

School Based Assessment Methods – Develop and Implement

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What do we mean by SBA?

- ▶ **Any means of assessment carried out at the school level**
 - ▶ Tests, exams, portfolios, observations, performances, peer/self assessment, etc.
- ▶ **However, traditionally**
 - ▶ Using school examinations and tests to mimic (mock) public or school end-of-year examinations
 - ▶ Student performance is usually reported as percentage scores or letter grades intended to reflect the same standards as the examination authority.
 - ▶ Teachers expected to comment on student performance in terms of effort, and likelihood of the student obtaining a pass or a high grade.



Why copy examinations?

- ▶ Generally assumed that public examinations (and the school-based mimics) evaluate students fairly and the consequences attached to the grades are merited and appropriate.
- ▶ Consequences of examinations are immense
 - ▶ Grades give entry to the next level of education and can lead to prestigious financial, educational, and social rewards—or NOT.
 - ▶ Grades can determine the quality of schools and teachers—usually FALSELY.
 - ▶ Effects are on the school, the teachers, the students, and their families.
- ▶ Simply, exams are the real thing!



Cultural efficiency for examinations

- ▶ When societies have grown large and complicated enough ... implies the need for
 - (a) a lot of **specialized cultural learning**,
 - (b) the use of mediational means, such as **written language**, that take considerable time to learn as the access route to dealing with the ever-expanding cultural inheritance, and
 - (c) restricted economic resources that make it **necessary**, and in some sense **efficient**, to have **one person teach many novices at one time in a central location**--a kind of economy of scale.
- ▶ **Deliberate instruction** is a species-specific characteristic of homo sapiens. Formal schooling is ... a contingent outcome of a convergence of cultural-historical processes under conditions in which **deliberate instruction must pack a large amount of cultural content into a small space and brief time**. ... Perhaps it is because the **basic constraints** that originally gave rise to transmission-style, assembly line education **remain in place**....-that the system is so difficult to reform in any but a fragmentary way." p. 464-5

▶ Cole, M. (2010). What's culture got to do with it? Educational research as a necessarily interdisciplinary enterprise. *Educational Research*, 39(6), 461-470. doi: 10.3102/0013189X10380247



Tests & Public Examinations: Strengths

- ▶ Students are usually motivated to try hard.
- ▶ Usually systematic and extensive coverage of the syllabus content, ensuring students and teachers pay attention to those things.
- ▶ Strong social acceptance that examinations
 - ▶ are accurate,
 - ▶ lead to valid decisions,
 - ▶ have positive social consequences,
 - ▶ identify talent regardless of sex, social status, ethnicity, wealth, and so on
 - ▶ Are robust against corruption, collusion, and cheating.
- ▶ Potentially provide diagnostic analysis of performance relative to teachable aspects of the required curriculum



What do Teachers want from SBA? Improved Teaching & Learning

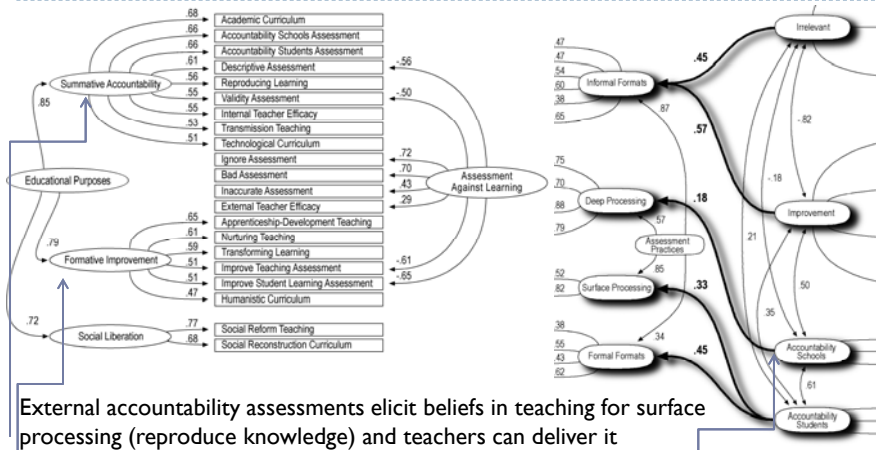
Study	Improvement	Irrelevance	School Account.	Student Account.
NZ Prim ^a	4.10	2.91	2.70	3.54
NZ Second ^b	4.02	2.95	2.68	3.93
QLD Prim ^c	4.05	2.90	2.74	3.51
QLD Second ^c	3.89	2.90	2.69	3.90
Hong Kong ^d	3.68	2.28	3.40	
Cyprus ^e	4.27	2.81	3.82	na

Teachers believe assessment exists to support improved teaching AND learning! They reject the idea that it is irrelevant. They are aware that it evaluates students and have mixed feelings about that...

6.0=Strongly Agree; 5=Mostly Agree; 4=Moderately Agree; 3=Slightly Agree; 2=Mostly Disagree; 1=Strongly Disagree

▶ Sources: a=Brown, 2004; b=Brown, 2011; c=Brown, Lake, & Matters, 2011; d=Brown, Hui, & Yu, 2010; e=Brown & Michaelides, 2011

NZ Primary Teacher Responses to External Assessments



External accountability assessments elicit beliefs in teaching for surface processing (reproduce knowledge) and teachers can deliver it

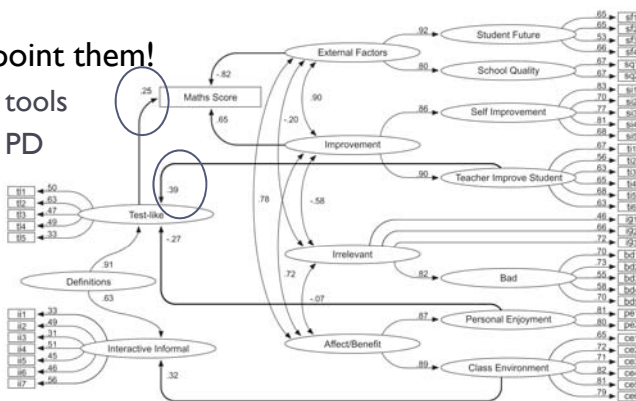
Real learning involves humanistic, deep processing and can be used to judge schools.

► Sources: Brown 2008; 2009a (left to right)

What do NZ students expect from SBA?

- Teacher will use SBA (esp. test-like assessments) to improve teaching & this belief predicts higher achievement
- Let's not disappoint them!
 - Teachers need tools
 - Teachers need PD

Interesting to know if these models apply equally in India



► Source: Brown, Peterson, & Irving, 2009

What's expected of SBA?

- ▶ NZ teachers give want to use assessments to improve the quality of their teaching and students' learning
 - ▶ They doubt high-stakes, external, formal exams can do this because they focus too much on the surface, reproduction aspects of learning rather than deep understanding
- ▶ NZ students think assessment is largely testing and expect teachers to do this in order to improve the quality of teaching and students' own learning

- ▶ But tests often don't actually inform improvement...



SBA—what's wrong?

- ▶ Tests rarely go beyond total score
 - ▶ Percentage correct and/or a rank-order score such as position in class (e.g., 1st or last) or position relative to a norming sample (e.g., percentile or stanine).
 - ▶ While these scores have some educational value, they do not lead to strong educational decision-making in the classroom.



SBA—what's wrong? Percentage Correct

▶ Easy

- ▶ Tasks scored right/wrong; all items are equally difficult;
- ▶ proportion correct tells you how much & how well someone has learned the material; getting more than $\frac{1}{2}$ right is minimum requirement for passing



▶ Wrong

- ▶ What about the parts, rather than the total?
- ▶ Real ability depends on the difficulty of the tasks answered correctly; not the proportion of questions answered correctly.
- ▶ Teachers grasp that hard questions should carry more weight than easy questions, but should not be expected to develop the technical skills to calculate this.



SBA—what's wrong? Percentage Correct

▶ Many important skills, knowledge, & understanding can NOT be scored discretely

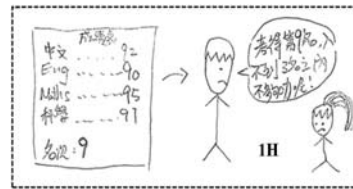
- ▶ They must be judged more holistically or analytically
 - Essays
 - Course work assignments
 - Projects
 - Discussions, Presentations/Forums
 - Scrap books
 - Portfolios
 - Production of ICT applications
 - Critical Comments/Reviews
 - Reflective writing
 - Report writing
- Judgements can be converted to grades or scores but that's a convention and reliability is problematic
 - Structured systems needed to overcome error*



▶ *See suggestions in Brown, 2009b, 2010; Brown & Ngan, 2010

SBA—what's wrong? Rank order scores

- ▶ Easy to determine and understand:
 - ▶ only 3 stand on the podium
- ▶ Order does not indicate what each person still needs to learn
- ▶ Leads to assumption that those at the bottom cannot learn and that those at the top cannot be taught more
- ▶ We normalise on our own population; assuming best and worst in my group are truly best & worst
- ▶ THUS
- ▶ Rank order scores do not help the teacher focus on who needs to be taught what next.



SBA—what's wrong? Streaming or Tracking

- ▶ Scores are used to stream classes and/or schools
 - ▶ Easy to do, grouping with similar needs/strengths might make it easier for teacher, but mixed ability might be better for student learning
- ▶ Students may get a false impression of their ability depending on their rank.
- ▶ The quality of a teacher or a school cannot be fairly determined if the groups are skewed in the first place—a high score does not mean high quality education.
 - ▶ We need to consider Value Added approach; though, this is a very complex statistical problem of how to get around ceiling and regression to mean effects when we don't have long vertical scales
 - ▶ But good schools add value to scores; not good schools have high scores

SBA—what's wrong? Diagnostic, formative potential

- ▶ From test companies or qualifications bodies, usually very systematic analysis of the content of tests
 - ▶ But sub-scores usually not reported at all or in a teacher friendly way that informs educational change*
- ▶ In SBA
 - ▶ Teachers rarely have the skills/time/resources to
 - ▶ map questions to the curriculum,
 - ▶ Map results to teachable components of curriculum
 - ▶ These are skills of testing experts, not the priority of teachers who need to focus on pedagogically skilled delivery and facilitation of real learning in the real-time space of a classroom

▶ *Responsibility of test agencies discussed in Hattie & Brown, 2010

Challenges in Reforming SBA

- ▶ **SBA serves multiple masters:**
 - ▶ improve the quality of teaching and learning;
 - ▶ assist in preparing students for external high-stakes assessments;
 - ▶ contribute to helping school leaders and teachers monitor the quality of their work;
 - ▶ must demonstrate to parents and others that high quality education is going on.
 - ▶ contribute to official qualifications awards.
- ▶ these competing pressures require SBA that is much more sophisticated than simply rejecting tests and examinations or simply mimicking high-stakes assessments.

▶

Requirements for educationally useful SBA

- ▶ must provide more information than total score or a rank-order type of score.
- ▶ teachers need to know *who needs to be taught or learn what next*.
 - ▶ This helps a teacher make decisions as to how to modify materials, student grouping, instructional strategies, and instructional sequences.
 - ▶ teachers need to know
 - ▶ which objectives the students have mastered and don't need to be taught anymore;
 - ▶ which objectives they surprisingly did well on and for which they can be praised;
 - ▶ which objectives they did surprisingly poorly at and which they need to revise, review, and practice; and,
 - ▶ which objectives were hard and that the students cannot yet do. These latter are what the teacher must include in their teaching plans, since learning hard material requires instruction.
- ▶ However, analysis of test questions in this way, and especially in a timely fashion, requires skills & resources that most teachers do not have.



Moving into effective SBA

- ▶ Don't just make teachers write their own tests and exams
 - ▶ It's hard to write high quality tests
- ▶ Don't make them ignore or give up tests and exams
 - ▶ Tests have a legitimate place alongside alternative forms of evaluating learning
- ▶ Don't blame tests
 - ▶ But blame the reports?
- ▶ Don't blame the teachers
 - ▶ If we don't train them or give them the resources....



Educational SBA: a pipe dream?

- ▶ **Since the early 1990s, New Zealand changing qualifications system**
 - ▶ Towards certifying performance in a broad range of domains and helping students learn more.
 - ▶ Curriculum specifies learning outcomes or objectives related to 8 levels of learning progress against which students are assessed.
 - ▶ The National Certificate of Educational Achievement uses socially moderated SBA in which teacher judgements count towards qualifications. **Score NOT adjusted based on examination performance.**
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Educational SBA: a pipe dream?

- ▶ **Conditions for success include strong acceptance that:**
 - ▶ teaching is more than telling (it involves guiding and facilitating),
 - ▶ assessing is more than examining (though there is still a place for examinations),
 - ▶ all students can learn if guided with targets and feedback, and
 - ▶ there is an important place for the teacher-expert in a classroom.
 - ▶ Wide-spread confidence in the professionalism of teachers
 - ▶ New Zealanders see that there are many routes to life-success other than just school-learning and high examination scores.
 - ▶ This makes it somewhat easier to implement a rich, multi-faceted approach to SBA.
 - ▶ **Social, economic conditions must be in place for SBA to be a powerful adjunct to formal examinations; it's not just technical**
-



How can it be done?

- ▶ Teachers need skill and resources—to categorise, analyse, diagnose individual & group needs, develop prescriptive responses, link to resources, and monitor effects.
- ▶ Teachers need more than tests, but still have a place. This is especially the case in societies where there is great confidence in the virtues of examinations.
- ▶ The solution adopted in New Zealand is multi-faceted;
 - ▶ it includes a wide variety of assessment tools & resources
 - ▶ in a culture in which teachers are respected as the people most capable of improving outcomes for all children
 - ▶ assessments are generally school-controlled and relatively low-stakes. If there is bad news, the teachers get to see it first, before any external bodies; this raises the probability that teachers will actually use assessments to improve their teaching rather than simply inflate their students' test scores.



SBA: a NZ response—Assessment Tools for Teaching & Learning-asTTle

- For this reason, in New Zealand we developed a computer-assisted, school-controlled test system (Assessment Tools for Teaching & Learning-asTTle)
- asTTle analyses strengths & weaknesses of student performance for both individuals and groups. And these can be reported to teachers, administrators, parents, & students
- The system does the donkey-work, leaving the teacher free to think about how to design and deliver appropriate instruction instead of trying to figure out who got what on the test.
- The system generates a number of different reports that allow teachers and school leaders to evaluate, respond to, and monitor the effects of their work.



Read more: Hattie et al., 2006; Hattie & Brown, 2008; Hattie, Brown, & Keegan, 2003;

asTTle—a National, School Based Assessment System

- ▶ Curriculum
- ▶ Choice
- ▶ Control
- ▶ Communication

NOT

- ▶ Central Control, Reporting
 - ▶ Compulsory
 - ▶ BUT funded by NZ Ministry of Education
-



The Development of asTTle



V1 – 2002 July

- Literacy.
- Years 5 to 7.
- English medium.
- 110 pilot schools.



V2 – 2003 February

- Added numeracy.
 - Years 5 to 7.
 - English and Māori medium.
 - Available to all schools.
-



The Development of asTTle



V3 – 2004 February

- Numeracy extended to Year 10.
- English and Māori medium.
- Approximately 600 schools.



V4 – 2005 February

- Levels 2 to 6.
- Years 5 to 10.
- Literacy.
- Numeracy.
- English and Māori medium.
- Single-User and Multi-User options.



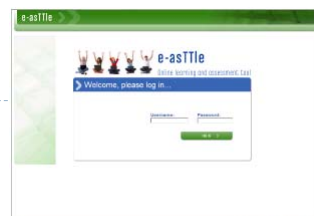
e-asTTle

▶ Generation 7: New options

- ▶ administration online
- ▶ computer adaptive testing
- ▶ Attitudes (motivation, engagement, interest, self-regulation, etc.)
- ▶ Longitudinal tracking
- ▶ Target setting

▶ Available in NZ schools from January 2009

- ▶ http://e-asttle.tki.org.nz/about_e_asttle



SBA Lessons Learned

1. Aligned to curriculum
2. Calibrated to criteria, norms, standards, and progress
3. Give teachers and administrators choice over testing and reporting: they have different needs
4. Communicate in novel and powerful ways
5. Remove central control, reporting or consequences
6. Make voluntary and beneficial to teachers
7. Use computer technology for customisation and IRT and to make SBA manageable!
8. Incremental and researched deployment



Lesson 1: Choice Curriculum Content

asTTle Select Mathematics Content

Mathematics: APEC demo

Select Content

Level	Number Knowledge	Number Operations	Algebra	Measurement
Most				
Many				
Some				
Few				
Very Few / None				

Select Content

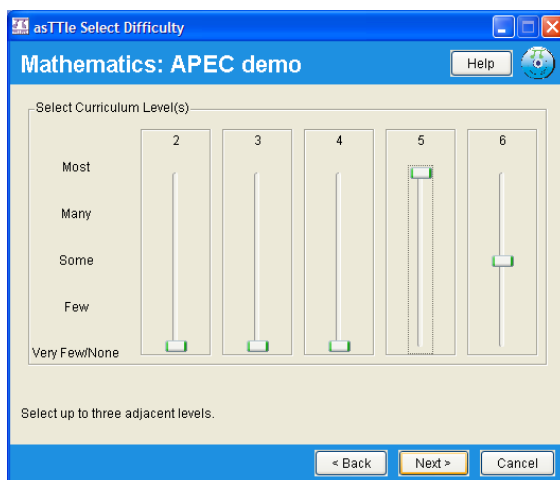
Level	Geometric Knowledge	Geometric Operations	Probability	Statistics
Most				
Many				
Some				
Few				
Very Few / None				

Select one to three content areas.

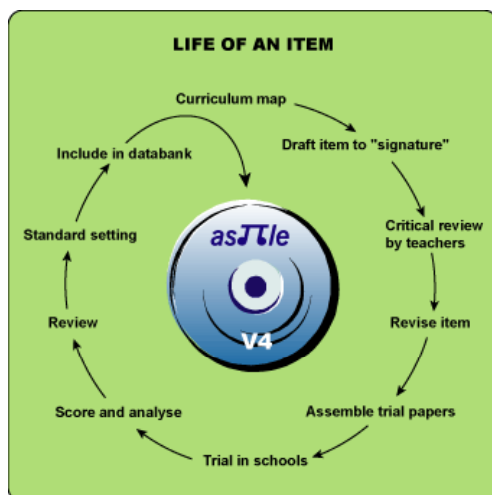
Next > Cancel



Lesson 1: Choice Curriculum Difficulty



Lesson 2: Calibration Processes



1000s of teachers involved

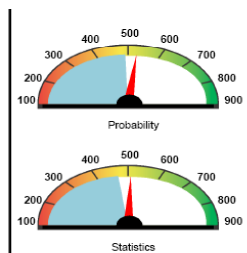
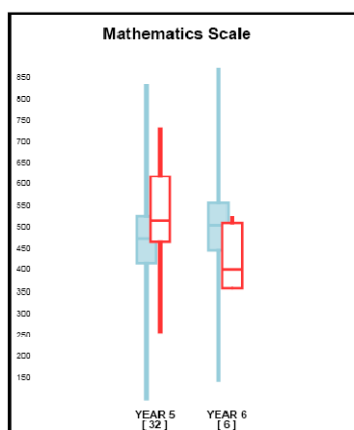
Lesson 2: Calibration to Curriculum

Content			
Number Knowledge	5	Number Operations	10
Algebra	17		

Difficulty					
2B	0	2P	0	2A	0
3B	0	3P	2	3A	0
4B	2	4P	4	4A	1
5B	1	5P	9	5A	7
6B	3	6P	2	6A	1



Lesson 2: Calibration to Norms



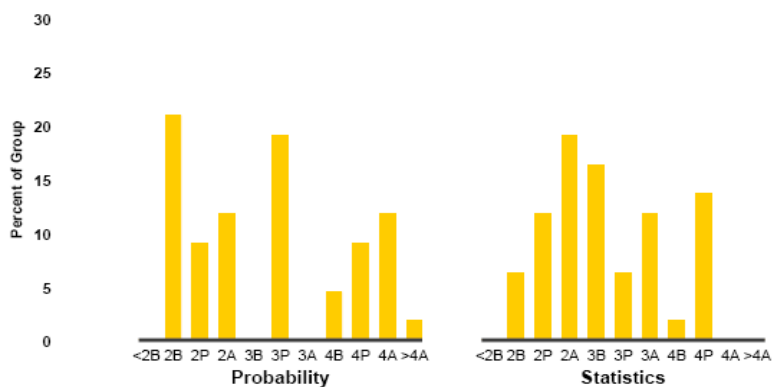
NB: student self-report of non-cognitive aspects



92,000 NZ students Y4-12; representative—a valid basis for comparison

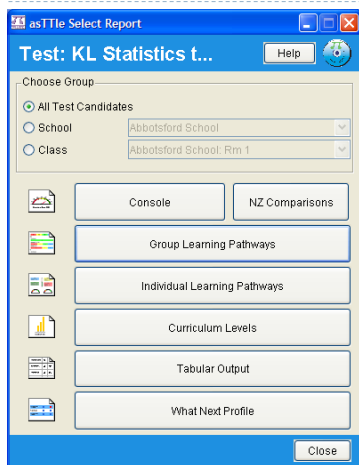


Lesson 2: Calibration to Standards



The ability to see who is where and who is with whom...

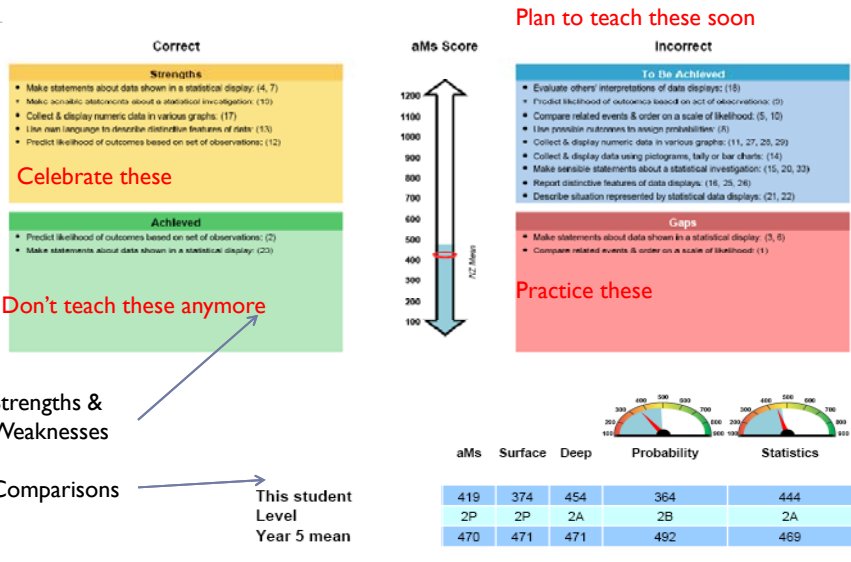
Lesson 3: Choice



	A	B	C	D	E	F	G	H
2 Basic	●	●	●	●	●	●	●	●
2 Proficient	●	●	●	●	●	●	●	●
3 Basic	●	●	●	●	●	●	●	●
3 Proficient	●	●	●	●	●	●	●	●
4 Basic	●	●	●	●	●	●	●	●
4 Proficient	●	●	●	●	●	●	●	●
5 Basic	●	●	●	●	●	●	●	●
5 Proficient	●	●	●	●	●	●	●	●
6 Basic	●	●	●	●	●	●	●	●
6 Proficient	●	●	●	●	●	●	●	●

Each report answers a single, important question and communicates visually.

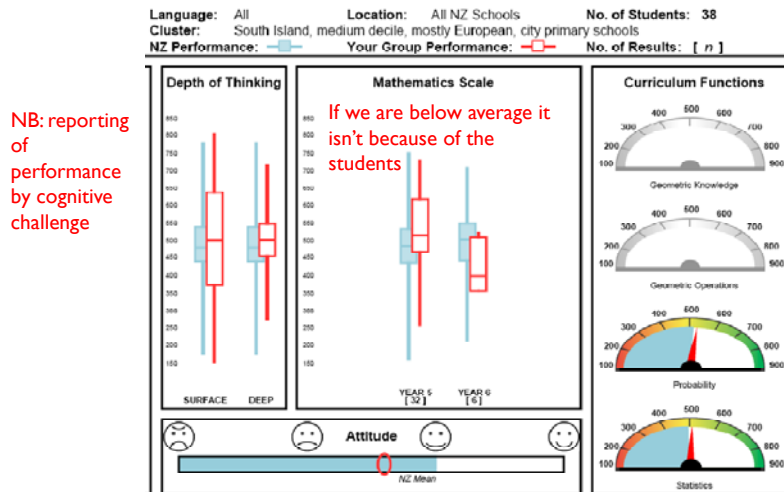
Lesson 4: Communication



Lesson 4: Improved Communication

- ▶ Link to asTTle Home Grown TV interview
 - ▶ Broadcast August 2, 2004, TVI, New Zealand
 - ▶ [click](#)

Lesson 5: Local Information



Lesson 6: Choice

- ▶ NOT just asTTle (test system)
 - ▶ Exemplars
 - ▶ Assessment Resource Banks
 - ▶ National Education Monitoring Project
 - ▶ School Entry Assessment
 - ▶ Other Nationally calibrated tests
 - ▶ PAT, STAR, TORCH, Y6 Reading Net, etc.
 - ▶ Other locally defined assessments

Lesson 7: ICT—gradual development, consistent with school infrastructure



2002—stand alone only

2004—shared database on Win, Mac, & Linux AND stand alone



2002—Win 95, 98

And from 2007 onwards fully online

2004—Win 98, 2000, XP



2002—OS Classic

2004—OS X 10.3 & 10.4



2004—Redhat 9

Lesson 8: Research

Technical reports made available to government and the public.

Go to www.asttle.org.nz select Technical Reports

ALSO

Postgraduate degrees
Brown (2003); Harland (2002); Irving (2004) Keegan (2003); Leeson (2003); Zwiigelaar (2001)

Curriculum Mapping

- Mapping the English curriculum.
- Pāngarau curriculum framework and map: Levels 2-4
- Mathematics in the New Zealand Curriculum - A concept map of the curriculum document.
- Te Reo Māori literacy curriculum map: Levels 2-4
- English reading curriculum framework and map: Levels 2-6.
- Mathematics curriculum framework and map: Levels 2-6.
- Written language curriculum framework and map: Levels 5-6.
- Pāngarau curriculum framework and map: Levels 2-6.
- Review of Māori literacy framework for kōhke 2-6 panui/tuhitahi of the Māori language curriculum statement, Te Reo Māori i roto i ngā Marautanga o Aotearoa.

Item development

- Item signature study: Report on the characteristics of reading texts and items from calibration 2.
- Strategies and thinking about number in children aged 9-11 years.
- Paper & pencil strategy assessment items for the New Zealand Number Framework: Pilot study.
- Numeracy item signature study: A theoretically derived basis.
- Item signature study: Report on the characteristics of reading texts and items from calibration 3.
- Assessment of student number strategy development: A case study in the use of paper and pencil items.
- Cognitive processes in asTTle: The SOLO taxonomy.
- Writing at Level 5-6 of the New Zealand English Curriculum: Development of Progress Indicators & Tasks.

Psychometrics

- A review of linear programming and its application to the Assessment Tools for Teaching and Learning (asTTle) Projects.
- Item signature study: Report on the characteristics of reading texts and items from calibration 1.

Scoring

- Development of the asTTle writing assessment rubrics for scoring extended writing tasks.
- Accuracy in the scoring of writing: Study in large-scale scoring of asTTle writing assessments.
- Scoring of a nationally representative sample of student writing at Level 5-6 of the New Zealand English curriculum: Use and refinement of the asTTle progress indicators & tasks.

Standard Setting

- Standard setting for asTTle reading: A comparison of methods.

Programming

- Narrative requirements document: Project asTTle CD ROM.

Reporting

- Comparison variables useful to teachers in analysing assessment results.
- Output reporting design: Focus group 1.
- Output reporting design: Focus group 2.
- Schools like mine: Cluster analysis of New Zealand schools.
- Reporting assessment information to teachers: Report of Project asTTle outputs design.
- Validation Evidence of asTTle Reading Assessment Results: Norms and Criteria.

Evaluation of Use in Schools

- The evaluation of asTTle in schools: The power of professional development.
- Using asTTle persuasive writing: A case study of teaching argument writing.
- A national teacher-managed, curriculum-based assessment system: Assessment Tools for Teaching & Learning (asTTle).
- Use of asTTle in secondary schools: Evaluation of the pilot release of asTTle V3.

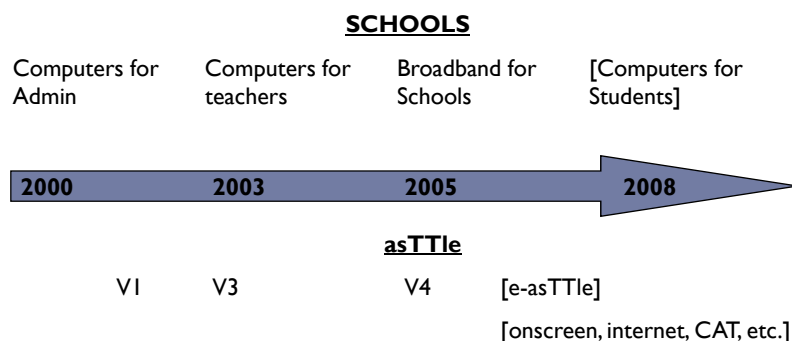
Lesson 8: Research Papers

- ▶ Brown, G. T. L., & Hattie, J. A. (2009, April). *Understanding teachers' thinking about assessment: Insights for developing better educational assessments*. Paper presented at the annual meeting of the NCME, San Diego, CA.
- ▶ Brown, G. T. L., Glasswell, K., & Harland, D. (2004). Accuracy in the scoring of writing: Studies of reliability and validity using a New Zealand writing assessment system. *Assessing Writing*, 9(2), 105-121.
- ▶ Hattie, J. (2009, April). *Visibly learning from reports: The validity of score reports*. Paper presented at the annual meeting of the National Council for Measurement in Education (NCME), San Diego, CA.
- ▶ Hattie, J. A. C. (2008). Some correlates of academic performance in New Zealand schools: The asTTle data base. In C. Rubie-Davies & C. Rawlinson (Eds.), *Challenging Thinking about Teaching and Learning*. New York: Nova Science Publishers.
- ▶ Leeson, H. V. (2006). The mode effect: A literature review of human and technological issues in computerized testing. *International Journal of Testing*, 6(1), 1-24.
- ▶ 'Otunuku, M., & Brown, G. T. L. (2007). Tongan students' attitudes towards their subjects in New Zealand relative to their academic achievement. *Asia Pacific Education Review*, 8(1), 117-128.
- ▶ Parr, J. M., & Timperley, H. (2008). Teachers, schools and using evidence: Considerations of preparedness. *Assessment in Education: Principles, Policy & Practice*, 15(1), 57-71.



Lesson 8: Incrementally Appropriate

Technology fits Infrastructure



Evidence it is working...

- ▶ Archer, E. (2009). *Beyond the rhetoric of formative assessment: Seeking solutions for South Africa in New Zealand's Assessment Tools for Teaching and Learning*. Unpublished manuscript. University of Pretoria.
 - ▶ Students were aware of and appreciated the grouping and regrouping of students that the teacher implemented by content area. They believed they were learning and were not ashamed of being in a lower group in one content area as they knew they were getting appropriate materials and instruction depending on their observed performance.
 - ▶ The teachers had adopted the asTTle system because of its multiple reports, which permitted access to improvement-related information rapidly, allowed appropriate differentiation of curriculum-aligned instruction, and allowed accurately monitoring of learning progress.
-



Evidence it is working...

- ▶ Brown, G. T. L., & Harris, L. R. (2009). Unintended consequences of using tests to improve learning: How improvement-oriented resources engender heightened conceptions of assessment as school accountability. *Journal of Multi-Disciplinary Evaluation*, 6(12), 68-91.
 - ▶ Alicia, a Year 8 (i.e., students approximately 12-13 years old) middle school teacher explained:
 - ▶ the data [from a school wide test] is being used to report to the Board of Trustees. It's good for me because it's a formative assessment for me. I can use this to see how to, what I need to do to in order to set up my program for narrative writing, ... that same information is used to report to the board.
-



Evidence it is working...

- ▶ Parr, J. M., Timperley, H., Reddish, P., Jesson, R., & Adams, R. (2007). *Literacy Professional Development Project: Identifying Effective Teaching and Professional Development Practices for Enhanced Student Learning* (RMR No. 851). Wellington, NZ: Ministry of Education, Research Division.
 - ▶ The asTTle curriculum analysis was used as the framework for teachers' professional development in reading and writing instruction and the asTTle tests themselves were used as a means of evaluating student learning outcomes. Students exhibited considerable gains in writing ($d=1.28$) and moderate gains in reading ($d=.48$).
 - ▶ McDowall, S., Cameron, M., Dingle, R., Gilmore, A., & MacGibbon, L. (2007). *Evaluation of the Literacy Professional Development Project* (RMR No. 869). Wellington, NZ: Ministry of Education, Research Division.
 - ▶ gains in student learning outcomes were associated with teachers who believed they had strong abilities to use and interpret assessment tools and greater knowledge of literacy
-

Conclusion

- ▶ Tests are not the problem, bad use through inappropriate reporting is most of the problem
 - ▶ Involve and make use of teacher commitment to improvement
 - ▶ Make it about education (teaching & learning) not primarily or solely about technology, testing, or accountability
 - ▶ Take time: devise, trial, listen, respond, support, train gradually
-

Finally

- ▶ *If you respect teachers and want SBA to improve outcomes, give teachers something like asTTle*
- ▶ a test system that
 - focuses on improved teaching
 - integrates with curriculum, and other forms of assessment, and
 - serves teaching goals



References

- Brown, G. T. L. (2004). Teachers' conceptions of assessment: Implications for policy and professional development. *Assessment in Education: Principles, Policy & Practice*, 11(3), 301-318.
- Brown, G. T. L. (2008). *Conceptions of assessment: Understanding what assessment means to teachers and students*. New York: Nova Science Publishers.
- Brown, G. T. L. (2009a). Teachers' self-reported assessment practices and conceptions: Using structural equation modelling to examine measurement and structural models. In T. Teo & M. S. Khine (Eds.), *Structural equation modeling in educational research: Concepts and applications* (pp. 243-266). Rotterdam, NL: Sense Publishers.
- Brown, G. T. L. (2009b). The reliability of essay scores: The necessity of rubrics and moderation. In L. H. Meyer, S. Davidson, H. Anderson, R. Fletcher, P. M. Johnston & M. Rees (Eds.), *Tertiary assessment and higher education student outcomes: Policy, practice and research* (pp. 40-48). Wellington, NZ: Ako Aotearoa.
- Brown, G. T. L. (2010). The validity of examination essays in higher education: Issues and responses. *Higher Education Quarterly*, 64(3), 276-291.
- Brown, G. T. L. (2011, accepted). Teachers' conceptions of assessment: Comparing primary and secondary teachers in New Zealand. *Assessment Matters*, 3.
- Brown, G. T. L., & Michaelides, M. (2011). Ecological rationality in teachers' conceptions of assessment across samples from Cyprus and New Zealand. *European Journal of Psychology of Education*. doi:10.1007/s10212-010-0052-3
- Brown, G. T. L., & Ngan, M. Y. (2010). *Contemporary educational assessment: Practices, principles, and policies*. Singapore: Pearson Education South Asia.



References

- Brown, G. T. L., Hui, S. K. F., & Yu, W. M. (2010, July). *Teachers' conceptions of assessment: Developing a model for teachers in Hong Kong*. Paper presented at the International Test Commission biannual conference, Hong Kong.
- Brown, G. T. L., Lake, R., & Matters, G. (2011). Queensland teachers' conceptions of assessment: The impact of policy priorities on teacher attitudes. *Teaching and Teacher Education*, 27(1), 210-220. doi:10.1016/j.tate.2010.08.003
- Brown, G. T. L., Peterson, E. R., & Irving, S. E. (2009). Self-regulatory beliefs about assessment predict mathematics achievement. In D. M. McInerney, G. T. L. Brown, & G. A. D. Liem (Eds.) *Student perspectives on assessment: What students can tell us about assessment for learning* (pp. 159-186). Charlotte, NC: Information Age Publishing.
- Hattie, J. A. C., & Brown, G. T. L. (2008). Technology for school-based assessment and assessment for learning: Development principles from New Zealand. *Journal of Educational Technology Systems*, 36(2), 189-201.
- Hattie, J. A., & Brown, G. T. L. (2011). Assessment and evaluation. In C. Rubie-Davies (Ed.) *Educational psychology: Concepts, research and challenges* (pp. 102-117). Abingdon, UK: Routledge.
- Hattie, J. A. C., Brown, G. T. L., & Keegan, P. J. (2003). A national teacher-managed, curriculum-based assessment system: Assessment Tools for Teaching & Learning asTTle. *International Journal of Learning*, 10, 771-778.
- Hattie, J. A., Brown, G. T. L., Ward, L., Irving, S. E., & Keegan, P. J. (2006). Formative evaluation of an educational assessment technology innovation: Developers' insights into Assessment Tools for Teaching and Learning (asTTle). *Journal of MultiDisciplinary Evaluation*, 5(3), 1-54.

