Measuring Learning

(taking up the challenge in Higher Education)

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Institutions of Learning

Institutions of Learning

- advancing human knowledge
- staff learning (advanced expertise)
- student learning (grad & undergrad)
- institutional learning

At a fundamental level, the success of an institution of learning is measured by the amount and quality of the learning occurring within it.

- Research
- Teaching
- Service

vehicles → LEARNING

indicators of 'research output'

- income from competitive grants
- citations in peer-reviewed journals
- successful commercialisations
- etc

How well do these indicate 'learning' (contribution to human knowledge)?

indicators of 'quality teaching'

- surveys of student satisfaction
- measures of student engagement
- course completion and pass rates
- etc

How well do these indicate 'learning' (student knowledge, skills, attributes)?

In an institution of learning, the measurement of learning is an institutional priority.

How well, as an institution, are we achieving our core business?

Measuring Student Learning

The assessment of student learning often is addressed only at the level of individual courses.

(ie, course assessments)

How much of what I taught has this student successfully learnt?

But the amount and quality of student learning occurring in an institution should be an institutional concern.

- The measurement of student learning is a non-trivial challenge.
- This is a field of research in its own right.
- Many routine 'course assessments' remain untouched by advances in the field.
- Best practice in the measurement of student learning tends to be found outside higher education.

I will focus now on some general challenges in measuring student learning...

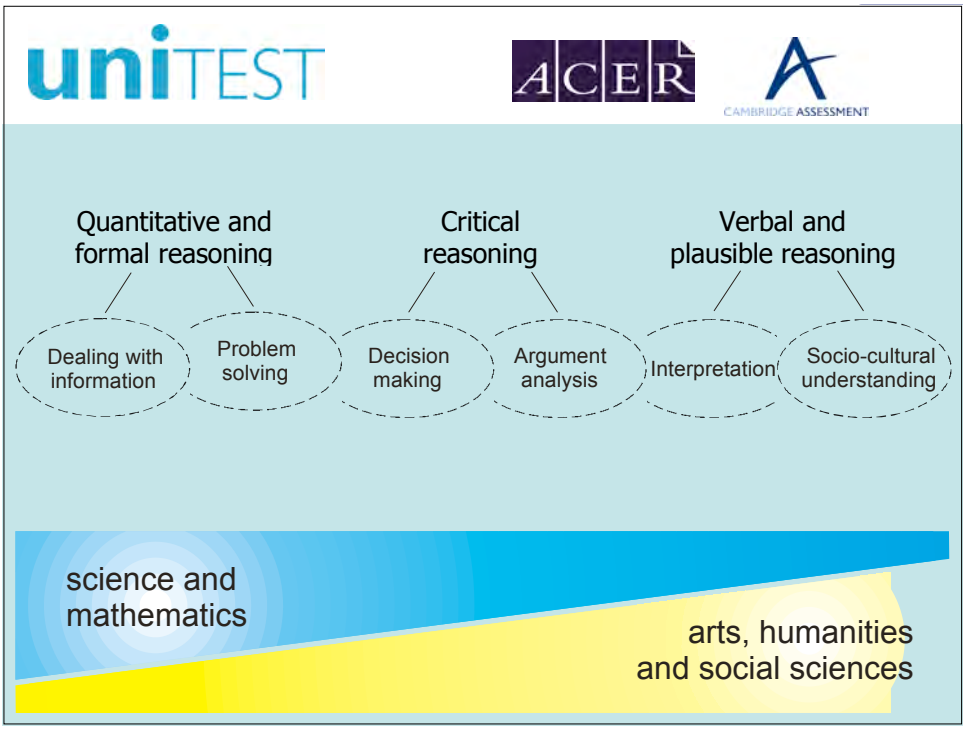
(likely to be equally relevant across education sectors)

Some Measurement Challenges

1. Selecting applicants for entry
2. Establishing readiness and starting points
3. Assessing and reporting student learning
4. Setting and maintaining standards (expectations)
5. Measuring generic capabilities
6. Building capacity to measure learning

Selecting applicants for entry

- in part a matching task – ensuring that applicants have the capabilities required for success in a program / course



Selecting applicants for entry

- in part a matching task – ensuring that applicants have the capabilities required for success in a program / course
- sometimes also a process of managing a fair competition (limited places, scholarships, etc)
- equity considerations – identify capacity and provide opportunities for those who have been disadvantaged by circumstances
- use of measurement instruments in this process (*GAMSAT*, *UMAT*, *STAT*, *UniTEST*, etc)

Establishing readiness and starting points

- diagnose gaps in knowledge and understanding
- identify the need for bridging courses, supplementary support, special interventions
- use of measurement instruments for this purpose:

  Tertiary Education Mathematics Test (TEMP)
  Tertiary Writing Assessment (TWA)
  English Language Skills Assessment (ELSA)
  Work Readiness Assessment Package (WRAP)

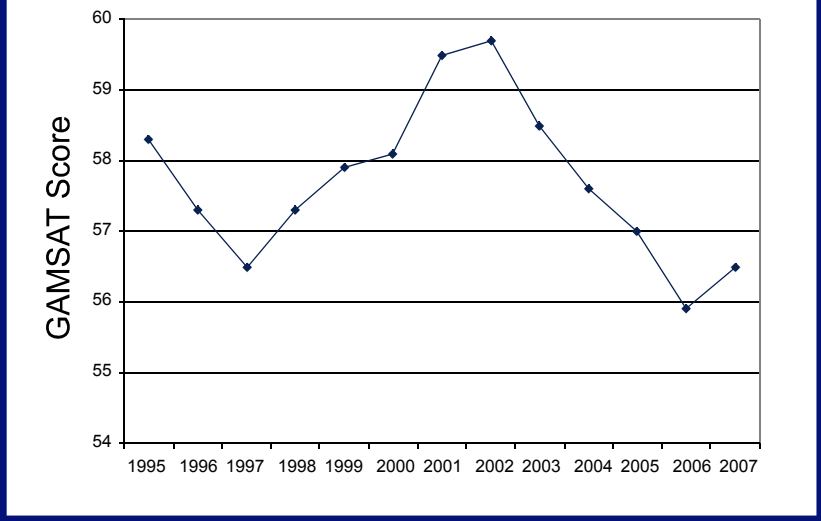
Assessing and reporting student learning

ideally, it should be possible to:

- compare levels of student achievement in a course from one year to the next (consistent standards)

Ways of attempting to ensure consistency:

- common test / examination
- 'equated' tests / examinations
- consensus (social) moderation



Assessing and reporting student learning

ideally, it should be possible to:

- compare levels of student achievement in a course from one year to the next (consistent standards)
- interpret levels of student achievement in terms of what an individual is likely to know, understand and be able to do

Proficiency level	General scientific literacy proficiencies students should have at each level
6	At Level 6, students can consistently identify, explain and apply scientific knowledge and knowledge about science in a variety of complex life situations. They can link different information sources and explanations and use evidence from those sources to justify decisions. They clearly and consistently demonstrate advanced scientific thinking and reasoning, and they are willing to use their scientific understanding in support of solutions to unfamiliar scientific and technological situations. Students at this level can use scientific knowledge and develop arguments in support of recommendations and decisions that centre on personal, social or global situations.
707.9 points	
5	At Level 5, students can identify the scientific components of many complex life situations, apply both scientific concepts and knowledge about science to these situations, and can compare, select and evaluate appropriate scientific evidence for responding to life situations. Students at this level can use well-developed inquiry abilities, link knowledge appropriately and bring critical insights to situations. They can construct explanations based on evidence and arguments based on their critical analysis.
633.3 points	
4	At Level 4, students can work effectively with situations and issues that may involve explicit phenomena requiring them to make inferences about the role of science or technology. They can select and integrate explanations from different disciplines of science or technology and link those explanations directly to aspects of life situations. Students at this level can reflect on their actions and they can communicate decisions using scientific knowledge and evidence.
558.7 points	
3	At Level 3, students can identify clearly described scientific issues in a range of contexts. They can select facts and knowledge to explain phenomena and apply simple models or inquiry strategies. Students at this level can interpret and use scientific concepts from different disciplines and can apply them directly. They can develop short statements using facts and make decisions based on scientific knowledge.
484.1 points	
2	At Level 2, students have adequate scientific knowledge to provide possible explanations in familiar contexts or draw conclusions based on simple investigations. They are capable of direct reasoning and making literal interpretations of the results of scientific inquiry or technological problem solving.
409.5 points	
1	At Level 1, students have such a limited scientific knowledge that it can only be applied to a few, familiar situations. They can present scientific explanations that are obvious and follow explicitly from given evidence.
334.9 points	

Figure 2.7 Summary descriptions for six levels of overall scientific literacy[8]

CLOTHES

Read the text and answer the questions that follow.

A team of British scientists is developing "intelligent" clothes that will give disabled children the power of "speech". Children wearing waistcoats made of a unique electrotextile, linked to a speech synthesiser, will be able to make themselves understood simply by tapping on the touch-sensitive material.

The material is made up of normal cloth and an ingenious mesh of carbon-impregnated fibres that can conduct electricity. When pressure is applied to the fabric, the pattern of signals that passes through the conducting fibres is altered and a computer chip can work out where the cloth has been touched. It then can trigger whatever electronic device is attached to it, which could be no bigger than two boxes of matches.

"The smart bit is in how we weave the fabric and how we send signals through it – and we can weave it into existing fabric designs so you cannot see it's in there," says one of the scientists.

Without being damaged, the material can be washed, wrapped around objects or scrunched up. The scientist also claims it can be mass-produced cheaply.

Source: Steve Farrer, 'Interactive fabric promises a material gift of the garb', *The Australian*, 10 August 1998.

Can these claims made in the article be tested through scientific investigation in the laboratory?

Circle either "Yes" or "No" for each.

The material can be	Can the claim be tested through scientific investigation in the laboratory?
washed without being damaged.	(Yes) / No
wrapped around objects without being damaged.	(Yes) / No
scrunched up without being damaged.	(Yes) / No
mass-produced cheaply.	Yes / (No)

Level 4. difficulty: 567

Assessing and reporting student learning

ideally, it should be possible to:

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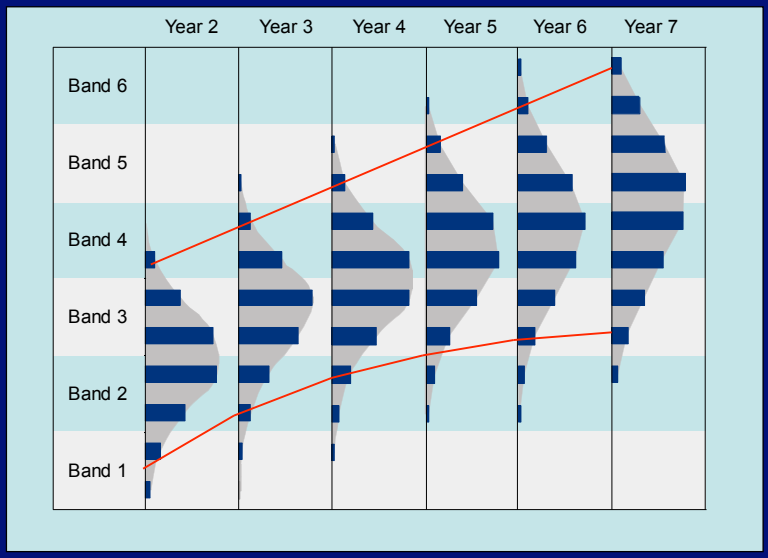
- interpret levels of student achievement in terms of what an individual is likely to know, understand and be able to do
- measure what progress a student makes (eg, over the course of a year or over several years)

mathematics



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- compare levels of achievement in an area across institutions / campuses

Grade	Uni A	Uni B	Uni C	Uni D	Uni E
100	High Distinction	High Distinction	7	HD	10, 9, 8
95					
90					
85	Distinction	Distinction	6		
80				DI	7
75	Credit	Credit	5		
70				CR	6
65	Pass	Pass	4		
60				PA	5
55					
50	Fail	Fail	Fail	Fail	Fail
45					
40					
35					
30					
25					
20					
15					
10					
5					
0					

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Setting and maintaining standards (expectations)

- are standards being maintained?
  (eg, does an *H1* indicate the same level of achievement as it did in the past?)
- would we know? how?
- what is done to ensure that expectations (eg, for achievement of an H1) are maintained?
- what efforts are made to benchmark standards against other institutions? internationally?

Measuring generic capabilities

Measuring generic capabilities

- education institutions identify generic capabilities that learners are expected to develop
- employers are calling for 'employability' skills
- evidence of generic capability development is patchy and employers often see employees as underprepared
- should better measures of generic capabilities be developed?
- use of measurement instruments? (eg, *Graduate Skills Assessment,* GSA)

Building capacity to measure learning

- build individual and institutional capacity to measure learning
- establish infrastructure to do this
- decide on capabilities (if any) to be measured and monitored across the institution
- set minimum requirements for the measurement of learning
- build discipline-based capacity and cross-institutional networks
- collect, analyse and act on data about student learning

in summary...

- learning is the core business
- better measures are required of the amount and quality of learning taking place
- this should be an institutional priority
- much is known about how to measure learning
- many of the challenges (six mentioned) are common across education sectors
- Australia is in a position to lead

Thank You