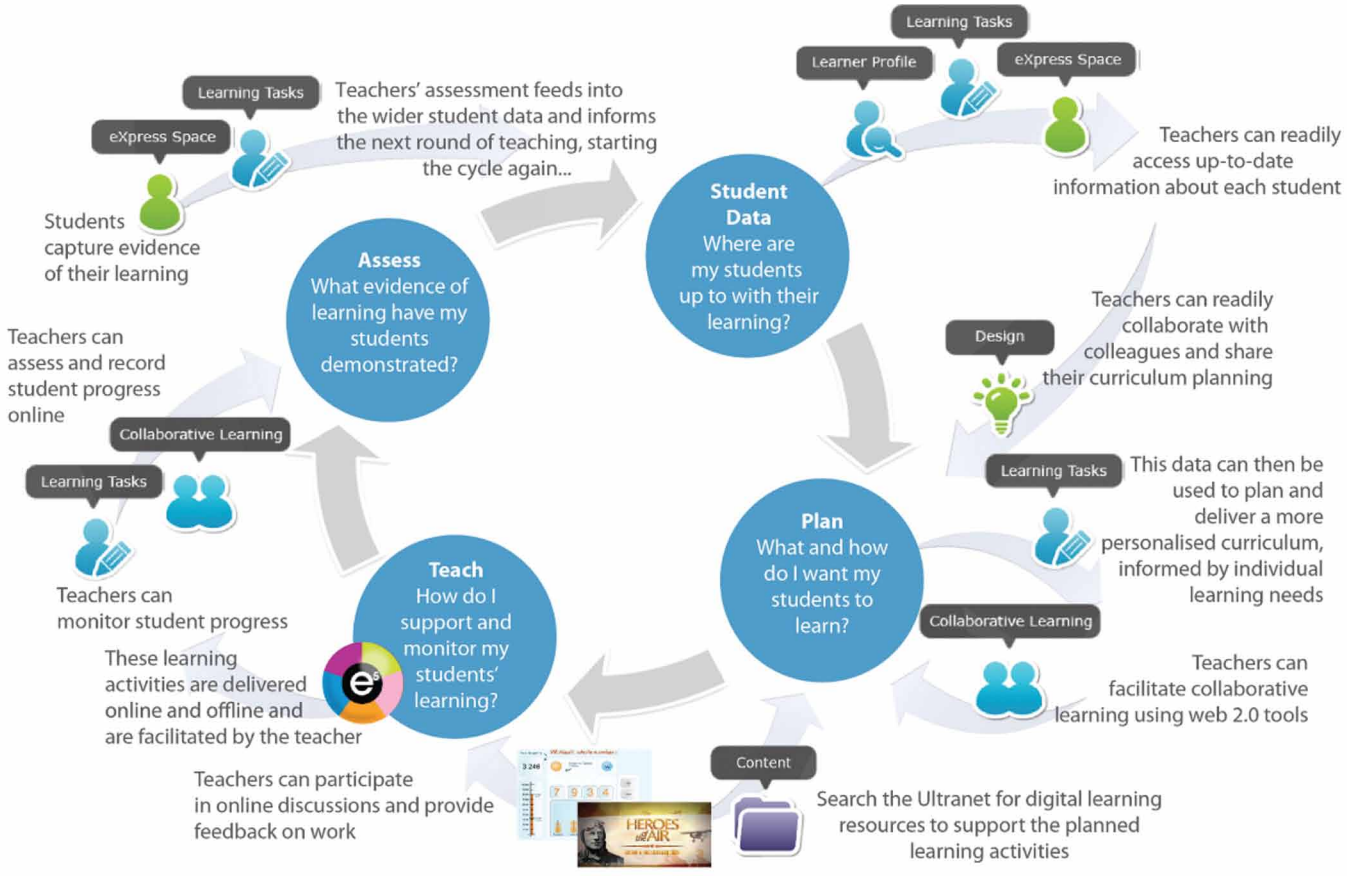
Teachers and school leaders now have a greater range of formats for effective assessment of skills and knowledge. They can use the data held in digital learning platforms to better diagnose and monitor individual students' progress and achievements and to identify patterns across groups. Parents can see what their children are learning, and by having more detailed information at hand can have more informed discussions and interactions with the school.

Teachers use assessment information, including feedback on the effectiveness of their own practice, to determine both the learning needs of their students and their own professional development (DEECD, 2011a). Rather than just being the end point, assessment is the beginning of a cycle of diagnosis and planning to answer key questions such as:

- What do my students already know?
- What sources of evidence have been used?
- What do they need to learn and do?

This approach is reflected in the cycle in Figure 1.

Figure 1: Teaching and learning cycle on the Ultranet



2 Knowing your students

In order to meet students' learning needs, it is important to know what they already know. Among the many ways of doing this, both formal and informal, is using digital assessment tools such as online testing and digital portfolios. Both yield a range of useful data that can build up over time.

Benefits of using digital assessment tools

A recent report (JISC, 2010) found that using digital tools for assessment, as described below, has benefits for:

- *dialogue and communication*: online interaction via forums, blogs, email and voice boards can enrich feedback and help clarify learning goals and standards while overcoming time and distance;
- *immediacy and contingency*: interactive online tests and handheld tools (such as voting devices and internet-connected mobile phones) can be used for learner-led, on-demand, formative assessment;
- *authenticity*: online simulations and video technologies allow students to rehearse real-world skills and experience both success and failure;
- *speed and ease of processing*: assessment delivery and management systems can provide instant feedback both to learners and practitioners, yielding robust information for curriculum review and quality assurance processes. Data can be transferred between institutions;
- *self-regulated learning*: peer assessment, collection of evidence and reflection on achievements in portfolios and blogs can generate ownership of learning and promote higher-order thinking skills, in turn improving performance;
- *additionality and efficiency*: technology makes it possible to assess skills and processes that were previously difficult to measure (e.g. through educational data mining). It can add a personal quality to feedback, even in large-group contexts, and, through efficiencies gained from asynchronous communication and automated marking, can enable practitioners to make more productive use of their time (based on JISC, 2010, p. 17).

Online assessments

Computer-based and online testing can provide timely feedback, either from the computer itself or from teachers. Tests available on-demand allow teachers and learners the flexibility to take them when it's appropriate for them. Having these assessments available anytime or anywhere often means that learners can assess their own preparedness, retake assessments as necessary, and use the results to help them with their studies. For teachers, the data from online tests can indicate in a timely fashion which learners may be at risk and those requiring more assistance.

Assessment tools provided by the Department of Education and Early Childhood Development (DEECD) include the following English and mathematics assessments:

English Online P-2
The English Online Interview is designed to assess all aspects of the Victorian Essential Learning Standards (VELS) for English (reading, writing and speaking and listening) for children in Prep to Year 2. It provides a wide range of diagnostic information for teachers about individual learning needs as well as state-wide data about Prep to Year 2 achievement in English.

Fractions and Decimals Online 5-8
The Fractions and Decimals Online Interview supports teachers to assess the mathematical understanding of students in Years 5-10 and high-achievers in Year 4. The Interview contains multiple entry points and is used to assess an individual student's understanding and strategies in relation to overarching ideas in the areas of fractions, decimals, ratio and percentages. The assessment can generate a range of profiles of student understanding organised around overarching ideas, and can also establish students' prior knowledge and determine their progress over time.

Maths Online P-2
The Maths Online Interview is used to assess the mathematical understanding of students in Prep to Year 4 and students at-risk in Year 5. It assesses an individual student's understanding and strategies in relation to key points of growth in the areas of numbers, measurement and space. The assessment contains multiple entry points, analyses student responses and can generate a range of profiles of student understanding organised around the points of growth.

Using on demand assessment tools can help teachers save time since most types of test questions are automatically marked and student results can be viewed through different types of reports. In addition, students benefit from getting immediate results and feedback, which can then be used to support, encourage and motivate their learning. The Victorian Curriculum and Assessment Authority (VCAA) has a range of on demand assessment tools available for schools to download. These include linear tests where all students get the same questions, and adaptive tests that vary the set of questions a student receives by using a system that presents progressively easier or harder questions to a student depending on their previous responses.

Portfolios

Portfolios, also known as e-portfolios, form part of personal online spaces such as digital learning platforms and store a range of data types, including text, audio and video evidence which demonstrates what students know and have done, over time (Maher & Geber, 2009). Portfolios are often intended under the control of learners and can be used for a range of purposes, including documenting:

- products – actual work samples, learning opportunities;
- processes– students' reflections of their learning, outlines, drafts, strategies used; and
- perceptions of learning – attitudes, motivations, self assessments and goal setting.

Portfolios can work for learners of all ages. For example, UK students in an early years setting create an 'e-profile', based mainly on images of activities and outcomes, with the assistance of their teachers. These are then used in a diagnostic way for assessment and planning and have the effect of increasing self-esteem for many students. The e-profile system is a means of recording progress that has been found to be successful with three- to five-year-old children, making it an initial (and arguably necessary) stage on the road to full e-portfolio development (Hartnell-Young, Harrison, Crook, Davies, Fisher, Pemberton & Smallwood, 2007).

One of the benefits of portfolios is the rich amount of evidence students can store and present to various audiences to demonstrate their progress and achievements at any point in time. A digital learning platform like the Ultranet provides a repository for students to house those pieces of work that show what they know and can do. Portfolios however, do not have to contain every piece of work a student completes. With the support of teachers and parents, students can determine the purpose and audience for their portfolios, and select pieces of work to be used as evidence to demonstrate achievements to those different audiences.

Used well, portfolios allow teachers to follow each student's progress and provide ongoing, personalised feedback, while also assessing the outcomes students have achieved and validating them against external criteria in a rubric consistent with relevant curriculum standards. By collecting and storing evidence over time, teachers, parents and students can track progress along a personalised learning journey (DEECD, 2010b).

Film clips about how e-portfolios used in schools can support assessment have been produced by the UK Qualification and Curriculum Authority (2009).
These clips can be viewed at:
http://vimeo.com/4982040

Using portfolios with students from non-English speaking backgrounds

At Noble Park English Language School, newly-arrived migrant and refugee students from non-English speaking backgrounds shared their personal stories using a mixture of recorded audio narrations, computer-based images, text, video clips and music as digital stories and digital portfolios The focus of this project was to demonstrate how English as a Second Language (ESL) students could further develop their oral language skills through the use of ICT. The project showed that through the processes of recording, re-recording and editing audio narration students improved their acquisition of English (DEECD, 2010a).

Using the Ultranet for portfolios

The Ultranet provides an ongoing space where parents, students and teachers can see the status of student goals and achievements. Learning portfolios are made available to all P-12 students and it follows the student throughout their school life. They allow students to reflect upon their achievements and set new goals for improvement at the end of specific tasks or units of work. The learning portfolio is viewable not only to the student themselves, but also their teachers at school and their parents/guardians. This provides opportunities for discussions with students about their learning.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PHILIPS

3 Planning curriculum and learning activities

Once teachers know where each student is up to in their learning and development through analysing the available data, they are in a position to plan appropriate and relevant learning activities, including assessments, to help them progress.

Research into the use of digital tools for learning

Victorian schools have rich experience of using digital tools in class for learning and ongoing assessment. Teachers report using different types of activities with their students to build skills, including:

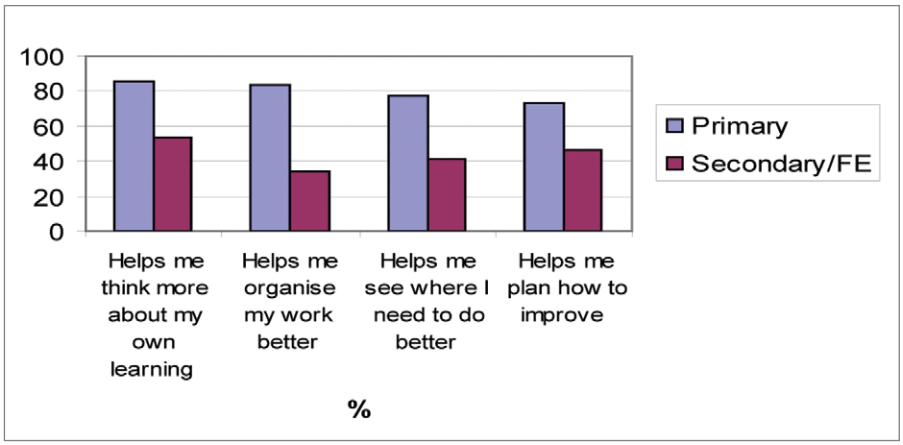
- radio, vodcasts, games, multimedia (eg. Kahootz), film making and animation to improve oral expression;
- blogging, discussion boards and script writing for movie making to develop written skills;
- virtual classrooms, social networking software, the internet, email and video conferencing to facilitate access to resources, experts, building learning networks, and professional learning opportunities;
- gaming (especially programming), and developing radio segments/podcasts to encourage creativity and critical thinking;
- databases and digital portfolios to assist with organising information; and
- claymation to build deeper conceptual understanding. (DEECD, 2010b)

In research from the UK, teachers were found to use digital learning platforms to match activities, groupings and outcomes to documented curriculum and/or assessment rubrics, and to identify gaps. One teacher commented:

> *We have a data handling program which has all the statements and whether the children have achieved them or are working towards them, so you can think, 'Right, I'm going to do an activity today which includes linking letters to sounds. Which children would be the most appropriate to work with at that level?' And you can actually use the data program to find that out so it will identify the children who you need to work with on that activity (Hartnell-Young, et al., 2007, p 35).*

Students can also be involved in planning and setting their own goals. Students in the UK were asked to what extent the learning platform or portfolio system helped them to think about, plan and organise their learning. Figure 2 shows the results.

Figure 2: Percentage of students who agreed and strongly agreed with goal setting and reflection statements (n = 149) (based on Hartnell-Young, et al., 2007, p. 15)



Primary school students were very positive in their view of these benefits, while older students were less so, particularly in terms of organising their work.

Planning to develop 21st century skills

Generic capabilities, such as problem-solving, innovation and ICT literacy, are sometimes called 21st century skills and are promoted as beneficial to individual students as well as being fundamental to achieving increased productivity in the Australian economy (Moyle, 2010). International researchers working on the Assessment & Teaching of 21st Century Skills (ATC21S) project categorise 21st century skills into four broad categories:

- ways of thinking: creativity, critical thinking, problem-solving, decision-making and learning;
- ways of working: communication and collaboration;
- tools for working: information and communications technology (ICT) and information literacy; and
- skills for living in the world: citizenship, life and career, and personal and social responsibility (ATC21S, 2011, p. 1).

The Australian curriculum being developed by the Australian Curriculum, Assessment and Reporting Authority (ACARA) aims to support 21st century learning outcomes as well as the goals identified in the Melbourne Declaration on Educational Goals for Young Australians (MCEETYA, 2008). The VELS address the development of 21st century skills through its three core interrelated strands of physical, personal and social learning, discipline-based learning and interdisciplinary learning.

There is increased interest internationally about how to assess these generic capabilities or 21st century skills. Many countries subscribe to their importance and policy relevance but fail to provide detailed and clear definitions for them (Ananiadou & Claro, 2009). This makes it difficult to determine assessment approaches for measuring them.

Ananiadou and Claro (2009) have developed a framework for conceptualising 21st century skills and their competencies from research conducted in OECD countries:

- The information dimension of the framework includes research and problem-solving skills, and looks at information both as a source and a product.
- The communication dimension includes effective communication as well as collaboration and virtual interaction. They argue that ICT can assist in strengthening students' skills around coordination and collaboration with peers.
- The ethics and social impact dimension focuses on social responsibility around the impact of individuals' actions, and social impact in a digital age.

Digital learning platforms provide students with personal learning spaces where they can undertake activities that develop 21st century capabilities such as information handling and identifying and solving problems. These skills can be developed by working collaboratively on projects with students in their class, other classes in the school, or those located throughout Australia or overseas.

Personalised assessment

Skilled teachers can use a wide range of ICT tools to improve assessment practices and make assessment more adaptive to different students' learning requirements. For example, in Victoria, assistive devices such as digital pens have been used to alleviate disability, remote learners' needs have been addressed using virtual classroom technologies, and gaming has been effective in increasing student engagement (DEECD, 2010b).

Item banks within digital learning platforms are another way in which teachers can create appropriate assessments for their students. Questions can be assessed and indexed so that learners are given tests that match their abilities. In addition, by using a randomised selection process to supply assessment questions from the item bank, students can receive questions with similar difficulty levels and sit their assessments at different times without invalidating the tests (JISC, 2007).


Pat Florentine

4 Teaching, learning and feedback

To support and engage students, teachers should:

- Engage the interest of students through a variety of assessment strategies.
- Meet the diverse needs of students through alternative assignment formats (e.g. multimedia-enhanced presentations, audio and video podcasts).
- Increase students' capacity to self-assess through assessing each other's work.
- Exploit technologies such as e-portfolios to evidence skills of reflection and self-assessment.
- Design assignments in ways that encourage original thought and minimise opportunities for cheating (JISC, 2010).

Supporting and monitoring student learning is an important role for teachers, and over the last decade, our knowledge of the important relationship between feedback and learning has increased. Hattie (2009) found that the most powerful single influence affecting achievement is feedback, and not only from teachers to their students. It is most important to create situations for teachers to receive more feedback about their teaching, which then creates a ripple effect back to students (Hattie & Timperley, 2007).

> *When teachers seek, or at least are open to, feedback from students as to what students know, what they understand, where they make errors, where they have misconceptions, when they are not engaged—then teaching and learning can be synchronized and powerful (Hattie, 2009, p. 173).*

Hattie's (2009) meta analysis found that the most effective forms of feedback provide cues or reinforcement to learners via video, audio or computer, or relate feedback to learning goals. Feedback needs to be learning-related rather than an extrinsic reward like a 'gold star', and is more effective when it provides information on correct rather than incorrect responses. Of course the learners then need to act on the feedback. Hattie (2009) suggests that an ideal learning environment or experience is when both teachers and students seek answers to each of these questions:

- Where am I going? Feed up
- How am I going? Feed back
- Where to next? Feed forward

Recent practitioner research in Victorian government schools on using ICT for teaching, learning and assessment found that:

- the way in which teachers assessed student outcomes changed and as students took control of their own learning, teachers had more time for assessment;
- reflection was encouraged, so students could go back to revisit their products such as podcasts and refine them;
- self, peer and teacher assessments, using formats such as blogs, were critical in improving student learning outcomes (in performance, motivation and understanding);
- students were more likely to complete tasks and produce quality work when peer assessment using blogs or student response systems was part of the process;
- technologies that enabled frequent feedback (for example, student response systems) and monitoring of students' performance (e.g. digital stories) were more effective in progressing outcomes;
- teachers were assessing deeper concepts when using ICT;
- teachers assessed different skills using the same digital tools (e.g. some teachers used digital stories to assess group work, while others used them to assess oral expressions);
- using ICT to monitor student results was often instantaneous and timely, offering immediate opportunities for remedial action;

Creating persuasive advertisements

At Auburn Primary School in Victoria, students developed persuasive advertisements using their netbooks and online sites. They first had to understand the structure, language features and purpose of the genre, by reviewing advertisements online and on radio, creating their own jingles, and using Digital Learning Objects from the FUSE website. Students interviewed their client (the teacher) and then created their digital advertisements, submitting them to the classroom blog for review. Peer assessment was involved, as each student reviewed three advertisements, giving feedback on the structure, layout, spelling, grammar and persuasive techniques of the advertisement. Parents were asked to review their child's advertisements via the class blog, and provide feedback on a range of features of writing, such as spelling, grammar, and layout, and on the design of the advertisement itself, including colour, images, font, and backgrounds (DEECD, 2011b).

- collaboration and peer review became part of the formal assessment using ICTs especially through blogging, discussion boards and film making, and this encouraged better performance;
- assessment criteria were more transparent to students, raising expectations in performance; and
- the public nature of students' work and having an authentic audience (through blogging, web pages, online chat, etc.) made students more aware of social etiquette, the need to present better products and encouraged healthy competition between students which raised academic achievement (DEECD, 2010b).

Similar research undertaken in twelve UK schools using different proprietary or open source digital learning platforms (Jewitt, Hadjithoma-Garstka, Clark, Banaji & Selwyn, 2010) found many ways of monitoring and assessing learning. Knowing that self assessment and peer review are important, learners can reflect, give immediate feedback and options for action, understand how their learning progressed over time, and gain a sense of ownership over their targets.

This was done through:

- recording and uploading learners' work to support reflection;
- giving instant feedback through auto-scoring computer quizzes or online teacher feedback;
- using the 'distance' of the online environment to more comfortably give feedback to peers;
- enabling learners to access archives of their work to see and value their progress;
- supporting learners to set goals by making their learning visible to them;
- providing learners with data to review targets and identify focus areas; and
- enabling teachers and learners to exchange messages using commentary boxes and audio notes.

As with the Victorian government school research, they found that assessment could be done more quickly and feedback provided more immediately using digital learning platforms. Figure 3 shows the feedback from primary students compared with those in secondary and further education colleges in the UK. A majority of primary students clearly felt that using the digital learning platform helped them to judge their own improvement and also helped them to learn.

Figure 3: Percentage of students who agreed and strongly agreed with statements about learning in online environments (n = 149) (Hartnell-Young, et al., 2007, p. 22)

Wolverhampton City Council in the UK developed a system-wide vision to support the transformation of attainment, inclusion, participation and skills. To support this, it provided an infrastructure with integrated curriculum provision and a set of tools for learners throughout the 14-19 age range that ran across the authority and beyond, as the students moved from schools and further education into higher education. The personal planning software at the heart of this strategy, called my-iPlan, draws data electronically from the authority's school information management software, the Connexions support and career guidance package, which is the entire collaborative curriculum offering of the area. This created a learning platform with wide functionality. Staff development to support the innovation was extensive. One leader said:

> *[It] allows the students to save any of their work to a webspace. It allows teachers and students to communicate. It allows teachers to set and send assignments. It allows teachers to receive, mark and save completed work. It allows teachers to create self-assessment documents. It permits rapid feedback. It also encourages e-working 24/7, and learning on demand (Hartnell-Young et al., 2007, p 51).*

Loughborough College in the UK has used a learning platform to provide fast and effective feedback to students. When assignments that have been submitted online have been marked, students can immediately view these through their learning platform, providing easier and quicker access to feedback (JISC, 2010).


Expert Editors!!
DIGITAL ILLUSTRATION
Dictionary Meaning

5 Assessing progress and outcomes

In the USA, the Assessment Design and Delivery System (ADDS) is a web-based assessment design tool developed to provide teachers with a structure and the resources required to develop and use quality assessments. As in a digital learning platform, materials and resources are located in one place to streamline the process of creating assessments. Vendlinski, Niemi, Wang and Monempour (2008) field tested the tool in large school districts around the United States and found that teachers who used the tool began developing their assessments with the big ideas in mind, created rubrics to evaluate student work, and included video or online sources in their assessment questions. The researchers' findings indicate that 'assessments that include web resources are far more likely to ask students for higher order thinking than those that do not include such resources' (Vendlinski, et al., 2008, p. 10).

Assessment should be embedded into the ongoing instructional cycle of planning, delivery and reflection. It is not just about measuring student outcomes at the end of a program of learning, but monitoring student progress and providing feedback along the way. Authentic assessment tasks allow students to better demonstrate their learning, and using technology for assessments, including high stakes ones, can allow teachers to mine the data and better meet the needs of their students.

Evidence of learning

There are different ways to gather evidence of student learning. Ongoing student assessment with quality feedback is important and has been associated with higher student achievement levels (Wiliam, 2010). Teachers, students and/or their peers can use the assessment results to help them make informed decisions about the next steps for learning.

Portfolios can make the evidence of attainment more obvious, in a range of media formats, to both teachers and students. This transparency can have the effect of giving the learner more control over their learning, and planning for future growth. A further benefit of portfolio systems is in tracking attainment measures for the purpose of individual planning (Hartnell-Young, et al., 2007).

Educators are interested in portfolios because these tools enable students to describe their own achievements against identified requirements. They enable students to organise their own content for viewing by teachers, other students, and outside audiences. Portfolios can also support students to record their learning and achievements beyond school (Stefani, Mason & Pegler, 2007).

Authentic assessment tasks

Approaches to assessment can provide authentic opportunities for students to demonstrate their knowledge, abilities and understanding. To improve student learning outcomes through assessment and feedback, there is a need to develop authentic assessment tasks around technologies. Authentic tasks:

- have relevancy to students' everyday life,
- encourage deep enquiry,
- practice/confirm knowledge acquired (e.g. deeper conceptual understanding), and
- allow students to evaluate and reflect on their learning.

Using digital learning platforms can provide different types of assessment experiences for students and make it easier for teachers to facilitate assessments of 21st century skills in areas such as higher order thinking skills, problem-solving capabilities and information handling abilities. Computer-based simulations and recording techniques can be used so that students can demonstrate their problem-solving skills and give teachers a better understanding of not only what students know, but how they arrived at their answers.

Using ICT to assess language acquisition

Hawkesdale P-12 College, in the rural western district of Victoria, used web 2.0 and mobile technologies to enhance the teaching of LOTE Chinese and to enable students to learn on demand. Using mobile technology coupled with an online community, students engaged in mobile blogging, and used 'Ning' to establish a collaborative, social networking space.

The teacher recorded several lessons covering the vocabulary and phrases she wanted the students to learn. After listening to lessons on the iPods, students recorded themselves speaking Chinese either using the class mobile phones, their own phones or an iPod with a voice recorder attached. They then took these recordings and placed them on their individual pages on the wiki for the teacher to assess.

A group of students went to China for six weeks and while there, made short videos on their mobile phones of Chinese students participating in different sports. They then uploaded them to the wiki for comment and feedback (DEECD, 2010b).

Educational data mining

Educational data mining (EDM) is concerned with developing methods to explore the unique types of data that come from educational settings, and using those methods to better understand students and the settings in which they learn. This includes mining the data that comes out of the interactions between students and software such as intelligent tutors and educational games, in order to better understand how students respond to educational software, and how these responses impact their learning (Baker, Corbett, Roll, & Koedinger, 2008). It also includes mining the data from online courseware and enrolment data (Romero, Ventura, & Garcia, 2008) in order to study questions about what factors determine student success and/or drop-out rates. Data mining can be used by teachers and curriculum developers in several different ways. Baker and Yacef (2009) have identified four key areas of application for educational data mining methods:

1 identifying key student attributes and behaviours to model their individual differences, or if in a collaborative setting group differences, so that software can respond to those differences and improve student learning;
2 using automated approaches directly on the data to discover or improve a model of knowledge in a domain;
3 discovering which types of pedagogical support work best for individuals, groups of students, or in specific situations; and
4 designing better learning systems through the use of empirical evidence to understand key factors which impact on learning.

One major benefit of a state-wide digital learning platform is that since student data is stored centrally, the data goes with a student if they change schools. Further, aggregated data can support more informed school planning and show regional and state-wide patterns. Jewitt, et al. (2010) found that UK teachers were collating, monitoring and analysing a wide variety of data, which in turn supported them setting and reviewing targets, seeing patterns in learners' information and creating groups based on similar needs. Because the digital learning platform provided a hub of information, it meant that:

- analysis and dialogue around learners' data led to an understanding of what was effective;
- a more holistic view of each student could be developed, reducing data fragmentation;
- school leaders could connect with classes through the data; and
- logs of online activity could be reviewed to identify patterns of use.

A teacher commented:

> *For parents to know what it is their child needs to do, how they're being assessed, and where they're up to, that's probably been the most significant bit of all, because then they really understand what their child is trying to do to get to the next level within science (Jewitt, et al., 2010, p. 38).*

LOTE Rubric Maker

In Victoria the Languages other than English (LOTE) Rubric Maker is a free application for teachers to download and install on their computers. The LOTE Rubric Maker enables teachers to create assessment sheets, which assess students' performance against the VELS. It finds the standards and progression points that match the selection teachers make when creating a rubric. The LOTE Rubric Maker supports a multi-disciplinary approach to teaching and learning and can be used to assess knowledge and skills in LOTE across the three VELS strands of physical, personal and social learning, discipline-based learning, and interdisciplinary learning (DEECD, 2011c).

High-stakes assessment

Traditionally examinations have been conducted using pen and paper. In the 21st century, an issue facing many countries including Australia is whether to allow students to undertake these assessments using computers and the internet. Online testing is now being incorporated into digital learning platforms, with such features as password protection, programmed start and end times on an assessment item, making it impossible to backtrack once answers are submitted, requiring the assessment to be completed in one sitting, and disabling feedback functions.

In Denmark, the final exams for high school are now undertaken online on a laptop. Examination papers have been replaced by personal computers for every student. As the Danish Education Minister Bertel Haarder, states, 'the question is not why should the internet be introduced into exams, but actually – why should it not be' (Zemer, 2009, p. 1).

The mode of assessment can play a role in the ways people perform on tests. Some people's mental processes can be affected depending on whether they are being assessed using pen and paper or a computer. Another issue is the test validity of computer-based assessments. Johnson and Green (2004) conducted a quantitative analysis of Year 6 students' performance on mathematics questions in both paper and computer-based formats. The differences between the students' overall performances on paper and computer were not statistically significant. However, findings indicated that primary aged children generally found questions to be more difficult on computer than on paper (Johnson & Green, 2004). There were a number of reasons for their findings, including:

- students experiencing difficulties with transferring information from the computer screen to paper or vice versa,
- the question type affecting students' willingness to show their methods of solving a problem, and
- a larger number of partitioning problems on the computer screen versus paper.

One identified outcome of the e-assessments was that students, especially boys, were more likely to submit an answer even if they were not sure if it was correct. Possible reasons for this include students' associations with taking a chance on computer games, and that using a computer was viewed as less personal and more private than writing something down on paper, which could be perceived as more public (Johnson & Green, 2004).

On the other hand, the Joint Information Systems Committee (2009b) provided evidence that some students prefer to do assignments on computers as they are more familiar with using a keyboard than writing longhand. This may suggest that older students are more comfortable with computers and computer based assignments than the younger students in Johnson and Green's research.

The University of Southampton in the UK has been using computer-assisted summative assessment in the School of Health Sciences, where much of their work and learning takes place on computers. Not only do students seem to be more comfortable with using computers, but it offers practical benefits such as allowing rich media to add authenticity to the experience of the exam, giving immediate feedback for practice and formative assessments, and freeing up time that would be spent on marking and data gathering (JISC, 2010). Computer-assisted assessments can add value to testing, but require as much attention to quality and design as traditional assessment.

In 2008, a Sydney girls' school allowed students to 'phone a friend' and use the internet and iPods during exams. This assessment method was trialled with Year 9 English students. Students were encouraged to access information from the internet, their mobile phones and podcasts played on MP3s as part of a series of 40-minute tasks. To discourage plagiarism, they were required to cite all sources they used.

'In terms of preparing them for the world, we need to redefine our attitudes towards traditional ideas of cheating', said the teacher coordinating the trial. 'Unless the students have a conceptual understanding of the topic or what they are working on, they can't access bits and pieces of information to support them in a task effectively' (Patty, 2008, p. 1).

'In their working lives they will never need to carry enormous amounts of information around in their heads. What they will need to do is access information from all their sources quickly and they will need to check the reliability of their information' (Patty, 2008, p. 1).

The teacher explained that the assessment task was set after students had read Martin Luther King's *I Have a Dream speech* and Dickens' book, *A Christmas Carol*, as studies in persuasive language. The assessment focused not on content, but on whether they used persuasive language effectively to make their argument.


3/4 ST
Code of
Co- operation
3/4 ST
the place
to be!
Essendon
North
PRIMARY SCHOOL
RAINFOREST maths
Time ... analogue (analog).
What time is it?
minutes past
EMAIL

6 Conclusions

Using digital tools for assessment reflects a global trend to modernise assessment processes in schools, vocational education and training, and universities. A review by the Joint Information Systems Committee (2009a) found that efficiency increased as a result of broadening the range of assessment methods available and making the methods more consistent with standards across different education providers. The benefits include 'new approaches to crediting student performance, developing and improving psychometric theory, improving the feedback loop between assessment and learning, improving accuracy, speeding-up the marking stages, and availability of assessments on demand' (JISC, 2009a, p. 6).

Assessment and the Ultranet

Digital learning platforms not only house common administrative data about students such as their names and contact details of their family, their attendance records and the like, but also extensive longitudinal data about students' progress and achievements at pre-determined points in time, over time, against specified curriculum standards and learning outcomes. They are designed so that once data is entered it can be manipulated for a range of purposes.

In the Ultranet, common student data is entered only once. The functionality is able to support inter-connections being requested from the various data sets included in the digital learning platform. To get the most from the Ultranet, schools need to consider the types of data and evidence of student achievement that is required. Teachers can then draw the connections to improve assessment and reporting of learning progress.

The Ultranet is able to record interactions with people and has a reporting function (number of logins, times of day or night, activity undertaken) so that some of educational data mining described earlier can be done.

Digital learning platforms like the Ultranet support the monitoring of students' progress and achievement by bringing together the various sets of data stored electronically to produce timely reports that teachers can use to inform their teaching and learning strategies. Students are also able to monitor their own learning through assessment results and the immediate feedback they receive from teachers and peers on their work.

Teachers can use the Ultranet to capture a complete record of student learning progress over time, from year to year and school to school. With a rich, readily accessible source of information about each learner, teachers can develop personalised curriculum targeted to the specific needs of each student and communicate their learning progress more easily with parents/guardians.

In addition, parents/guardians are able to access the Ultranet at their own convenience and check class activities, their children's learning progress, and teacher feedback. Having ongoing access means they can discuss learning or schooling issues with their children as they arise, and work more closely with teachers to support their children's learning.

Ongoing feedback to parents about students' progress

Bellaire Primary School has begun to use the Ultranet to create a link between school and home by reporting students' progress to parents on a regular basis. This means that parents receive relevant and up to date information about their child's achievements and future areas of growth throughout the year, not just on student reports at the middle and end of the year.

Each student has regular conferences with their teacher to discuss the goals they have achieved and the goals they are currently working on. The teacher records the conversation from the conference and uploads it to the Ultranet, in a learning task that is viewable by teachers, students and parents. Parents are then able to log on and view their child's progress. As with normal reporting, the conference includes ways in which parents can assist their child at home with his/her learning goals. However, by uploading the conferences to the Ultranet, parents can engage with what their child is learning on a more frequent basis (T. Soulsby, personal communication, 19 August 2011).

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8 Glossary

Some of the commonly used terms and phrases that describe different functions and actions in online environments in this series of *Digital Learning Platforms Research Papers* are described below. Some of these definitions are also available on the Department's *Technology A-Z website*. See: http://www.education.vic.gov.au/studentlearning/elearning/technology/default.htm

Assessment	Assessment is the process of gathering, analysing and reflecting on evidence to make informed and consistent judgements to improve future learning and development.
Asynchronous	Asychronous transactions occur at any time and do not require a common timing for that communication to occur. People who participate in online environments asynchronously, are not necessarily communicating at the same time.
Blended learning	Blended learning refers to the mixing of different pedagogical strategies including both face-to-face with computer-mediated learning.
Blog	A blog (a contraction of the term 'web-log') is a type of website, usually maintained by an individual who creates entries and can then publish them to the blog immediately. A typical blog combines text, images, and links to other blogs, web pages, and other media related to its topic. Blogs can be private or public and readers can leave comments in response to blog entries.
Chat	Chat in online environments refers to informal online conversations.
Chatrooms	Chatrooms on the internet are places where informal, synchronous conversations are held. It is an online application that supports conversations and user-generated content.
E-assessment	E-assessment refers to the use of ICT to assess students' skills and knowledge. E-assessments can range from on screen testing systems that automatically mark learners' tests and provide almost instant feedback, to e-portfolios where learners' formative and summative work can be stored, marked and presented for a range of audiences.
E-portfolio	E-portfolios or electronic portfolios enable students to collect and house digital evidence online, which demonstrates what they know and have done, over time.
Flexible learning	Flexible learning is a global phrase referring to different styles of learning, including learning with technologies. Flexible learning strategies expand students' choices about what, when, where and how they learn.
Formative assessment	Formative assessment provides information that can be used to inform planning and progression of learning as part of a process of monitoring and feedback.
Forum	An internet forum is an online space where notices can be posted and responses collected. It is another term to refer to an online application that supports conversations and user-generated content.

Functionality	The functionality of software refers to the set of tasks a software application is equipped to perform.
Instant Messaging	Instant messaging (IM) is a form of real-time communication between two or more people based on typed text (e.g. MS Messenger, Skype Chat, Communicator). The text is conveyed via devices connected over a network such as the internet, and participants receive immediate replies. It is also possible to save a conversation for later reference.
Learning management system	Learning management systems are software applications designed to support the teaching and learning of students, and the administration, documentation, tracking, and reporting of students' performance. Learning management systems provide teachers with the capacity to upload lessons and online learning activities and for students to access these remotely.
Learning object	A learning object is a web-based resource that can be used and re-used to support learning. It usually comprises rich multimedia such as animation, audio, video and/or text.
Learning platform	A learning platform is similar to a learning management system. Learning platforms are comprised of an integrated set of interactive online applications that enable teachers, students, parents and others to access information, tools, content and resources to support and enhance teaching, learning and educational administration.
Moodle	Moodle is the abbreviation for Modular Object-Oriented Dynamic Learning Environment. It is an open source Course Management System (CMS), Learning Management System (LMS) or a Virtual Learning Environment (VLE). Moodle is popular among educators in all levels of education around the world, as a tool for creating web sites for students.
Ning	A ning is an online collaborative community which can quickly and easily be set up. Nings include user profiles, blogs, discussion forums, groups, chat, photos, videos and other features. The administrator of a ning can choose which features are included and the layout of the environment.
Personal learning environment	Personal learning environments are designed for students to be able to control both the content and processes of their learning when online. Personal learning environments include functions that provide students with support to identify and review their own personal learning goals.
Podcasts	Podcasts are audio and/or video files that can be listened to live from the internet or downloaded to a personal computer, netbook or hand-held device. Podcasts are distinguished from most other digital media formats by their ability to be syndicated, subscribed to and downloaded automatically when new content is added.

Social networking software	Social networking software supports the building of online communities of people who share interests and/or activities, or who are interested in exploring their interests and activities with others. Most social networking services are internet-based and provide a variety of ways for users to interact, such as with email and instant messaging. Popular social networking sites include *Facebook*, *MySpace* and *Ning*.
Summative assessment	Summative assessment involves teachers or external agencies making judgements about what students have learnt in a given period of time or unit of study.
Synchronous	Synchronous transactions occur when people communicate with each other at the same time.
Ultranet	The Ultranet is a digital learning platform specifically designed and built for use in Victorian government schools. It provides access to Web 2.0 applications and tools in many of its spaces. The Ultranet puts high quality online tools into the hands of teachers and students that will transform teaching and learning in Victorian schools
Virtual learning environment	A virtual learning environment is similar to a learning platform. It is a software system created to support the different pedagogical and administrative requirements of teaching and learning in educational settings.
Web 2.0	The term Web 2.0 refers to online applications designed to facilitate communication, information sharing and collaboration on the internet. Web 2.0 applications are often freely available and allow for the use of rich multimedia. They are designed so that they do not require specialised technical skills or knowledge to use them. Web 2.0 applications allow content to be published online almost instantly. Web 2.0 applications can be effectively used in classrooms to provide rich opportunities for communication, creation and collaboration. Depending on the specific program, teachers and students can share information, create their own content, connect with others, work collaboratively, organise information, and provide feedback to each other.
Web browser	Web browsers are software programs used to access the Internet from a device, and include common programs such as Internet Explorer, Mozilla Firefox, Google Chrome and Safari. Learning platforms are usually housed on the Internet as this enables them to be accessed outside of the school by opening a web browser and navigating to the learning platform website.
Wiki	A wiki is a website that allows the easy creation and editing of any number of interlinked web pages via a web browser using a simplified WYSIWYG (what you see is what you get) text editor. Unlike blogs, wikis are typically maintained by a group of people, and can be useful for online collaboration, with contributors able to track the changes or comments made by others. Wikis can be accessible to anyone on the Internet, or they can be secured and made open only to invited members.