

Cognitive and Behavioural Engagement of Students with Multistage Testing

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Acknowledgments

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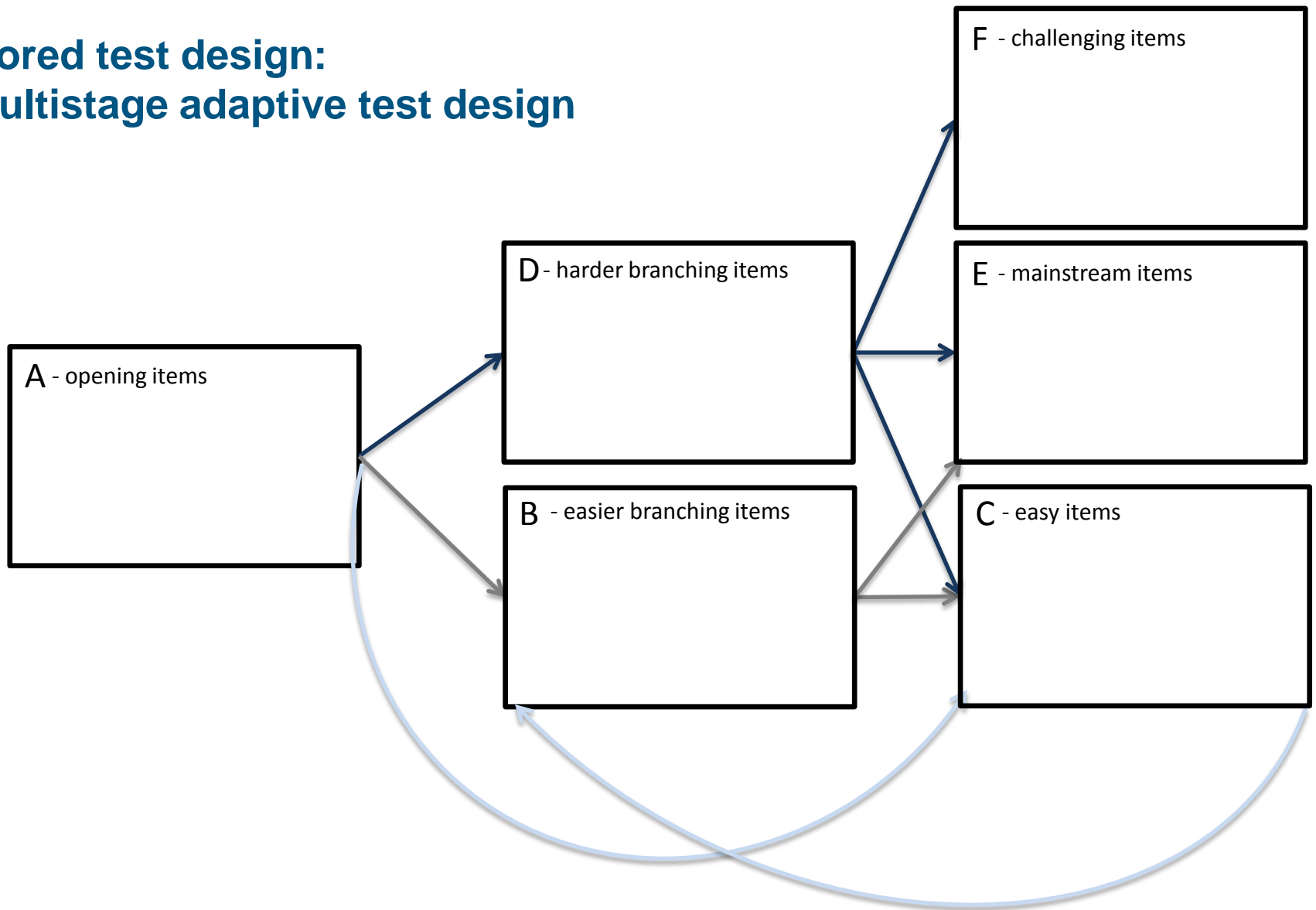
Funding:

- National Assessment and Surveys Online Program (NASOP) – funded by the Australian Government Department of Education

The National Assessment Program – Literacy and Numeracy (NAPLAN)

- ▶ Tests all Australian students in grades 3, 5, 7 and 9 in Reading, Writing, Language Conventions and Numeracy.
- ▶ Rasch model is used to scale tests and student results.
- ▶ Results are reported at:
 - national and state and territory level
 - school level
 - student level.
- ▶ As part of NASOP research, ACARA was tasked to develop a design for future NAPLAN tests.
- ▶ The key enhancement proposed by ACARA is the use of multistage adaptive test design – the tailored test design.

Tailored test design: a multistage adaptive test design



Why TTD?

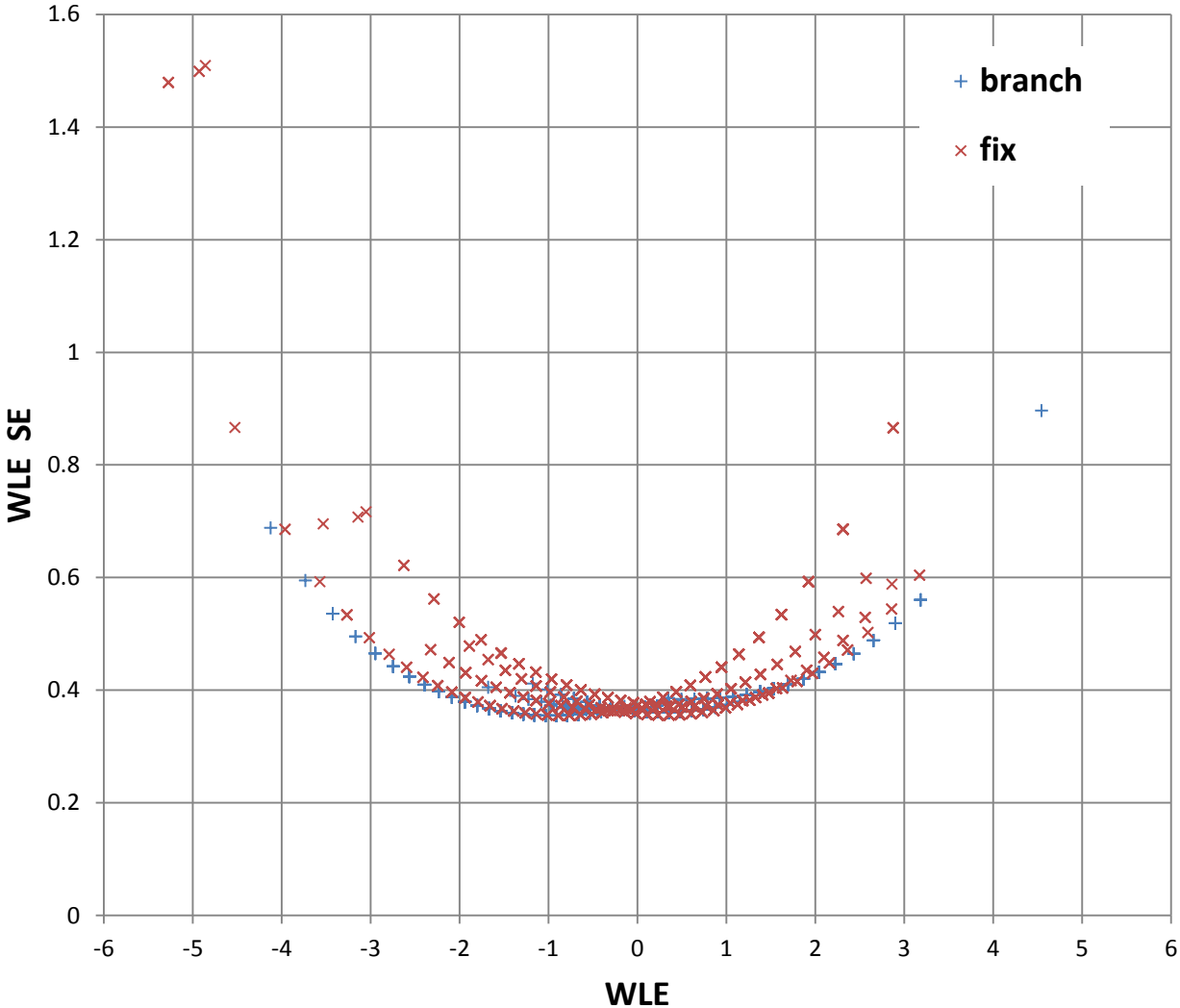
- ▶ For large-scale assessments, MST offers several advantages over CAT*, including:
 - better control over item content and exposure
 - better control over structure and administration of the final test
 - requiring significantly fewer items to run and maintain the testing program
 - more control over vertical scaling of tests across different grades.

Will TTD work for future NAPLAN tests?

- ▶ The feasibility study for the numeracy and reading tests was completed in 2013.
- ▶ 256 schools, more than 8,000 students across grades 3,5,7 and 9.
- ▶ Students were randomly allocated to either TTD or fixed linear test conditions.

*(see Hendrickson, 2007)

TTD feasibility study outcomes: Reading Grade 5



Will the wider educational community trust that TTD works?

- ▶ The 'measurement' argument is not always sufficient.
- ▶ We need to show that TTD provides a fair and valid testing situation.
- ▶ We need to show that TTD is not introducing factors that might hinder student performance.
- ▶ We need to show that TTD has a potential to increase the test motivation and engagement for all students.

Cognitive laboratories

- ▶ Think-aloud, concurrent and retrospective interviews and structured observations.
- ▶ These methods provide rich qualitative data about student experiences, insights and interactions with test items and testing situations.

Research questions

- ▶ What is the impact of the TTD on the students' test-taking behaviour?
- ▶ How do students interact with the testlets at key branching points of the test:
 - the rising and falling pattern of item difficulty
 - investigating key items in the two adjoining branching testlets.
- ▶ What is the impact of staged and branched testing on student test engagement?

Research studies

- ▶ A main study to investigate behavioural and cognitive engagement with TTD for the mainstream students.
- ▶ A separate study to investigate whether TTD provides adequate provisions for students with socio-educational disadvantage.

The main cognitive laboratories study: method

Participants



Domain	grade 3	grade 5	grade 7	grade 9	Total
Numeracy	10	10	10	14	44
Reading	10	11	11	9	41
Total	20	21	21	23	85

Procedures

- ▶ Students were observed and interviewed while completing either a TTD or a fixed linear test.
- ▶ Interaction with 12 to 14 key items in each test were subjected to detailed exploration.
- ▶ Interviews focused on the following aspects of TTD:
 - testlet and test structure and branching
 - experience with computer based testing
 - test engagement.

The main cognitive laboratories study: Results

Branching:

- students did not identify difficulty progression as a point of difference between online and standard NAPLAN tests
- was not regarded as a significant issue or something that distracted them from their test-taking experience.

Experience with computer based testing:

- large numbers of students reported preferring the computer-based test on the grounds that it was more interesting simply because it was on a computer.

Engagement:

- online tests are more engaging
- students were mostly unaware of branching and testlet targeting, but when they were made aware of these tests characteristics, the effect on engagement was positive.

Students with SE disadvantage cognitive laboratories study

Participants:

Domain	grade 3	grade 5	grade 7	grade 9	Total
Numeracy	25	21	35	11	92

Procedures:

- students completed one of the two fixed pathways; A-B-C and A-C-B.

Results:

- the TTD provides pathways that give students an opportunity to successfully re-engage with the whole test
- the test design increased self-esteem and sense of achievement for these students.

Conclusions

- ▶ Students regard branching to be a positive enhancement of NAPLAN tests.
- ▶ Students were not affected by the rising and falling pattern of item difficulty as they move through different stages of the tailored tests.
- ▶ Tailored tests enabled educationally disadvantaged students to remain positively engaged with the full test.
- ▶ Tailored tests delivered more motivating assessment to all students – including students who might be struggling with the current NAPLAN tests - all students reported an increased sense of achievement.
- ▶ More work remains to be done.

Next steps

The research currently underway includes following studies:

- ▶ In-depth cognitive investigation of student interaction with the most challenging items in testlet F in reading and numeracy
- ▶ In-depth cognitive investigation of student engagement and interaction with selected technically enhanced item types
- ▶ Further investigation of measurement aspects of the TTD for reading and numeracy

Thank You

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