

Streamlining Resulting and Analysis for High-stakes Examinations

Australian Pharmacy Council

- Accredite and evaluate pharmacy degree programs, intern training programs in Australia, New Zealand and internationally
- Accredite organisations who accredit continuing professional development (CPD) activities in Australia
- Assess overseas trained pharmacists wishing to migrate and practice in Australia
- Conduct computer-based examinations for interns and overseas candidates wishing to register in Australia – 12 per year – all Australian States and 21 countries

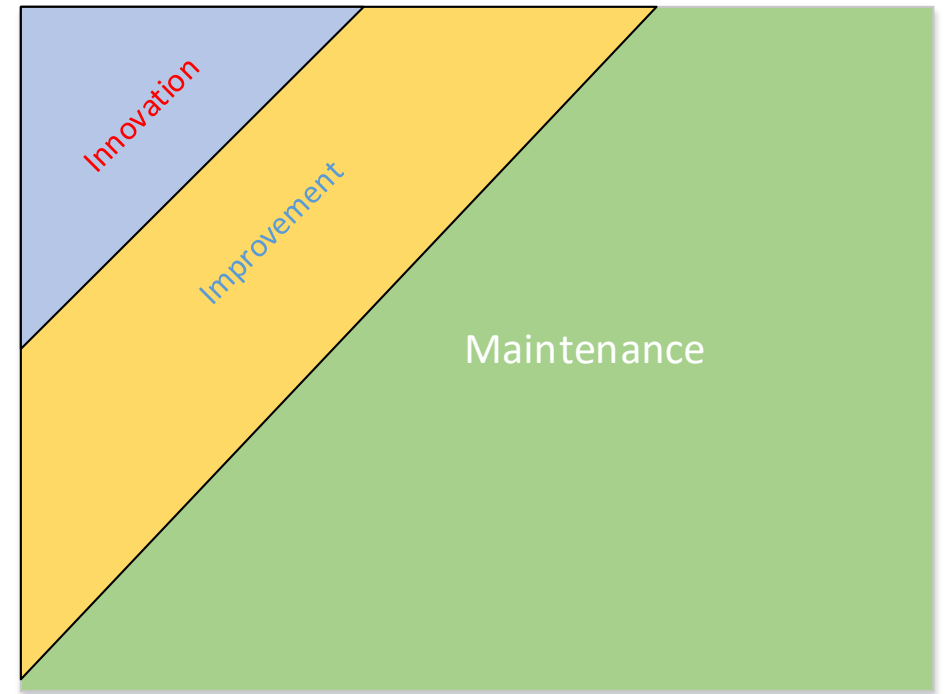
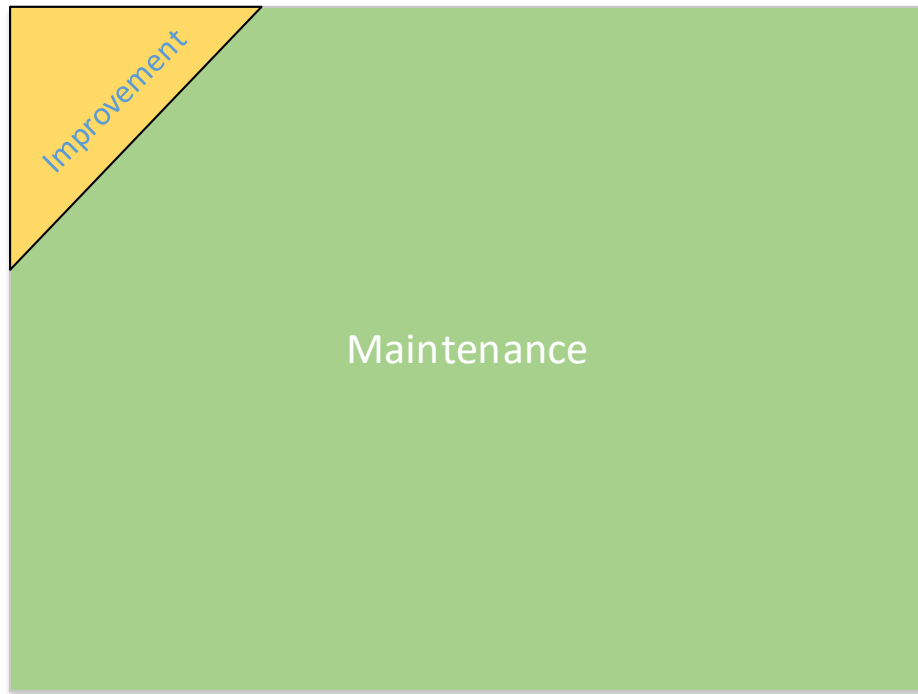
Legacy Examinations System

- In-house Custom Built Item Bank
- Lertap Excel Add-on provided limited Item Statistics consistent with Classical Item Theory
- Scoring completed in Excel
- Customer Relationship Management Storage

Issues

- Small team fully occupied
- Little time to review and improve examinations
- Large effort required for annual reporting
- Stuck in Classical Item Testing model
- Need for greater assurance at Board and Executive level of:
 - integrity
 - confidentiality
 - availability
 - defensibility
- No time for innovation

Shift Required

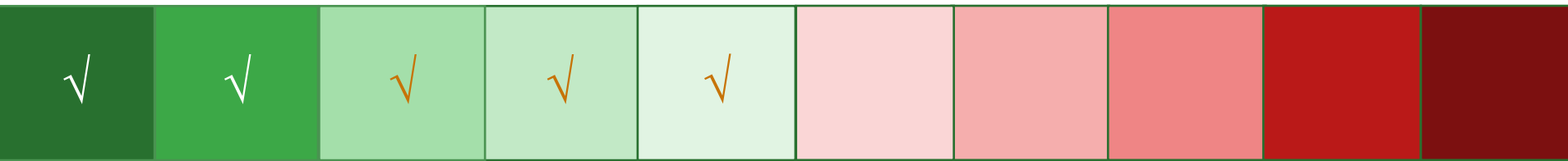


Classical to Rasch

- Fairer more consistent measurement across multiple forms
- Opportunities to analyse and improve items

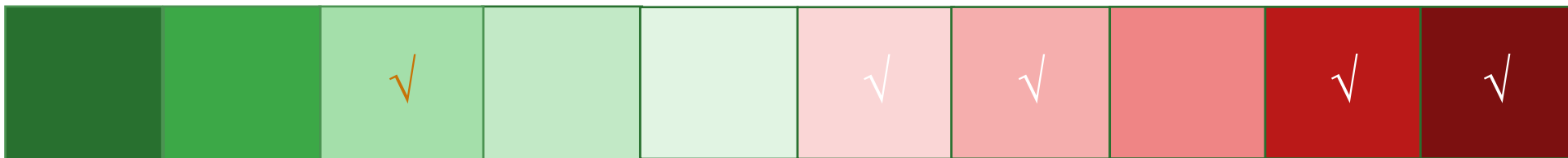
Classical Approach

Easy



5/10

Hard



5/10

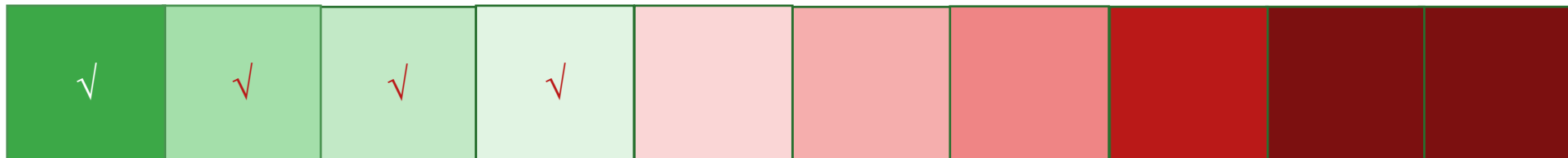
Multiple Forms

FORM A



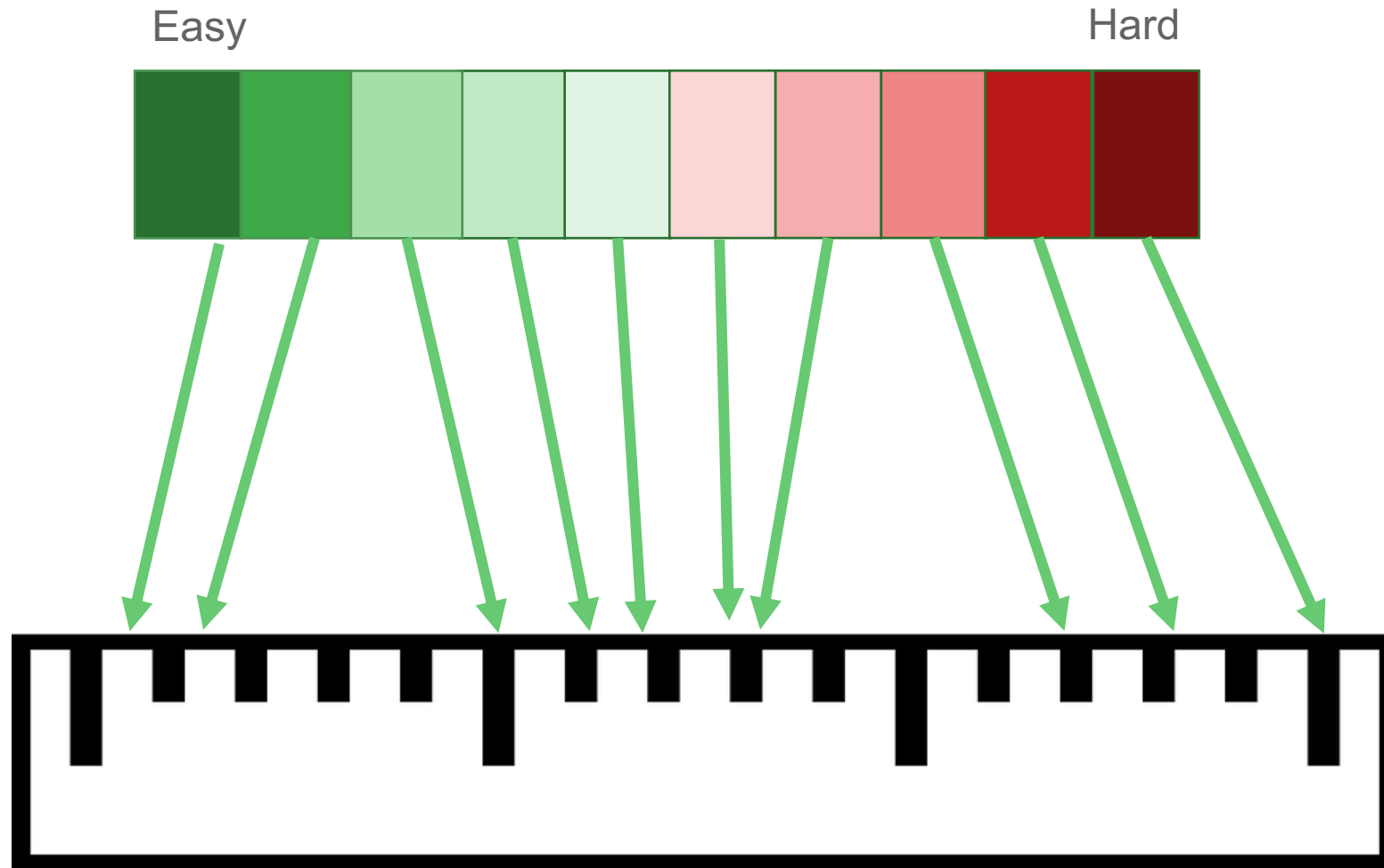
5/10
Pass

FORM B

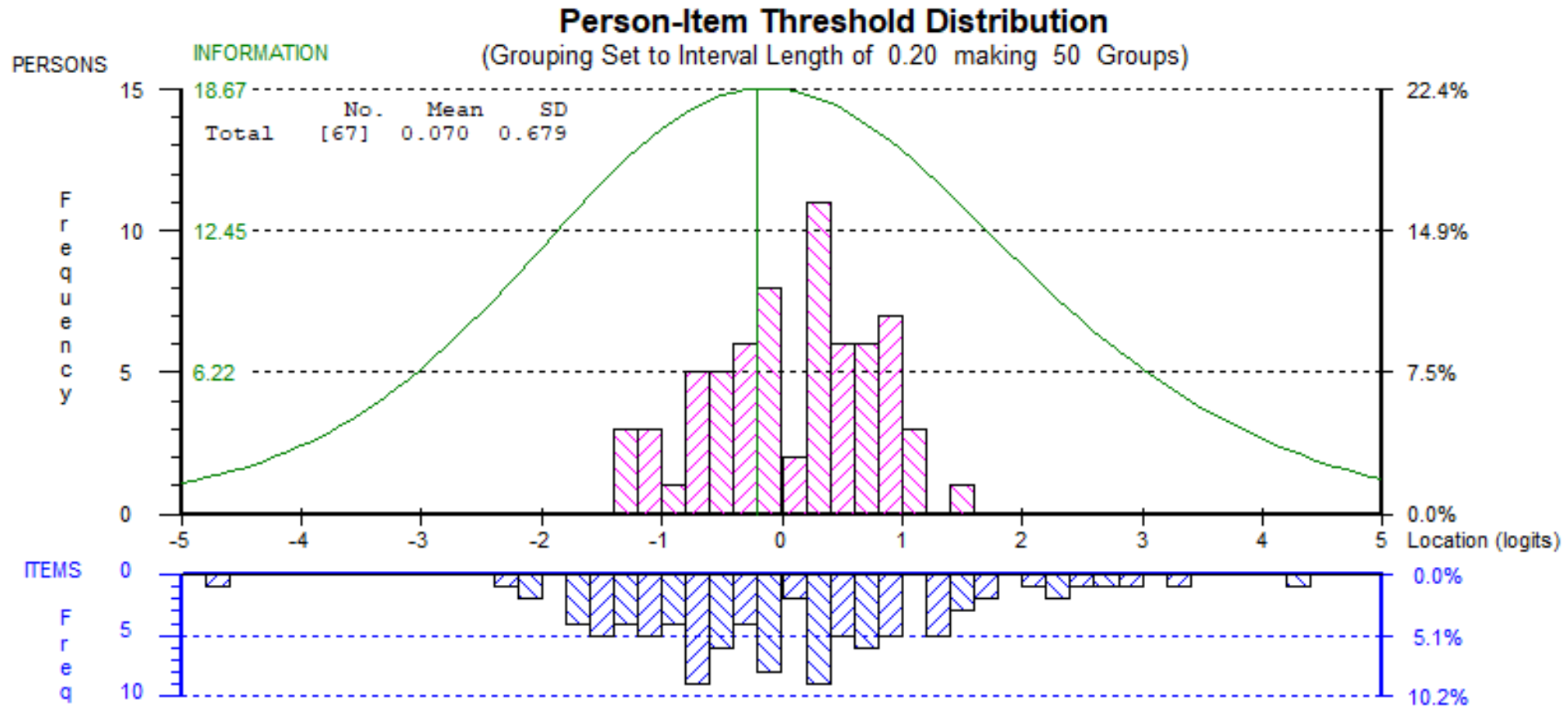


4/10
Fail

Rasch Scale

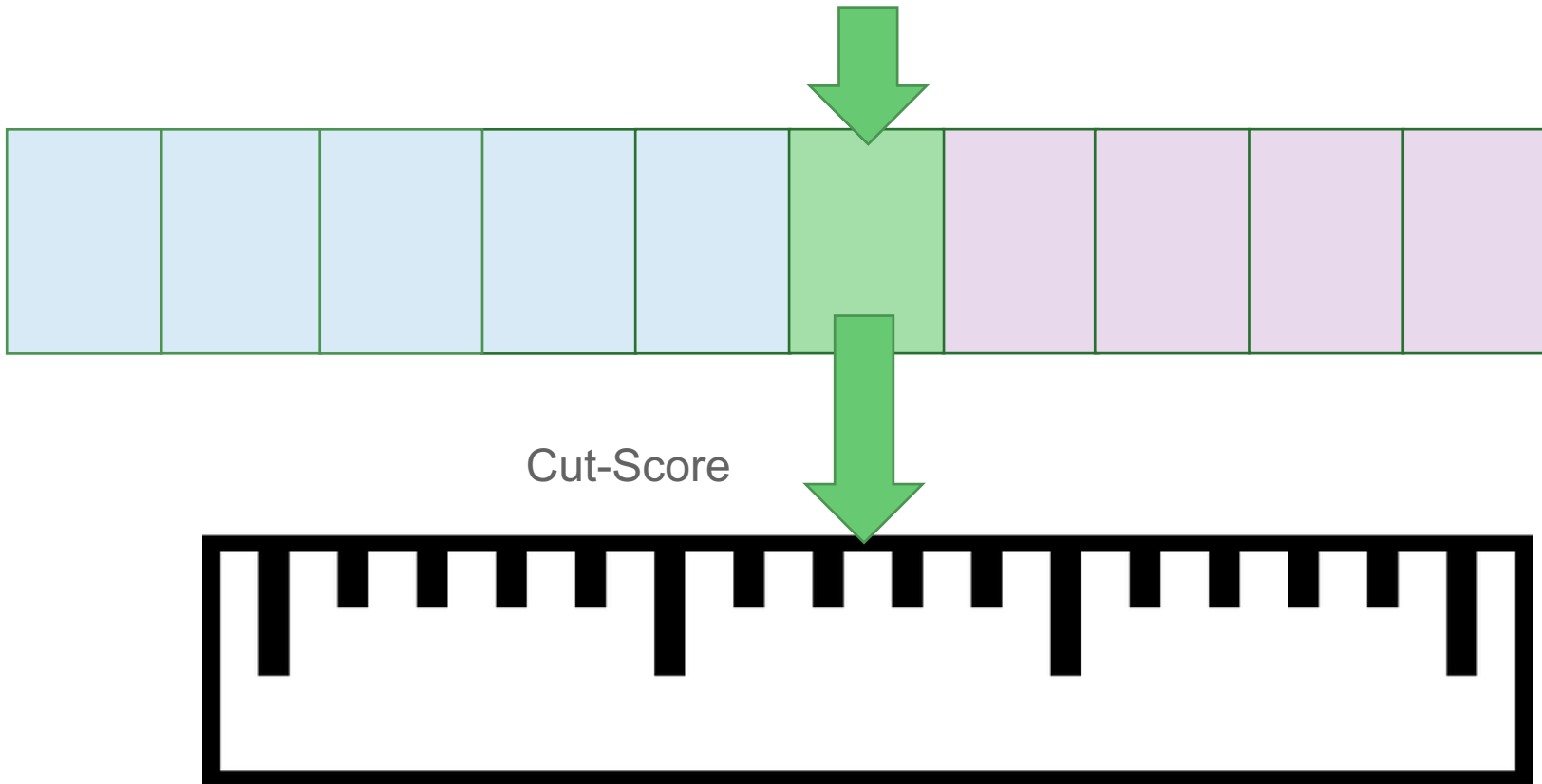


Rasch Modelling

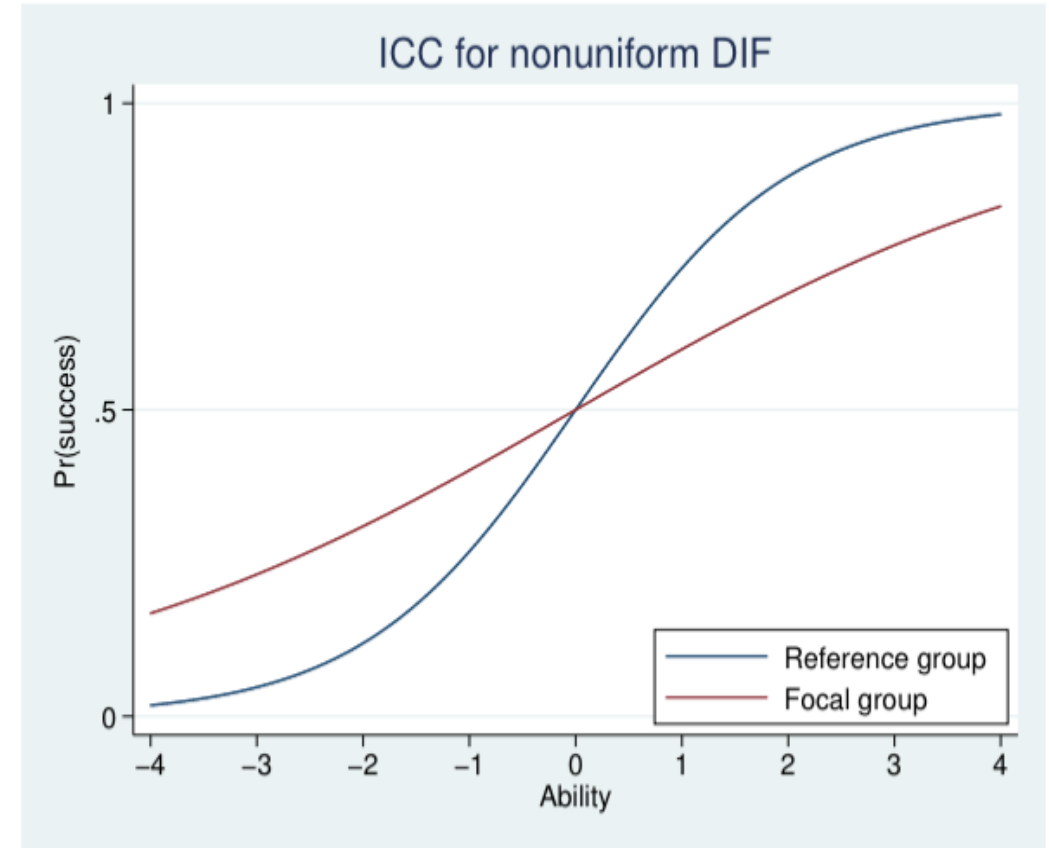
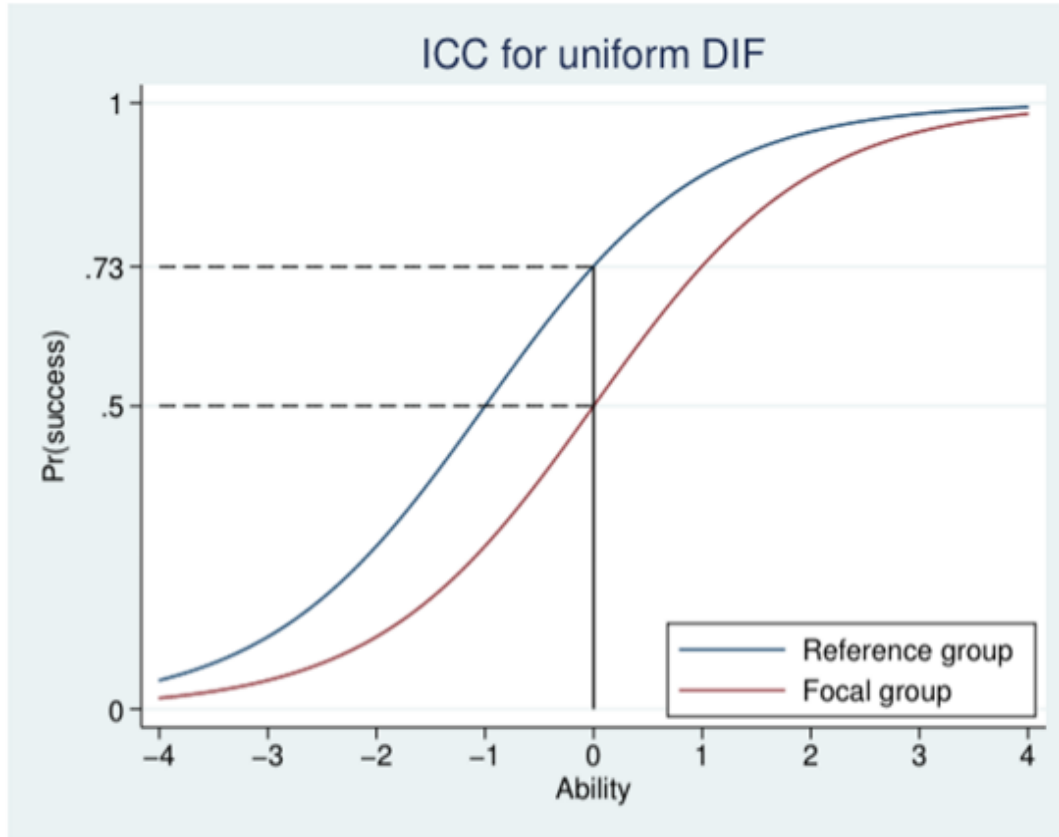


Standard Setting – Cut-Score

Minimally proficient candidate can answer questions of this level of difficulty and below more often than not



Example Analysis - DIF



Improvement - Phase 1

- Purchase and implemented ExamDeveloper
 - Controls the workflow external subject matter experts
 - Permits storage of classical and IRT statistics
 - Permits selection of items and construction of examinations based on statistics gathered from previous examinations and or trials
- Purchase and Implementation of RUMM2030 software
 - Permits graphical and statistical analysis required for Rasch modelling approach
- Excel add-ons and complex spreadsheet analysis

Issues

- Small team fully occupied **even busier**
- Little time to review and improve examinations **able to review individual questions**
- Large effort required for annual reporting **no change**
- Stuck in Classical Item Testing model **no change**
- Need for greater assurance at Board and Executive level of:
 - integrity
 - confidentiality
 - availability
 - defensibility **no change**
- No time for innovation **no change**

Improvement - Phase 2

- Purchase and implemented Stata
 - Produced results in standard format
 - Built in error checking
 - Calculated Classical Statistics
 - Permits selection of items and construction of examinations based on statistics gathered from previous examinations and or trials
 - Automated production of input files for Rumm2030
- Ran results in parallel to legacy system
 - Ensured integrity of resulting practice to level of previous system
 - Increased faith in new system within team
- Used Word function in Stata to automate production of annual reports
 - Greatly reduced time involved

Example Resulting Program Components

- Task 1 User Instructions
- Task 2 Adds fields to answer sheet
- Task 3 Check of Scored items (Saves scores for Item Analysis)
- Task 4 Create Sub-scores and Percentages
- Task 5 Calculates Pass/Fail
- Task 6 Calculates Moderation Recommendations (Saves first set of results)
- Task 7 Classical Item Analysis for each paper
- Task 8 Rasch Analysis

Typical Code

```
keep Score APCID QuestionNumber
reshape wide Score, i( APCID) j ( QuestionNumber) string
destring Sc*, replace
egen Total = rowtotal(Sc*)
label var Total "Total Score"
rename ScoreQ* Q*
alpha Q*, item asis
scalar Alpha1A=r(alpha)
matrix A=r(ItemTestCorr)
matrix AT= A'
xsvmat float AT, rownames(QuestionNumber) saving ("c:/CAOPResults/temp/CAOPtempdisc_1A.dta", replace)
use "c:/CAOPResults/temp/CAOPtempdisc_1A.dta", clear
label var questionnumber "Question Number"
rename AT1 disc
label var disc "Discrimination Index"
format disc %4.3f
save "c:/CAOPResults/temp/CAOPtempdisc_1A.dta", replace
```

Example Reporting Code

- putdocx paragraph, halign(center)
- putdocx image "C:\Intern Written Reports Processing\Graphics\NationalTotal.png", width(5)
- putdocx save "C:\Intern Written Reports Processing\Processing\NATIONALS3.docx", replace
- putdocx append "C:\Intern Written Reports \Templates\National Cover.docx" "C:\Intern Written Reports \NATIONALS1.docx" "C:\Intern Written Reports \Templates\Appendix.docx", saving("C:\Intern Written Reports \Reports\NATIONAL.docx", replace)

Output

- 23 individual reports to Universities
- 6 individual reports to Internship Training Providers
- 1 National Summary for the Pharmacy Council Board

Example



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Intern Written Examination 2018 National Report

May 2019



Example

1. Intern Written Examination 2018 Results – Analysis

1.1. Introduction

The Australian Pharmacy Council (APC) has delivered the Australian Intern Written Examination (Written Examination) on behalf of the Pharmacy Board of Australia (PharmBA) since August 2010.

The Written Examination is a 125 multiple-choice-question computer-delivered examination that assesses intern practical pharmacy competence. The examination is national in scope (i.e. does not contain state-specific questions) and covers both community and hospital practice environments. Interns were eligible to sit the Written Examination upon completion of 40% of their approved supervised practice hours. Interns must pass the Written Examination before sitting the PharmBA's oral examination.

The five content areas covered by the Written Examination are based on the National Competency Standards Framework for Pharmacists in Australia 2010.

The content areas covered in the examination are:

- Domain 1 (Professional and ethical practice)
- Domain 4 (Review and supply prescribed medicines)
- Domain 5 (Prepare pharmaceutical products)
- Domain 6 (Deliver primary and preventative health care)
- Domain 7 (Promote and contribute to optimal use of medicines)

The required pass mark for the Written Examination is:

- Overall: minimum pass mark of 65%
- Domain 1: minimum pass mark of 63%
- Domain 4: minimum pass mark of 50%
- Domain 5: minimum pass mark of 63%
- Domain 6: minimum pass mark of 50%
- Domain 7: minimum pass mark of 50%.

This document summarises candidates' performance for the APC's Intern Written Examinations held during calendar year 2018 (February, April, June, August, October and December).

2. Result Summary

1424 candidates sat the Intern Written examination nationally one or more times. Accounting for candidates sitting more than once the total number of candidate attempts nationally was 1543.

Figure 1 shows the pass rate for each Examination.

Figure 1: National Pass Rate for each examination

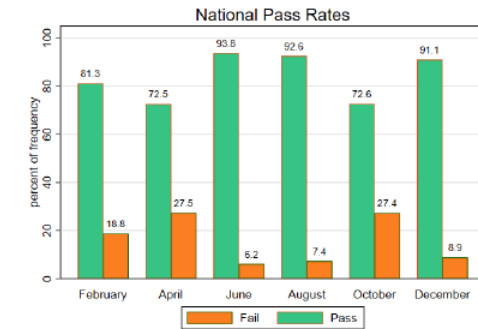
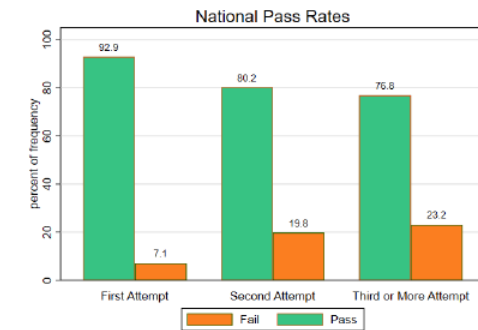


Figure 2 shows the pass rate for first, second and later attempts.

Figure 2: National Pass Rate by Attempt



Issues

- Small team fully occupied **even busier**
- Little time to review and improve examinations **able to review individual questions**
- Large effort required for annual reporting **greatly reduced**
- Stuck in Classical Item Testing model **no change**
- Need for greater assurance at Board and Executive level of:
 - integrity
 - confidentiality
 - availability
 - defensibility **no change**
- No time for innovation **no change**

Systems Review

- provided guidance on data management and improved processes that are reproducible and auditable
- Recommended:
 - keep as much processing in a single application
 - apply Stata's data management facilities to take control of data integrity, auditability and reproducibility
 - use loops and local variables to reduce the risks related to data transfer
 - map drives to allow Stata to access the files on SharePoint directly or to use Stata's webuse features
 - use Stata features to handle missing data

Improvement - Phase 3

- Project 1
 - Demonstrated Classical Item Analysis and Rasch Analysis can be done efficiently in Stata
- Project 2
 - Data Management Framework
 - Data Protocols
 - Data Action Plan

Improvement - Phase 3

- Current Status Project 2
 - Currently being implemented
 - All results are produced from one Stata program
 - In-built data integrity routines
 - Item analysis report generated automatically as results are produced
 - Once set up all records will be filed automatically within structure
 - Annual Reports are generated within 5 minutes once data is available

Issues

- Small team fully occupied **still busy but now manageable**
- Little time to review and improve examinations **able to review individual questions**
- Large effort required for annual reporting **greatly reduced**
- Stuck in Classical Item Testing **have approval to move to Rasch modelling in 2020**
- Need for greater assurance at Board and Executive level of:
 - integrity
 - confidentiality
 - availability
 - defensibility **Currently implementing Data Management Framework**
- No time for innovation **Bought time for innovation**

The Future

- Computer-adapted tests?
- Rapid Item-Generation?
- Voice of the customer?

Thank you

Contact Details

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