

**PERFORMANCE-BASED ITEM
ANALYSIS FOR PROFILING SKILLS
AND COMPETENCIES FOR
PROGRESS FILES**

Carol Collins

Performance-Based Item Analysis for Profiling Skills and Competencies for Progress Files

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Introduction

The University of Luton has successfully implemented Personal Development Planning (PDP) modules for students on HND 1 and level 1 degree programmes and is in the process of introducing PDP at degree level 2. Computer-based assessment (CBA) at the University contributes to assessment practices and forms a part of the teaching, learning and assessment strategy. CBA is used to deliver approximately 7,000 tests per annum, across a range of disciplines, subjects and levels.

This paper presents the findings of an exploratory item analysis into student performance on two PDP modules and a Scheme¹ module assessed by CBA. The purpose is to investigate if CBA holds the potential to fulfil a diagnostic function over and above its role in summative assessments.

Tracking progress, monitoring performance and measuring improvement over time forms a critical part of a personal development plan. The reporting functionality of most CBA software generates data that can inform on the performance of candidates and the educational validity of test items.

The focus of this study is on the performance of stronger and weaker candidates on test items across differing question *types*. The underlying notion being that different question *types* might measure or signal a particular cognitive skill or competency level. With this in mind one might reasonably expect weaker candidates to perform at the lower cognitive levels and that maybe this is reflected in their performance on certain question *types*, as compared to the performance of stronger candidates on the same test items.

Methodology

Three computer-based assessments were selected from a bank of CBA tests, chosen to comprise either PDP modules or modules of a similar nature, giving a generic² like quality to the question and test database. This is important when considering building databases of test items for use in adaptive tests for PDP type assessments with test items calibrated for use at varying levels.

¹ Module chosen by the student from outside of the subject area studied

² The term generic is used in the loose sense of the word. PDP tests measure general skills and competencies, which may be transferable – but are constructed to be relevant to the subject or topic area.

Two of the tests chosen for the study (1,2, below) follow consecutively and are level 1 students on different programmes. These tests can be used for further research for pre and post testing evaluations (if students progress to next level). Test (3) was included as scheme modules are chosen from outside of the subject area studied. Therefore, student motivation is likely to be more intrinsic and test items less subject bound, giving the potential for interdisciplinary sharing or pooling of test items.

Details of the examinations selected are as in table 1, below:

Module	Subject	Level	Students	No of questions	Question types
(1) PDP	Information Systems	HND 1	90	44	MC, MR, HS
(2) PDP	Information Systems	1	124	44	MC, MR, HS
(3) Scheme	Psychology	1	111	46	MC, MR, HS, Selection

Table 1: Examination Details

Question analysis

The CBA software used in this study has the capability of generating various statistics, which are used to determine the effectiveness of test items to improve test validity and reliability. The question types used in these examinations were as follows:

- Multiple-choice (MC) - Presents the question wording and (normally) 4 options or choices from which the candidate selects 1 answer or solution. Often termed any one from four.
- Multiple Response (MR) – Presents the questions wording and a range of options. The candidate may select one or more answer or responses. Therefore, it is possible to either increase or decrease the ratio of correct to incorrect responses from the norm of 1:4.
- Hot Spot (HS) – Presents the question wording and a marker that the candidate is required to move to an area on the screen. This is a very powerful and visual orientated question type. It is mostly used to display graphical information. An area of the screen is designated as the correct location for a score.
- Selection (Sel) – Presents the question wording and a drop-down list of options from which the candidate selects one from the list of options. The number of items in the list may vary. Typical selection questions will have a ratio of 1:6. They are used for matching or ranking questions and are therefore compound question types.

Initially, a report for each of the exams was generated, giving the rank-order of students, based on the average score as a percentage of the maximum score achievable.

The top and bottom scoring 20% of candidates were then selected and banded into two groups, one comprising the stronger candidates and the other the weaker candidates. A question analysis report for each group was generated (appendix 1,2,3) to include statistics on:

- Average score
- Facility
- Discrimination

The average score per group, per item, was generated in the CBA software and exported to EXCEL. The difference was calculated to identify one groups' performance across each of the questions on the exam to highlight any differences that may need further investigation or more in-depth breakdown of question, answer and distracters to explain the phenomena.

Facility is the level of difficulty of a question. The facility scores were taken to help identify if certain question *types* proved easier or harder to answer than others. The facility scores were generated in the CBA software, which calculates the average score for the question divided by the maximum achievable score. This was transposed into percentages and expressed in terms of *low*, *mid* or *high* difficulty level, taking 70% or above as indicating a *low* level and 30% and below as indicating a *high* difficulty level for each of the questions. An in-between score was classified as a *mid* level difficulty question. This helps to inform on the validity of the item and reliability of the examination.

The CBA software calculates discrimination using the standard Pearson product-moment correlation.³ Discrimination is the statistical correlation of the question and score and the overall test score, which helps to measure the capability of the item to distinguish between stronger and weaker students. This is used to help gauge the value of the test item to see if certain question *types* proved easier than others.

³ For further details of this method and others see: Mhairi McAlpine (2002), A summary of Methods of Item Analysis, Bluepaper, no 2, CAA Centre. Also see Bull & MckKenna (2001), Blueprint for computer-assisted assessment.

Results

Module (1) HND level exam

This module is a PDP module in information systems. The topics covered in the exam include test items that relate to presentation skills, research skills, computer search skills, database systems, library and learning resources, writing skills and technical manual writing. The table below shows the performance of the total students and the breakdown between top and bottom scoring candidates. The percentage pass mark for this exam is not known.

	Total Students	Top Students	Bottom Students
Number	90	18	18
Average Score	52%	66%	39%

Table 2: Total students and top and bottom 20%

There were 44 questions in the examination. The questions were predominantly aimed at the knowledge level of Bloom's taxonomy.

The average scores identified one incident where the bottom group scored more than the top group. This was on a multiple-choice question. Further investigation revealed the following information. The item was classified as a 'high' difficulty level and had a negative discrimination score of -0.9. This would indicate that this question has a poor correlation with the test score. This means that candidates' performance on this item is not indicative of their performance for the entire test. A further breakdown of the question into the responses for each option reveals that the difference was in fact only one response. Also there was a strong distracter (option 1) and it is unusual to have only 3 options in an MCQ question, so the students may have guessed. This question should be revised to contain at least 3 distracters.

Options	Top group	Bottom Group
1	61% (11 responses)	39% (7 responses)
2	17% (3 responses)	28% (4 responses)
3 Correct answer	22% (4 responses)	33% (6 responses)

Table 3: Multiple-choice question split by option chosen

The chart in figure 1 shows the breakdown of question types used in the exam. Overall, there were 44 questions. There were 32 multiple-choice questions, 9 multiple response and 3 hot spots. The numbers inside the bars are the facility figures. They are the average of the top and bottom 18 students' scores on those particular question types. Some questions, such as multiple response questions had a maximum achievable score of more than one. Therefore facility was used to enable a comparison across question types.

(1) PDP HND Information systems

This chart gives the facility score per question type

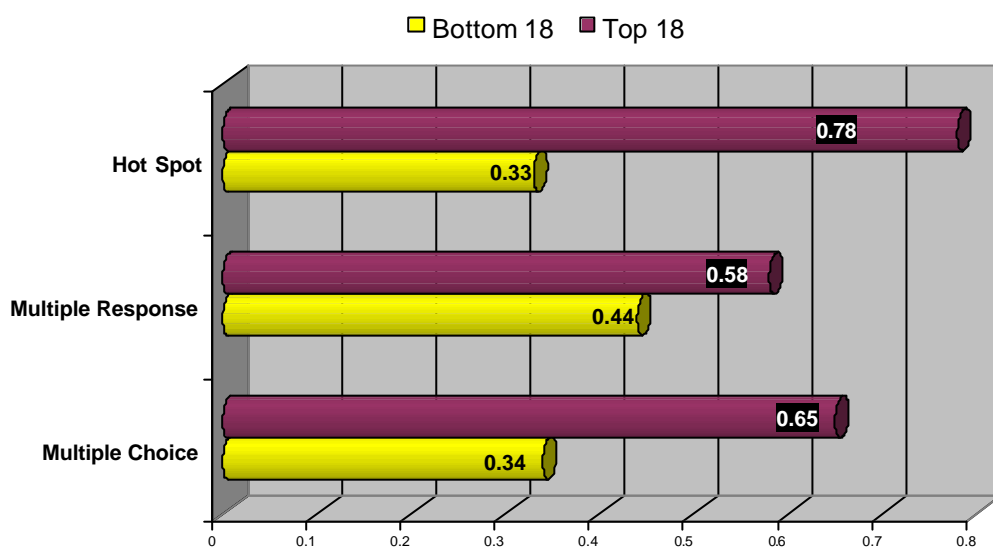


Figure 1: Breakdown of facility score, per group, per question type.

The chart above indicates that the performance of the students on hot-spot questions proved the most powerful in discriminating between the stronger and weaker students. The hotspots questions used in this examination required the candidates to move a marker onto a designated area, which contained text. In this examination multiple-choice questions also function to discriminate between stronger and weaker candidates.

Module (2) PDP Information Systems

This examination is the next level of the PDP examination for information systems. Topics in this examination are the same as the previous one. The questions are assessing knowledge but require more subject specialist knowledge. To answer these questions the students require more detailed and intricate understanding of the subject. The profile of the examination is as below:

	Total Students	Top Students	Bottom Students
Number	120	24	24
Average Score	57%	72%	44%

Table 4: Total students and top and bottom 20%

The overall performance of both groups of students on this test was higher than the previous test, with the top and bottom overall difference remaining approximately the same.

The chart produces a similar profile to the last examination across the question types. The performance of students taking this test shows that although the difference between multiple-choice remains the same, the gap between hotspot scores has lessened and likewise with the multiple response questions. The breakdown of the question types is on the chart as below:

(2) PDP Information systems

This chart shows the facility score per question type

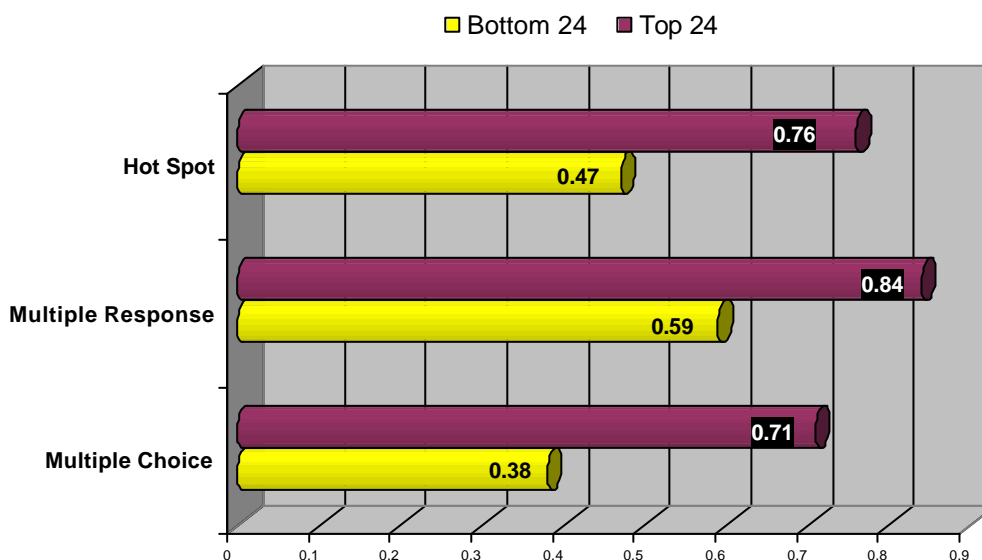


Figure 2: Breakdown of facility score, per group, per question type.

There was one incident of where the discrimination had a negative index (appendix 2, q22). Although this is a high difficulty level question it cannot be taken as a predictor of performance of a candidate across the entire exam. On investigation the following table provides a breakdown of the question by times chosen.

Options	Top group	Bottom Group
1	50% (12 responses)	42% (10 responses)
2	21% (5 responses)	42% (10 responses)
3	21% (5 responses)	8% (2 responses)
4 Correct answer	8% (2 responses)	8% (2 responses)

Table 5: Multiple-choice question split by option chosen.

Scheme Module

This module is a scheme module for everyday psychology at degree level 1. The topics covered in the exam include test items that relate to cognitive processes, psychological effects, emotions, everyday relationships and statistics on probability.

The questions appear to be designed to test a range of cognitive skills on the basis of Bloom's (1956) taxonomy of cognitive skills. Thus, some questions are assessing: knowledge, comprehension, application analysis and synthesis. This is achieved through using a variety of question *types* and the inclusion of detailed case studies and scenarios.

The overall profile is as follows:

	Total Students	Top Students	Bottom Students
Number	111	22	22
Average Score	54%	70%	39%

Table 5: Total students and top and bottom 20%

The examination contained 47 questions of which 25 were Multiple-choice, 13 were Multiple responses, 2 were hot spots and 7 were selection questions. The marking scheme was therefore more complex than the two previous examinations used in the study.

In the chart below scores are calculated using facility to enable comparison. Therefore, the figures in the bar may be seen as representing scores from a maximum achievable of 1 per question.

(3) Scheme Module

This chart shows the facility score per question type

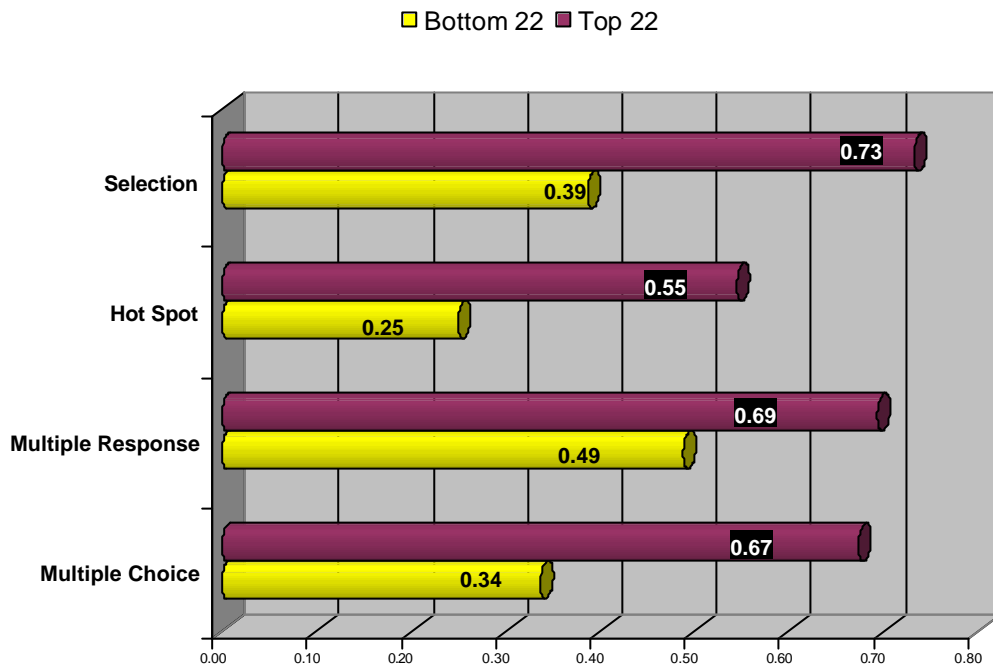


Figure 2: Breakdown of facility score, per group, per question type.

The chart above shows that the top and bottom group performed to their levels with no one particular question type proving more difficult than the other. The multiple response questions proved the least effective at discriminating between candidates.

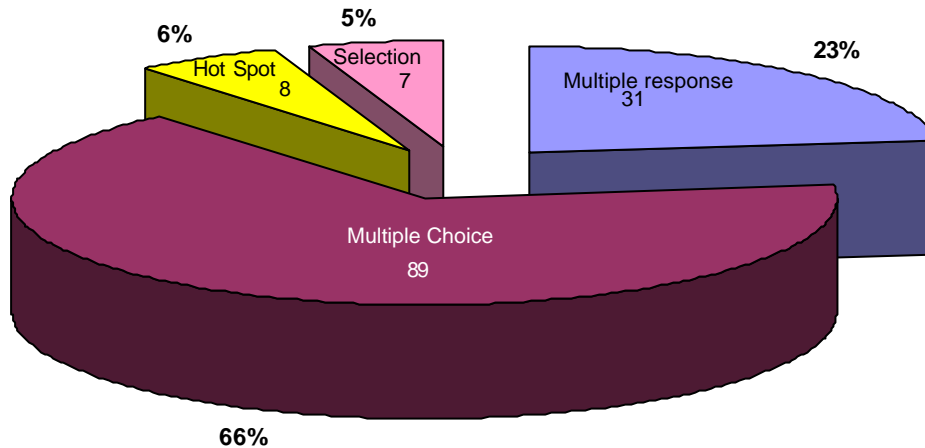
Conclusions

The study informs on test item design and test construction as much as it does on the performance of students and cognitive skills on the range of question types. It is a preliminary and exploratory study and the work into the use of CBA for PDP is ongoing. The examinations chosen did not fully cover the range of question types. On reflection, it would have been better to have taken the full range of question types across many CBA examinations, rather than concentrating on the PDP modules or on a particular number of examinations. However, as PDP and CBA form an integral part of what we do at Luton this is an interesting study in its own right. If we first briefly consider test design, we can then discuss the implications for the strategic use of CBA for PDP module assessment and how it could be used as a diagnostic and evaluative tool.

The chart below shows the breakdown of question types used in these examinations

Question Types Total

This pie chart shows the combined totals of question types for the 3 exams.
The total number of questions for each group per segment



This indicates that although there is an over reliance on multiple choice type questions, they do form a vital part of tests and play a valid part in assessment. As the scheme module indicates multiple choice question types can be utilised at varying cognitive levels (as in relation to Bloom's (1956) taxonomy) if used innovatively. Equally, in the consecutive PPD modules, although knowledge driven, it is clear that there can be a qualitative difference in the knowledge being assessed at different levels.

What does this mean for the CBA practitioner constructing tests?

Reports generated can inform the practitioner on the validity and reliability of the CBA tests. The initial findings suggest that there are a few things that could help improve the calibre of test items.

- Multiple response and selection type questions must be carefully constructed to avoid making too hard or easy by constructing questions with a higher ratio of correct to incorrect responses of less than 1:4.
- Hot spot questions are visually orientated and this may be a feature to exploit in relation to students preferred learning styles. It could be that the action of using the mouse to place a marker makes students more focussed on the question.*
- Test construction needs to be carefully considered to include a range of question types. Some questions types offered by the functionality of the software were not utilised at all in these examinations and should be exploited to full potential to give as varied a choice of question as possible.
- Multiple-choice questions can equally assess different levels of understanding, cognitive skills or competency if used innovatively.
- It should be investigated to see if there is any value in tagging questions in line with Blooms (1956) taxonomy so that students can identify where they are at the moment and work towards achieving the next level.
- It should be investigated if it is worthwhile calibrating items and tagging questions into high, mid or low difficulty levels based on corpus of test takers results so that

practitioners and students can see where they are in statistical terms in relation to their peers without identifying specific candidates.

- Sharing or pooling of resources should be considered across disciplines for the more generic type areas of study including research skills, IT skills, Information systems skills etc.

* Practitioners should be aware of disability issues as required by SENDA legislation (2000).

Further work

Further work is required into the validity and practicalities of using the reporting function of CBA to inform the students on test results, but if developed into a component of PDP, it does hold the potential for students to:

- Use the feedback from the reports to inform on their performance on certain question types, skill levels, competencies
- Track progress over time by keeping quantitative data and reports in a personal portfolio
- Measure performance against other groups or bands of students over a given time scale
- Analyse responses to individual questions, looking at the breakdown of correct responses per test item
- Build a profile of their skills and competencies as indicated by their performance on PDP type modules
- Use this information as the basis or substance upon which to formulate action plans, analyse and reflect upon skills and competencies that they have acquired or lack as measured by the CBA tests.

In conclusion, CBA has a contribution to play in the assessment of PDP. It has the potential to offer a transparent and effective means of measuring performance. It can be used for formative, summative, diagnostic and ipsative measurements of performance. But this aspect has yet to be exploited fully and needs to be developed. It could, for instance be used to assess many different qualitative aspects of the learning process in addition to the quantitative data generated by CBA tests.

CBA is a popular form of assessment with practitioners and students. In part, this may be due to the benefits of automated marking, and in part attributable to the role of objective tests in measuring student learning. Whatever the motivation, the student learning experience is enriched by the use of varied assessment practices, including the strategic use of objective tests and CBA as a valid educational and assessment tool.

Recommendations

- The building of item banks with calibrated test items for difficulty level suitable for adaptive types testing, so that students take a test tailored to their level of understanding and skills
- The sharing or pooling of resources for interdisciplinary use for PDP modules

- Further research into question types across the bank of CBA examination to determine if some questions do discriminate better than others as suggested by the hot spot question is this study
- Use specially designed CBA tests designed around the PDP modules to include questionnaires on preferred learning styles, attributes, aptitudes, abilities, qualities and career orientated tests.

References

Bloom BS, (1956) with Englehart, Furst, Hill, and Krathwohl, *Taxonomy of educational objectives, Cognitive Domain*, Longmans, New York.

Bull, J & McKenna (2001), *Blueprint for computer-assisted assessment*, CAA Centre for HEFCE.

McAlpine, Mhairi, (2002), *A summary of methods of item analysis*, Bluepaper, number 2, CAA Centre, for HEFCE.

Question Mark Computing, Designer for Windows, User manual, version 2.

Appendix 1

PDP HND	Q - Type	Average score		Difference	Item Difficulty		Discrimination	Max score
		Bottom 18	Top 18		Facility	Difficulty		
q1	mr	1.72	2.22	0.5	0.66	mid	0.3	3
q2	mr	2.06	2.5	0.44	0.76	low	0.27	3
q3	mc	0.33	0.33	0	0.33	mid	0.01	1
q4	mc	0.11	0.44	0.33	0.28	high	0.27	1
q5	mc	0.33	0.83	0.5	0.58	mid	0.35	1
q6	mc	0.06	0.39	0.33	0.22	low	0.24	1
q7	mc	0.28	0.56	0.28	0.42	mid	0.2	1
q8	mc	0.33	0.33	0	0.33	mid	0.12	1
q9	mc	0.5	0.94	0.44	0.72	low	0.39	1
q10	mc	0.06	0.44	0.38	0.25	high	0.29	1
q11	mc	0.22	0.67	0.45	0.44	mid	0.4	1
q12	mc	0.11	0.56	0.45	0.33	mid	0.33	1
q13	mc	0.28	0.67	0.39	0.47	mid	0.36	1
q14	mc	0.11	0.56	0.45	0.33	mid	0.31	1
q15	mc	0.39	0.78	0.39	0.58	mid	0.3	1
q16	mc	0.11	0.17	0.06	0.14	high	0.06	1
q17	mc	0.06	0.11	0.05	0.08	high	0.13	1
q18	mr	1.39	1.83	0.44	0.54	mid	0.24	2
q19	mc	0.78	1	0.22	0.89	low	0.25	1
q20	mr	1.28	1.56	0.28	0.47	mid	0.21	2
q21	mr	0.56	1.17	0.61	0.43	mid	0.31	2
q22	mc	0.22	0.44	0.22	0.33	mid	0.22	1
q23	mc	0.06	0.39	0.33	0.22	high	0.35	1
q24	mc	0.17	0.44	0.27	0.31	mid	0.21	1
q25	mc	0.61	0.89	0.28	0.75	low	0.36	1
q26	mc	0.89	1	0.11	0.94	low	0.15	1
q27	mc	0.28	0.22	-0.06	0.25	high	-0.1	1
q28	mc	0.44	0.72	0.28	0.58	mid	0.22	1
q29	mc	0.11	0.67	0.56	0.39	mid	0.42	1
q30	mc	0.39	0.89	0.5	0.64	mid	0.38	1
q31	mc	0.44	0.83	0.39	0.64	mid	0.32	1
q32	mr	1.72	2.06	0.34	0.63	mid	0.26	3
q33	mc	0.44	0.89	0.45	0.67	mid	0.29	1
q34	mc	0.33	1	0.67	0.67	mid	0.49	1
q35	mc	0.72	0.89	0.17	0.81	low	0.11	1
q36	mr	0.72	1.61	0.89	0.58	mid	0.44	2
q37	mr	0.89	1.17	0.28	0.51	mid	0.13	2
q38	mc	0.39	0.94	0.55	0.67	mid	0.45	1
q39	mc	0.39	0.83	0.44	0.61	mid	0.26	1
q40	hs	0.61	0.94	0.33	0.78	low	0.27	1
q41	mr	1.5	1.72	0.22	0.54	mid	0.13	3
q42	hs	0	0.61	0.61	0.31	mid	0.4	1
q43	mc	0.78	1	0.22	0.89	low	0.18	1
q44	hs	0.39	0.78	0.39	0.58	mid	0.21	1

Appendix 2

PPAD	Q - Type	Average score		Difference	Item Difficulty		Discrimination	Max Score
		Bottom 24	Top 24		Facility	Difficulty Level		
q1	mc	0.42	0.92	0.5	0.67	mid	0.58	1
q2	hs	0.79	0.79	0	0.79	low	0.04	1
q3	mr	1.71	2.38	0.67	0.68	mid	0.58	3
q4	hs	0.08	0.62	0.54	0.35	high	0.58	1
q5	mc	0.58	1	0.42	0.79	low	0.47	1
q6	hs	0.54	0.88	0.34	0.71	low	0.36	1
q7	mc	0.29	0.62	0.33	0.46	high	0.32	1
q8	mr	1.92	2.5	0.58	0.74	low	0.49	3
q9	mr	1.92	2.71	0.79	0.77	low	0.54	3
q10	mc	0.29	0.67	0.38	0.48	mid	0.42	1
q11	mc	0.54	0.88	0.34	0.71	low	0.39	1
q12	mc	0.21	0.29	0.08	0.25	high	0.22	1
q13	mc	0.17	0.33	0.16	0.25	high	0.15	1
q14	mc	0.08	0.58	0.5	0.33	mid	0.58	1
q15	mc	0.62	0.92	0.3	0.77	low	0.34	1
q16	mc	0.17	0.67	0.5	0.42	mid	0.59	1
q17	mc	0.5	0.71	0.21	0.6	mid	0.31	1
q18	mc	0.08	0.62	0.54	0.35	mid	0.54	1
q19	mc	0.21	0.67	0.46	0.44	mid	0.54	1
q20	mc	0.29	0.79	0.5	0.54	mid	0.47	1
q21	mc	0.62	0.83	0.21	0.73	low	0.19	1
q22	mc	0.12	0.25	0.13	0.19	high	-0.13	1
q23	mc	0.04	0.38	0.34	0.21	high	0.45	1
q24	mr	1.38	2.08	0.7	0.58	mid	0.51	2
q25	mc	0.71	1	0.29	0.85	low	0.4	1
q26	mr	1.33	1.5	0.17	0.47	mid	0.2	2
q27	mr	0.92	1.29	0.37	0.55	mid	0.26	2
q28	mc	0.25	0.58	0.33	0.42	mid	0.35	1
q29	mc	0.08	0.08	0	0.08	high	0.04	1
q30	mc	0.54	0.71	0.17	0.62	mid	0.17	1
q31	mc	0.42	0.92	0.5	0.67	mid	0.56	1
q32	mc	0.67	1	0.33	0.83	low	0.5	1
q33	mc	0.46	0.46	0	0.46	mid	0	1
q34	mc	0.25	0.54	0.29	0.4	mid	0.36	1
q35	mc	0.42	0.88	0.46	0.65	mid	0.54	1
q36	mc	0.71	0.96	0.25	0.83	low	0.39	1
q37	mc	0.54	0.88	0.34	0.71	low	0.39	1
q38	mr	1.29	2.08	0.79	0.56	mid	0.48	2
q39	mc	0.42	0.96	0.54	0.69	mid	0.57	1
q40	mc	0.46	0.92	0.46	0.69	mid	0.52	1
q41	mc	0.58	0.75	0.17	0.67	mid	0.16	1
q42	mr	1	1.67	0.67	0.67	mid	0.6	2
q43	mr	0.83	1.29	0.46	0.53	mid	0.37	2
q44	mc	0.46	1	0.54	0.73	low	0.57	1

Appendix 3

Report3 Sch Module	Q Type	Average score		Difference	Item Difficulty		Discrimination	Max score
		Bottom 22	Top 22		Facility	Difficulty Level		
q1	mr	2.55	3.91	1.4	0.54	mid	0.2	6
q2	mc	2.45	3	0.6	0.91	low	0.19	3
q3	mc	1.32	1.82	0.5	0.52	mid	0.09	3
q4	mc	0.27	0.73	0.5	0.17	high	0.19	3
q5	mc	1.45	3.45	2.0	0.61	mid	0.4	4
q6	mc	1.55	1.55	0.0	0.39	mid	0.02	4
q7	mc	0.91	2.18	1.3	0.39	mid	0.21	4
q8	mr	2.82	4.27	1.5	0.51	mid	0.35	6
q9	mr	4.36	4.45	0.1	0.73	low	0	6
q10	sel	3.27	4.55	1.3	0.65	mid	0.31	6
q11	sel	3.64	7.45	3.8	0.55	mid	0.56	10
q12	hs	0.55	1.77	1.2	0.39	mid	0.29	3
q13	sel	5	9	4.0	0.7	low	0.5	10
q14	sel	3.27	7.77	4.5	0.46	mid	0.43	12
q15	mc	1.45	2.23	0.8	0.46	mid	0.27	4
q16	mc	1.77	2.32	0.6	0.68	mid	0.08	3
q17	mr	2.91	3.73	0.8	0.55	mid	0.28	6
q18	mc	2.18	3.36	1.2	0.69	mid	0.32	4
q19	mc	0.55	2.36	1.8	0.36	mid	0.23	4
q20	mr	2.73	4.73	2.0	0.62	mid	0.49	6
q21	mc	0.91	2.36	1.5	0.41	mid	0.27	4
q22	mr	2.27	3.09	0.8	0.45	mid	0.18	6
q23	hs	1.27	2	0.7	0.41	mid	0.16	4
q24	mc	2	3.82	1.8	0.73	low	0.4	4
q25	mr	3.95	5.86	1.9	0.55	mid	0.2	9
q26	mc	0.95	2.86	1.9	0.64	mid	0.56	3
q27	mr	3.82	4.73	0.9	0.71	low	0.34	6
q28	mr	4	6.82	2.8	0.68	mid	0.54	8
q29	mr	4.5	7.09	2.6	0.64	mid	0.45	9
q30	mc	1.45	3.09	1.6	0.57	mid	0.22	4
q31	mc	1.23	2.45	1.2	0.61	mid	0.25	3
q32	mc	0.41	2.05	1.6	0.41	mid	0.46	3
q33	mc	0.73	1.64	0.9	0.3	high	0.25	4
q34	sel	3.82	11.88	8.1	0.62	mid	0.67	12
q35	mc	0.68	2.05	1.4	0.45	mid	0.28	3
q36	mc	1.23	2.59	1.4	0.64	mid	0.31	3
q37	mr	1.64	2.55	0.9	0.35	mid	0.29	6
q38	mc	0.27	1.23	1.0	0.41	mid	0.34	3
q39	mc	0.73	2.73	2.0	0.43	mid	0.42	4
q40	mc	1.09	2.45	1.4	0.59	mid	0.32	3
q41	mc	1.64	2.45	0.8	0.68	mid	0.18	3
q42	mc	0.91	1.82	0.9	0.34	mid	0.18	4
q43	sel	2.5	3.23	0.7	0.48	mid	0.12	6
q44	mr	2.95	4.5	1.6	0.53	mid	0.19	7
q45	mc	0.82	1.64	0.8	0.41	mid	0.13	3
q46	mr	3.73	5.73	2.0	0.79	low	0.46	6
q47	sel	2.29	4.82	2.5	0.45	mid	0.44	8

