

What is 21st Century Learning – and What Part Does Classroom Assessment Play?¹

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There is an international policy rhetoric which calls for a new kind of learning to face the challenges of the 21st century. In this the learner is seen as flexible, self-regulating and able to work with others to problem solve, with the skills needed to meet the demands of the ever-changing labour market. However, despite paying lip-service to this, most of our schooling does not encourage this kind of learning as it is still dominated by didactic teaching and assessments which encourage teacher-dependent and memory-based learning.

How can we begin to design formative assessments that encourage deeper learning in which students ‘think for themselves’? Taking what we know from the study of expertise and of exceptional learners, I review some of the key elements of effective learning. These are then linked to classroom practices, particularly those associated with Assessment for Learning.

The 21st Century Learner Agenda

Look up the goals of education in any developed nation and you will get a similar story – the country wants an educated workforce that can respond to the demands of the 21st century global market. This will require ‘21st century skills’ which typically include flexible thinking, the ability to work in teams and communicate effectively and lifelong reflective learning.

¹ This paper draws on the background papers for keynote addresses for the 2014 IAEA conference in Singapore, May 26-30 and the Third Black Sea conference in Batumi, Georgia, 12-13 September 2014.

Here's the PISA² version:

Are students prepared for future challenges? Can they analyse, reason and communicate effectively? Do they have the capacity to continue learning throughout life? (www.pisa.oecd.org/homepage)

Hong Kong summarises its educational goals as:

Our priority should be to enable our students to enjoy learning, enhance their effectiveness in communication and develop their creativity and sense of commitment. (www.e-c.edu.hk.eng/reform)

This leads to seven learning goals:

- i. recognize their roles and responsibilities as members in the family, the society, the nation; show concern for their well-being;
- ii. understand their national identity and be committed to contributing to the nation and society;
- iii. develop a habit of reading independently;
- iv. engage in discussion actively and confidently in English and Chinese (including Putonghua);
- v. develop creative thinking and master independent learning skills (e.g. critical thinking, information technology, numeracy and self management);
- vi. possess a breadth and foundation of knowledge in the eight Key Learning Areas; and
- vii. lead a healthy lifestyle and develop an interest in and appreciation of aesthetic and physical activities.
(www.edb.gov.hk/en/curriculum.../7-learning-goals)

² The Programme of International Student Achievement (OECD)

Singapore has its Desired Outcomes of Education (DOE) with its goals of producing:

- a confident person;
- a self-directed learner;
- an active contributor; and,
- a concerned citizen. (www.moe.gov.sg/education/desired-outcomes)

The highly successful Alberta Province in Canada offers: ‘As never before, the next generation will need to be innovative, creative, and skilled at managing knowledge as a resource’ (*Inspiring Education*, 2010, p.3).

We could go round the world finding similar aspirations for those growing up in a fast-changing world where work is continuously changing in response to new technologies.

But this is not brand new 21st century thinking. John Dewey was there over a century ago. In 1903 he wrote: ‘Modern life means democracy, democracy means freeing intelligence for independent effectiveness – the emancipation of the mind to do its own work’ (p.193). He maintained that children must actively participate in their education because ‘if the pupil has no initiative of his own... the result is a random groping after what is wanted, and the formation of habits of dependence upon the cues furnished by others’ (*Democracy and Education*, 1916, ch3, para6). ‘If interest is aroused, we begin to participate’ (ch5, para7) and when students are given choice ‘such freedom is in turn identical with self-control; for the formation of purposes and the organization of means to execute them are the work of intelligence’ (ch6, para1).

The aspect of 21st century learning that is new is the role of *digital literacy* and the opportunities that new technologies offer to the learning process. But how much of this has actually filtered through to everyday classroom activity?

The Driving Up Standards Agenda

However there is a second, and often more powerful, policy agenda – that of improving standards within the education system. For many politicians improving standards means better results in national tests and examinations, and particularly, in international tests. This agenda is expressed in terms of the need for ever-improving test scores which are central to school accountability systems. These systems may be local, national or international. Local and national accountability systems may involve publishing school level results in the form of ‘league tables’ and establishing targets which schools must meet (‘floor standards’ in England, Annual Yearly Progress in US). Increasingly dominant are the international tests such as PISA³ which rank countries against each other and have, in many countries, become high-stakes for politicians, policy makers and officials.

A further development is using improvements in test results to evaluate teachers in relation to performance pay – a process which harks back to the nineteenth century 'payment by results' in England (Stobart, 2008). The result of all these is that policy makers, schools and teachers see their central task as getting better results, something which leads to what Michael Gunzenhauser has called the default philosophy of education which “places inordinate value on the scores achieved on high-stakes tests, rather than on the achievement that the scores are meant to represent” (2003, p.51). Because of the power of this default philosophy, teachers in the current climate “may find themselves doing things that fall short of their visions of themselves as educators such as drilling students on practice tests, de-emphasizing or elimination of untested subject matter, or teaching to the test” (p.51).

Competing Agendas

In many countries the lifelong learning and standards agendas do not sit comfortably together and when this happens the standards agenda generally

³ The Programme of International Student Achievement (OECD)

wins out. But it is not just teachers who are pressured by the need for results. When assessments have a selective purpose, for example university entrance, students may also adopt an instrumental view of learning – the aim is to get the best grades by being as strategic as possible. This is not surprising when, as Bourdieu (1991), observed ‘between the last person to pass and the first person to fail, the competitive examination creates differences of all or nothing that can last a lifetime’ (p.120). Bethell and Zabulionis (2012) provide examples of this from former Soviet states where university entrance examinations are so high-stakes that ‘a single mark can make the difference between, for example, a university place and a year in military service’ (p.17).

The 'Double Duty' of Assessment

If the ‘standards versus lifelong’ contradiction is to be resolved we need assessment systems which encourage the open thinking which leads to creativity. David Boud has introduced the helpful concept of *sustainable assessment* in which assessment activities

Have to focus on the immediate task and on implications for equipping students for lifelong learning in an unknown future... they have to attend to both the process and the substantive domain. (2002, p.9)

This is the double duty of assessment, to make demands on present knowledge and skills in a way that also develops lifelong learning skills such as self-regulation and learning how to learn. This requires a delicate balancing act which avoids, on the one hand, the recall of unassimilated content or mechanistic skills and on the other an exclusive focus on process skills which neglects substantive content. Over eighty years ago John Dewey made a similar point:

Of course intellectual learning includes the amassing and retention of information. But information is an undigested burden unless it is understood. It is knowledge only as material is comprehended. And understanding, comprehension, means that the various parts of the

information are grasped in their relations to one another – a result that is attained only when acquisition is accompanied by constant reflection upon the meaning of what is studied. (1933, pp.78-9)

Expert Learning

Descriptions of 21st century learning often seem to be a wish-list of desirable skills and knowledge⁴. My more pragmatic approach has been to study the learning processes of those we recognise as experts in their respective fields. How did they become creative forces and what can we take from this to improve classroom learning? I have developed this in detail in *The expert learner, challenging the myth of ability* (2014). Here I present an outline of some key themes.

Expert learning is the mastery of skills and knowledge at a level that distinguishes the expert from others. Experts, especially in relation to novices, are likely to excel in:

- Choosing the appropriate strategy to use;
- Accurately, and often quickly, generating the best solution;
- Using superior detection and recognition, for example seeing patterns and 'deep structures' of a problem;
- Applying extensive qualitative analyses to a problem;
- Accurately monitoring their own performance;
- Retrieving relevant information more effectively. (Chi, 2006)

This is the kind of learning, facilitated by collaborative skills, we want to encourage for the 21st century. The question is how we get it. From the study of top performers across areas such as music, sport, literature and science some key elements can be identified in how they became experts. These can be summarised as:

⁴ See, for example, the range of skills considered in P. Griffin, B. McGaw and E. Care (Eds.) (2012). *Assessment and teaching of 21st century skills*. Dordrecht: Springer.

1. *Providing opportunities and support to develop skill.* The assumption here is that expertise/ability is developed rather than inborn⁵ and develops in relation to the opportunities provided. So Bill Gates had access to real time computer programming through his school well before most universities did and was an expert programmer well before he went to university (Gladwell, 2008), while Mozart's father was giving him three hours of music practice a day from the age of three (Howe, 1999).
2. *Being motivated to succeed.* People don't become experts by accident, they have to want to be successful. Parents and schools can help, and the need for good results may encourage learning, but there needs to be a personal hunger for mastery. Marie Curie, the first woman Nobel prize winner and the first person to win two in different sciences, is a fine example of this. She overcame innumerable obstacles to study science – leaving Poland, where women could not go to university, in order to study at the Sorbonne in Paris where she lived in poverty. Even her research into radioactivity was conducted in a leaking shed using spent radioactive materials she begged from a glass factory in Austria.
3. *Undergoing extensive deliberate practice.* One of the reasons that intrinsic motivation is needed is the amount of deliberate practice required to become an expert. Malcolm Gladwell has popularised the idea that nobody gets to the top of their field without 10,000 hours of deliberate practice, shorthand for 10 years of preparation. Sport and music provide plentiful examples of this, from David Beckham as a boy practising free kicks until it got dark to top musicians who engage in demanding solo practice far more intensively than others. The emphasis here is on *deliberate* practice – concentrating on the difficult skills we are not good at until they become automatic.

⁵ See Shenk, D. (2011) and Stobart, G. (2014) for discussions of this claim.

4. *Building powerful mental models to handle and organise information.* Experts can see the big picture and spot patterns and anomalies that others do not see. So chess grandmasters only need a few seconds to memorise all the pieces on a chess board while a novice will only remember a handful. The difference is that grandmasters will see the big picture, the pieces are part of a game – so grandmasters spot patterns and are able to ‘chunk’ more information. The novice tries to remember individual pieces and so can only remember a few.
5. *Receiving continuous and effective feedback to improve performance.* John Wooden is a legendary US college basketball coach whose teams have won every honour. His coaching methods have been widely analysed, including the way he gave feedback. What researchers found was that his feedback was brief, immediate, and focused on the skill that was being learned. When over 2000 of his feedback comments were analysed, 86 per cent were about how to do the task better with only seven per cent praising and seven per cent criticising players. We learn from expert sports coaching the importance of receiving task-based informative feedback.
6. *Developing self-regulation to monitor performance.* Experts develop the skills of self-regulation, the ability to inspect their own processes and performance. We see this in the way athletes and cyclists monitor their performance. We also see it in the way experts react when they are stuck – how they can take a step back and question what they have been doing and to try a different approach. This again is vital to good learning – ‘knowing what to do if you don't know what to do’.

Implications for Classroom Assessment

How do we translate these findings into classroom assessment practices? This paper focuses on informal formative assessment, though there are equally powerful implications for summative assessments, including external testing (Stobart, 2014b). A good framework for classroom assessment is Assessment for

Learning as this incorporates many of the key expertise findings and is familiar to many teachers. It has been progressively developed to involve:

- Finding out where learners are in their learning through dialogue, questioning and using classroom work diagnostically;
- Making clear the learning intentions in lessons so that learners understand why and what they are learning and how it links to what they know already;
- Showing what successful work will look like through modelling and exemplars;
- Providing feedback which helps to move learning forward;
- Developing learner self-regulation and autonomy. (Wiliam, 2011; Baird et al., 2014)

Dialogue in the classroom

Experts are active and curious learners and 21st century learning involves effective communication and a questioning approach (OECD, 2005). It is said that Einstein's mother used to ask him 'what questions did you ask in school today?' rather than the familiar 'what did you learn in school today?'. Most of us would say we often learn more from discussing an idea than being told about it. Yet the classroom is generally a place where dialogue consists of answering the teacher's recall questions. This means that the teacher rarely finds out about how students are reasoning and what misconceptions they may have. John Hattie's research findings reveal the extent of this:

Teachers talk 70-80 percent of the time;

ask 200-300 questions a day of which 60 percent require recall of facts and 20 percent are procedural ('where's your book?');

less than five percent of the time is spent in group or whole class discussion of meaningful ideas;

70 percent of answers take students less than five seconds and, on average, involve three words. (Hattie, 2012, p.30)

What is equally concerning is that research going back 80 years has shown similar proportions – not much has changed in the classroom (Stobart, 2014).

Assessment for Learning encourages the use of more open-ended and thought provoking questions ('what if...; how do you think...; what is your opinion of...'), the answers to which will reveal a lot more about students' understandings. This also includes giving students the time to think before they answer – 'wait time'. This practice, which often involves students briefly discussing the question in pairs, developed as the result of Mary Rowe's research which showed that on average teachers *wait for less than a second* after having asked a question before they do something – identify a respondent, rephrase it, or answer it.

Making clear the learning intentions

One of the most powerful ways of encouraging effective learning is to make sure that learners understand what they are learning and why. Often in classrooms the 'what and why' are something the teacher knows – but doesn't always share with the students. A key to effective learning is understanding the big picture. Experts can make sense of a situation or new information because they can see where it fits in. If a student is not clear about what is being learned and where it fits with what is known already then learning will be ineffective.

For example, when novice physicists are compared with expert ones, novices organise the information around surface features while experts recode them in terms of basic principles of physics. So a problem involving balancing a cart on an inclined plane is treated as a 'balance-of-forces' problem by experts while for novices it will be viewed in terms of superficial features – a problem specific to carts and inclined planes (Chi, 2006). What this also means is that for experts new problems are often minor variants of situations in which they know what principles to use, while for novices every new problem is a new problem: 'One becomes an expert by making routine what to the novice requires creative problem-solving' (Anderson, 1980, p.292).

One of the key classroom practices in making clear the learning intention is that of ‘tuning in’ – what do the students know already, how does this link to the new learning and why are we learning this?

Showing what successful work will look like

Expert performers have a clear picture of what a good performance looks, or sounds, like. Part of understanding is recognising successful learning. Three factors in the classroom are *negotiating, exemplifying and modelling* successful performance.

Negotiating involves discussion with students about what a good performance would look like and what the criteria are to assess what is being looked for in a quality performance. To do this effectively we may need to provide exemplars of good work. Royce Sadler suggests that a powerful way of using exemplars is to provide two (anonymous) examples of work, one which meets the standard and one that is below the required standard. Students are then given the assessment criteria and asked to decide which is the better piece of work and why. If they are able to explain why one piece is higher quality than another they are in a position to assess their own work in terms of the criteria – the beginning of self assessment and peer assessment skills.

Providing effective feedback

We all give, and get, lots of feedback. The evidence is that most of it is not effective – it does not move the learning forward by closing the gap between where the learner is and where the learner needs to get to. In a major meta-analysis Avraham Kluger and Angelo DeNisi concluded ‘We believe that researchers and practitioners alike confuse their feelings that feedback is desirable with the question of whether Feedback Intervention benefits performance’. Their research found that ‘in over one third of the cases Feedback Interventions reduced performance’, in other words it had a negative effect on

learning. There is now a substantial literature on classroom feedback⁶ which has identified some of the key features of effective feedback. In summary these are:

- It is clearly linked to the learning intention;
- The learner understands the success criteria/standard;
- It focuses on the task rather than the learner (self/ego);
- It gives cues at appropriate levels on how to bridge the gap;
- It is effectively timed;
- It is specific and clear;
- It offers strategies rather than solutions;
- It challenges, requires action, and is achievable.⁷

Developing learner self-regulation and autonomy

This is a common feature of most descriptions of 21st century learning. It is also central to expert learning. Most recent accounts of Assessment for Learning see this as the goal – students who can think for themselves and monitor their own performance⁸.

This reflects a shift towards more socio-cultural thinking in which the teacher/learner relationship changes in that more responsibility is given to the learner and the traditional classroom power relationships are modified (Baird et al., 2014).

To achieve this goal involves the successful implementation of the practices above – finding out where learners are in their learning, making clear the learning intentions and success criteria, and providing specific feedback that the student can act upon.

⁶ See, for example, Hattie, J. and Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77: 81–112.

⁷ See Stobart (2014), chapter 6, for a fuller account

⁸ See, for example, Brookhart (2007); Baird et al. (2014)

Conclusion

There is an international policy rhetoric around the need for 21st century learning. Yet in many classrooms around the world little has changed to encourage this. If we want our students to be expert 21st century learners there need to be changes in the classroom. What kind of questions are our students being asked and asking? How clear are they about what is being learned and why? How informative is our feedback in moving learning forward by 'closing the gap' between what is known and what is the learning goal?

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