Assessment To Move Education into the Digital Age


Brief Report from Thematic Working Group TWG 5 on Assessment

Introduction

The Call to Action from Edusummit 2009 included two issues impacting the future of assessment that we aimed to advance through discussions in the Edusummit 2011 meeting:

- To establish a clear view on the role of ICT in 21st century learning and its implications for formal and informal learning.
- To develop new assessments designed to measure outcomes from technology enriched learning experiences.

At Edusummit 2011 it was recognised that assessment exists in a complex dynamic relationship with curriculum, pedagogy, and the needs and demands of the world outside of schools. Furthermore the need for a better understanding of ICT’s role in 21st century learning and assessment was identified, especially in relation to both the formal and informal settings where 21st century skills may be acquired. Innovative developments in assessment for example, can support or even drive developments in both curriculum and pedagogy. In new assessments designed to measure complex and higher order outcomes from technology enriched learning experiences, there is a need for alternative assessment approaches and instruments, along with an understanding of the impact of ICT on assessment.

Research update

The nature of assessment

The nature and purpose of assessment requires some clarification. The importance of formative assessment for pedagogy and the relationship between formative and summative assessment has been recognised by policy makers in many countries recently but these issues are still subject to debate and ongoing research. In particular there are different understandings of formative assessment in different contexts. A key feature of formative assessment in any context is that learners and/or teachers use information obtained from assessment to understand learning needs and to adapt teaching and learning to meet those needs. The term assessment for learning (formative assessment) is often used to distinguish these practices.
from assessment of learning (summative assessment). Therefore whether any particular assessment instrument is formative or summative depends on the use to which it is put.

*Effects of technological advances for assessment*

New technologies can support both formative and summative assessment and those advances are increasing the range of possibilities for assessments. For example students can be assessed through simulations, e-portfolios and interactive games. Formative assessment can be enabled by online peer assessment systems, adaptive feedback from computers, self-assessment and “semi-automatic systems” that combine teacher, peer and automatic feedback. Developments in technologies are making it possible for many types of assessment to be marked automatically thus enabling large cost savings that will be enticing in austere times. Elements of assessments that present significant technological challenges for automatic marking include: hand-drawn diagrams to illustrate answers; collaborative problem solving activities; and advanced essay answers where quality measures are negotiated in academic communities. Therefore ensuring that the focus of assessment remains on designing valid instruments, approaches and interactions that assess important knowledge and skills, rather than being seduced by potential time and cost-savings, may be a significant challenge.

Another characteristic of ICT enabled assessments, especially in embedded contexts such as working online on problems, playing a digital game, or working collaboratively with a simulation to explore and discover patterns in data, is the creation of massive amounts of data about the interactions. For example, a log file for a single user might create 70,000 records for a 10-minute interaction. Traditional educational research is not equipped to analyze this sort of data, which implies a need to explore this and other “game changers” for teacher education.

*What to assess?*

Analysis of frameworks for 21st Century skills across the globe showed strong agreement on the need for skills in the areas of communication, collaboration, ICT literacy, and social and/or cultural awareness. Creativity, critical thinking, problem solving and the capacity to develop relevant and high quality products are also regarded by most frameworks as important skills in the 21st century. Therefore developments in assessment systems need to focus on finding ways to assess these higher order and more complex skills. The specific skills and knowledge needed to make use of new technologies for learning and for participating fully in the knowledge society have also been discussed extensively in recent years and various new literacies have been defined e.g. ICT literacy; information literacy; digital literacy and media literacy.

A further challenge stems from current high-stakes assessments at school level focussing predominantly on assessing individuals: the importance of assessment of collaborative work is sometimes recognised but rarely addressed. Furthermore, teacher assessment (e.g. observation, judgment, test making and scoring), which could contribute significant information for the assessment of 21st Century skills, has decreased owing to concerns about reliability and costs above those of validity, trustworthiness and value to the learner.
Recommendations from Edusummit 2011

Three main aspects of assessment were examined in depth:
- Student involvement in assessment
- Digitally-enhanced assessment
- Assessing application of ICT skills acquired in formal and informal learning environments

Student involvement in assessment as well as learning is essential for three main reasons. First formative assessment which is known to achieve better learning depends on learners understanding their own learning needs. Secondly learning occurs in both formal and informal settings so only learners themselves can be fully aware of their range of learning experiences and achievements. Thirdly we need to enable students to demonstrate what they have achieved rather than focusing only on whether they pass or fail on specific measures which may place arbitrary ceilings on their achievements.

Involving students in assessments includes coaching students towards self-assessment through peer assessment, engagement in collaborative assessment efforts and assessing their expertise at peer assessment (a meta-assessment).

New forms of digitally embedded assessment create richer assessment opportunities using multi-modality. These new forms will enable us to think beyond the division of formative and summative assessment by allowing educators to focus on process and to interpret and map development and achievement, in unobtrusive and continuous ways.

A digitally-enhanced assessment is one that integrates 1) an authentic learning experience involving digital media with 2) embedded continuous unobtrusive measures of performance, learning and knowledge, which 3) creates a highly detailed (high resolution) data record which can be computationally analyzed and displayed so that 4) learners and teachers can immediately utilize the information to improve learning. Digitally-enhanced assessments create opportunities to think beyond formative and summative assessment by allowing a focus on 1) documenting and understanding learning processes as well as outcomes, and 2) interpreting and mapping the details of a learner’s development and achievement over time, and 3) expanding knowledge about and recognizing a wider expanse of intelligence. Digitally-enhanced assessment is more effective than current paper and pencil testing in supporting learning, has higher validity since it is embedded in authentic tasks, and is not an artificial or obtrusive measure that interrupts learning.

Regarding assessment of application of ICT skills acquired in formal and informal learning environments three key issues were identified. First there is a need for rich application contexts that evoke complex sets of skills. Second the emphasis should be on performance assessment within such authentic contexts. Third both students and teachers need to develop their understanding and application of ICT skills and this approach applies to assessing both students and teachers.

Recommendations for Policy
• Assessment policy should focus on empowering learners by enabling them to articulate their understanding and capabilities through their choice of media.
• Assessment policy should focus on supporting the learning process thus prioritizing formative assessment in developing technologies for assessment. Therefore the emphasis should shift from summative to continuous, diagnostic and formative assessment throughout the learning process. Assessment policy should support a balance of assessments incorporating peer assessment, student self-assessment, and learning potential assessment.
• Assessment policy should call for and financially support the exploration of new modes and models of digitally-enhanced assessment for national standards and outcomes.
• Assessment policy should request that researchers develop new research methodologies needed for high resolution, multiple sourced, multimedia, digital information collected unobtrusively during learning & assessment processes.
• Assessment policy should include tracking and reporting on the extent to which assessment information leads to increases in human capital and capabilities in key disciplinary areas while broadening and increasing access and opportunities to learn.
• Assessment policy should develop a shared formative performance-based assessment culture, e.g. developing a community of practice, teacher training policy, supporting R&D of novel assessment tools and resources

Recommendations for Practice
• Empower learners to negotiate with their teachers where they are going, where they currently are and how to get where they need to be.
• Engineer effective class-room discussions and other learning tasks including those using digital media, that elicit evidence of student understanding
• Provide feedback that moves learners forward
• Activate students as instructional resources for one another
• Activate students as the owners of their own learning
• Know how to conduct and utilise continuous integrated assessment with the digitally-enhanced assessment tools developed through research
• Understand how to use traces and data provided by the new digitally-enhanced assessment tools
• Develop capacity to assess students’ application of ICT
• Share practice with other teachers anywhere in the world regarding assessment AS learning (i.e. embedded assessment) and assessment FOR learning (i.e. formative assessment – utilised in the affordances of technology)

Figure 1 summarises relationships between key elements of formative assessment in digitally-enhanced settings.
Where the learner is going | Where the learner is right now | How to get there
--- | --- | ---
Teachers | 1 Clarifying and negotiating learning intentions and criteria for success | 2 Engineering effective discussions and other learning tasks, including those using digital media, that elicit evidence of student understanding | 3 Providing feedback that moves learners forward
Peers |  | 4 Activating students as instructional resources for one another – peer support, peer feedback |  | 5 Activating students as the owners of their own learning
Learners |  |  |  |

Figure 1: Aspects of formative assessment adapted from a framework developed by Black and Wiliam (2009)

**Recommendations for Research**
- Create new methodologies for collecting, visualizing, analyzing and reporting information from rich digital media sources.
- Create partnerships between educational researchers, computer scientists and corporations to develop adaptive assessment algorithms that:
  - Create high resolution visualizations
  - Provide timely human-assisted formative feedback
  - Map each learner’s progress and practice history
  - Automate and scale the processes of analysis and decision-making
  - Link analyses to the demonstration of learning outcomes
  - Develop the knowledge base concerning how to empower learners by investigating how self-regulated learning can be developed especially in social and technology mediated contexts
  - Develop a global database of performance tasks
- Engage in continuous academic R&D on assessment of emerging ICT literacies with regards to novel tools and environments, e.g. social networking, mobile devices, online gaming environments.
**Brief Report Editors**

Mary Webb and David Gibson

**Contributors to Thematic Working Group TWG 5: Assessment**

Mihaela Banek Zorica, Department of Information Sciences, University of Zagreb, Croatia
Alona Forkosh-Baruch, Tel-Aviv University, Israel
David Gibson, University of Arizona, USA
Jean-Marc Labat, Université UPMC, Equipe MOCAH-Lip6, France
Joyce Malyn-Smith, PI ITEST Learning Resource Center EDC, USA
Joost Meijer, SCO-Kohnstamm Instituut, Netherlands
Chris Montacute, Specialist Schools and Academies Trust (SSAT), UK
Tim O'Shea, University of Edinburgh, UK
Kirsten Panton, Microsoft, Denmark
Davide Parmigiani, Researcher and professor of Education, University of Genova, Italy
Christine Redman, Melbourne University, Australia
Nick Reynolds, Melbourne University, Australia
Michelle Selinger, CISCO Systems, Australia
Shahjahan Mian Tapan, Islamic University of Technology (IUT), Bangladesh
Alfons Ten Brummelhuis, Kennisnet, Netherlands
Paolo Tosato, Interuniversity Centre for Educational Research and Advanced Training, Italy
Mary Webb, King's College London, UK