BRAIN-FRIENDLY ASSESSMENTS

What They Are and How to Use Them

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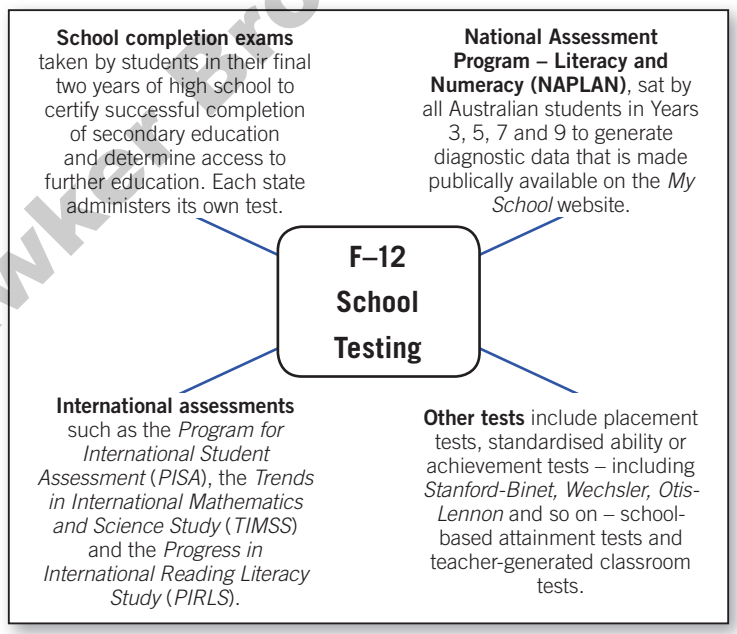
Many standardised tests are administered to students, but high-stakes achievement tests are the most controversial because their scores can result in serious consequences. In 2008, Australia implemented high-stakes testing for the first time with the establishment of the National Achievement Program – Literacy and Numeracy (NAPLAN). NAPLAN results are used to decide the amount of performance-based federal "reward funding" that Australian schools receive, and several states have proposed that teacher pay also be linked to NAPLAN performance. For students, a low NAPLAN score may limit educational options in the future, since many schools use the test results as a criterion for admission. Finally, many teachers and administrators have argued that the publication of NAPLAN scores on the Australian Curriculum, Assessment and Reporting Authority's *My School* website – which enables the comparison of results across multiple schools – can affect a school's reputation and dissuade potential enrollees.

Because NAPLAN is a one-time event with considerable ramifications for educators and students alike, there is now a backlash developing. For the past several years, teachers, administrators and parents have been protesting that high-stakes standardised tests are unreliable because, among other things, they try to measure in a few hours what a student was supposed to learn over an entire school year – or even several years.

FIGURE 1.1 The diagram shows the large number of tests that can be administered to students in Australian schools. Most of these are standardised tests.



CHAPTER 2

Why, Who and What We Assess

The test of a good teacher is not how many questions he can ask his pupils that they will answer readily, but how many questions he inspires them to ask him which he finds it hard to answer.

—Alice Wellington Rollins

TEACHERS HAVE BEEN ASSESSING THEIR STUDENTS SINCE AT LEAST ANCIENT GREECE. Socrates tested his students through oral questions and conversations. Their answers, whether right or wrong, led to more dialogue, insights and greater depth of understanding. No one worried about getting a score. Even today, educators profess that the Socratic approach represents the epitome of excellence in teaching and learning. Yet, look how far we have strayed from the brain-friendly and challenging Socratic method to the reliance upon standardised and other testing that has become today's norm.

MAJOR PURPOSES OF ASSESSMENT

In an ideal world, the major reason teachers use assessments would be to determine how much a student has learnt after a period of instruction. Any other reason would be a distant second. But, alas, in this world of education that's obsessed with scores, one wonders if assessing learning is anywhere near first place. Administrators can use assessments and test scores for placement of students, and policymakers and parents can use them to compare schools within their area. But the purpose of this book is to focus on the most important reason for assessment: to determine how much and how well students are learning as they progress through our schools. I suggest that there are four major components of student-centred, brain-friendly assessments. As Figure 2.1 (p. 12) illustrates, in addition to assessing student growth, we assess to determine teacher effectiveness, to ensure that we are matching instruction with curriculum and to examine the school's climate to entice students to stay and not drop out.

Unfortunately, it seems that high schools are not adequately preparing their graduates for postsecondary education and career. As of 2011, only 72.5 per cent of Australians aged 17–24 were fully engaged in work or study. Among Indigenous Australians in the same age group, 60.6 per cent were not fully engaged in work or study, while young people from the most impoverished backgrounds were disengaged at a rate of 41.7 per cent (Hurst 2013).

One can interpret these finding in several ways. They could suggest that schools are not teaching the knowledge and skills that students need to obtain and keep a job in this highly technological world. Another possibility is that some students may not have the motivation to benefit from their courses by discovering how to apply what they learnt in a workplace environment. A third interpretation is that the instructional level in our schools is too basic and does not present students with options to apply their knowledge and skills in order to solve problems and think critically.

Appropriate assessments might provide clues to one or all of these possibilities – yet the results of high-stakes tests like NAPLAN can only tell us *what* happened, not *why*. So, teachers should design their own assessments to reveal why students performed as they did, using the information to make any instructional adjustments needed to improve student achievement. But to do this accurately and fairly, the assessments must be carefully designed to be brain-friendly, so students will not fear them but rather perceive the assessments as indicators of their academic progress.

MATCHING ASSESSMENTS TO STUDENT ABILITIES

Students come to a school with varying levels of ability and motivation, with different interests, from numerous cultures and speaking a wide variety of languages. Teaching this marvellous medley of individuals is indeed a challenge but assessing them may be even more so. Given the mix of cultures, languages, abilities and interests, one may pose the question, should all students be assessed? The answer, simply, is yes, but not necessarily in the same way. The brains of all these students are wired differently as a result of their experiences. Even identical twins raised in the same environment will have significant differences in how their neural networks are connected and how they interact with their world, though they look and perhaps behave so much alike.

Artistically talented students should be able to demonstrate their learning through the arts.

A review of these partial results indicates that Kathy is already quite knowledgeable about rocks and minerals and that she would be helpful as a peer tutor. Bill and Maria have some basic knowledge of rocks but know little about minerals. Everyone but Dan understands the differences between a rock and a plant, so the teacher does not need to teach this in a whole-class format, thereby saving some time. She can work with Dan individually and ask one of the other students to help, either one-on-one or in a small group.

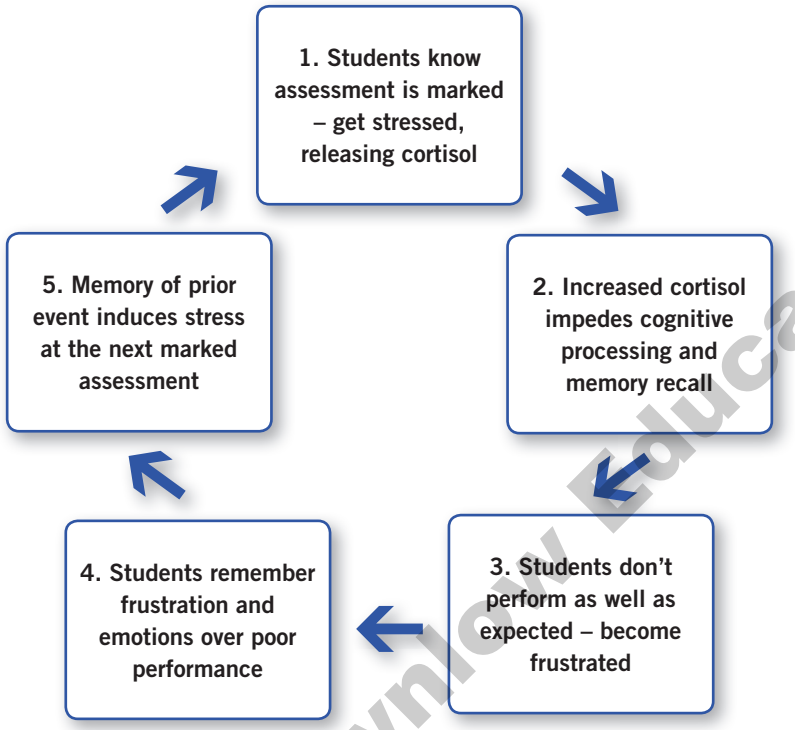
Table 3.2 shows a similar partial matrix used with Example 3 on introducing quadratic equations.

TABLE 3.2 Example of matrix of responses to pre-assessment on quadratic equations

Introducing Quadratic Equations			
Student's name Year 10	**Solved equation correctly**	**Factored expression correctly**	**Problems + types**
Robbie	Y	Y	None
Jasmine	Y	N	Forgot how to factor
Hemi	N	N	Never had this before
Melissa	Y	Y	None
Wanda	Y	Y	None
Christie	N	N	Had this but can't remember how to do it
Ahmed	Y	Y	None
Joshua	Y	Y	None
Etc.			

Assuming these results are representative of the entire class, how should the teacher plan the first lesson on introducing quadratic equations? Should the teacher review, in a whole-class format, solving linear equations and factoring? Should the teacher set up cooperative learning groups? How should the teacher differentiate instruction, if that would be more efficient? Are there any other ideas for the teacher to consider? Pre-assessments can provide a wealth of information *before* the teacher plunges into a new topic. They give the teacher the opportunity to plan more interesting challenges for those students who already know some of the material, allowing the teacher more time to spend with those who need to learn the new information and skills.

FIGURE 3.5 The diagram illustrates the test anxiety cycle. The frustration and emotions of not doing well on one assessment are recalled and induce stress when taking subsequent assessments.



An example of using nonmarked assessments. A Year 7 geography teacher has discovered the value of formative assessment, especially when used regularly and without the threat of the work being marked. He also knows the value of telling students how their brain learns and remembers and how that information can help them monitor their study habits. Several times a week, he begins a class by distributing a sheet of paper to each student and saying, "Take a few moments to see how well your memory systems are working. Write down three important points you learnt and remember from yesterday's lesson on [subject]. Once again, we are just looking at what your brain stored last night." Note that he is asking for this information the next day. He wants to determine what each student retained in long-term memory, and he knows that the transfer of information from working to long-term memory occurs during sleep – as shown in Figure 2.4 (p. 24), which he has shared with the class.

After a few minutes, he puts the students in cooperative learning groups of three and gives them this task: "Share your responses and talk about how you remembered each of the learnings you wrote down. Then briefly discuss and write down any memory and study strategies you used that worked for you. You have five minutes, and then I will ask one student to report from each

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growth and further academic achievement. Furthermore, marks should not be the only way that teachers communicate with parents about their children's work and progress. Two-way correspondence between teachers and parents ensures that they all are working together to advance the child's learning and achievement.

What Does Marking Accomplish?

There is very little research evidence to show that marking motivates students to perform better.

Marks seldom accomplish what educators and parents really think they accomplish. There is very little research evidence to support the idea that marking motivates good students to perform better. Rather, the evidence suggests that marking often motivates fixed-mindset students to chase after *more* good marks instead of focusing on what they are really learning. Nor does marking motivate struggling learners who may have decided that working harder at learning does not yield results. High-achieving, growth-mindset students learn because they want to and pay little attention to marks or other incentives (Jeong 2009). Educators and parents should recognise the limited effect that marking has on actually motivating students to learn, and they should do so by reducing the extended and often erroneous interpretations that all stakeholders read into marks. A student's mark should represent an accurate assessment of what products, processes and progress they made in achieving the learning objects in a particular content area – no more and no less.

ASSESSING EAL/D STUDENTS

Assessing EAL/D students is a major challenge because poor English language proficiency may prevent them from demonstrating what they really learn. Think for a moment what the brain of each of these students is confronting. First, the brain is working hard to establish another set of neural networks to process the new language. In the early stages of this activity, it has to make connections between the student's native language and newly constructed English language centres to provide basic translations. The older the student, the more labour-intensive this whole procedure becomes because the strongly consolidated native-language networks may hinder the development of the weaker and vulnerable English language networks. Language practice, to be sure, helps strengthen these new connections.

Glossary

Automaticity. A condition whereby an individual can perform a skill without conscious deliberation.

Circadian rhythm. The daily pattern of body functions, such as body temperature, breathing and the sleep–wake cycle.

Classical conditioning. Occurs when a conditioned stimulus prompts an unconditioned response.

Competitive plasticity. The notion that neural circuits are turned over to other uses when an individual does not practise or engage in a specific skill.

Context-dependent memory. The improved memory recall of information or an episode when the context where it happened is the same as the context where it was retrieved.

Convergent thinking. The lower-order thinking process required to recall the answer to a problem that has only one solution.

Declarative memory. Knowledge of facts and events to which we have conscious access.

Delayed sleep preference. A condition caused mainly by a shift in an adolescent's sleep cycle that results in difficulty falling asleep at night and waking up in the morning.

Divergent thinking. The higher-order thinking process required to recall, analyse and evaluate information to solve problems with multiple solutions.

Dopamine. A neurotransmitter linked to the brain's complex motivation and reward system.

Educational neuroscience. A new field of inquiry that examines how findings from neuroscience can affect the curricular, instructional and assessment decisions of educational practitioners.

Electroencephalograph (EEG). An instrument that charts fluctuations in the brain's electrical activity via electrodes attached to the scalp.

Endorphins. Opiate-like chemicals in the body that lessen pain and produce pleasant feelings.