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# SCHOOL ADMINISTRATORS' BELIEFS THAT SCHOOL IMPROVEMENTS WERE DUE TO FORMAL SCHOOL REGISTRATION: A RASCH MEASUREMENT

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## Abstract

This paper presents the results of an investigation into the attitudes of School Administrators to the relationship between formal school registration and school improvement. It concerns a mandatory inspection-type registration process for all Non-Government Schools in Western Australia. Part of the aim of this registration process was to help schools improve twelve educational and administrative aspects. These were: (1) School Governance, (2) School Financial Viability, (3) Enrolments & Attendance, (4) Number of Students, (5) Instructional Time, (6) School Staff, (7) School Infrastructure, (8) School Curriculum, (9) Student Learning Outcomes, (10) Care for Students, (11) Disputes and Complaints, (12) Legal Compliance. A questionnaire based on these twelve aspects was designed with five items per aspect (60 items total), conceptually ordered from easy to hard, and given to 110 administrators. It was completed by 65 administrators for a useable, response rate of 59%. The data were analysed with the Rasch model computer program RUMM2030 which accommodated the small numbers by estimating parameters even when some response cell frequencies are zero or low. It does this by re-parameterising the thresholds into principal components (not the factor analysis kind), but components that make up the structure of the threshold parameters where there are data. The frequencies are not used directly, but rather functions of the frequencies are used as the sufficient statistics for these parameters and the thresholds are recovered from these. A unidimensional, linear scale, School Administrators' Beliefs That Actual School Improvements Were Due to Formal School Registration, was created with 48 items. The Person Separation Index of 0.86 was highly satisfactory. The item-trait interaction was 83.76, df=96 with p=0.81 supporting the creation of a unidimensional scale. The results showed that there was a group of items that administrators said were relatively easy to say that actual school improvements were due to formal registration and another group that administrators said were very hard to say that actual school improvements were due to formal registration. This study produced a new Rasch measurement for a key aspect of school improvement. It provides new insight into the policy and practice of school registration.

## INTRODUCTION

In 2004, the Government of Western Australia introduced an inspection-type registration process for Non-Government (Independent) Schools, fulfilling the legislative requirement of a new School Education Act 1999 (Act, Part 4). The government claimed that it would ensure a high quality education for all students in Western Australian, including those students enrolled in Independent Schools (Barnett, 1997). Registration panels were formed to review the registration of independent schools. However, six years later, questions have arisen regarding this school registration process, no one knows whether or not this school registration process is actually helping schools, or even if school administrations believe that it has helped make improvements at their schools (Constable, 2010). There are no published research data from Western Australia in relation to this issue and the Registration Authority in Western Australia has not authorised any research on it. In response to this situation, the present study investigated the attitudes of School Administrators at Non-Government (Independent) Schools in Western Australia to the relationship between formal school registration and school improvement. It considered those attitudes to the following twelve criteria or aspects of school registration: (1) Governance; (2) Financial Viability; (3) Enrolment and Attendance; (4) Number of Students; (5) Time Available for Instruction; (6) Staff; (7) School Infrastructure; (8) Curriculum; (9) Student Learning Outcomes; (10) Levels of Care; (11) Management of Disputes and Complaints; and (12) School Compliance with Written Laws. It further placed these attitudes to the twelve aspects within the context of seven independent variables (gender, school size, school type, school location, qualification, age and seniority).

### The Education System in Western Australia

Education in Western Australia is controlled by the Minister of Education, who is a member of the Government of Western Australia, via the Department of Education, which supervises state or public education and the Department of Education Services, which supervises all non-government education. Schooling is divided into three sections, starting with primary education (primary schools), followed by secondary education (secondary schools or secondary colleges) and tertiary education (Universities and Technical and Further Education Colleges).

Primary education usually begins with two preparatory years, commonly known as the 'kindergarten' and 'pre-primary' years of schooling. These school years serve as an introduction to schooling. Formal learning in primary schools begins in Year One and concludes in Year Seven. (*Late 2011, the WA Minister of Education announced that starting in 2013, year seven would no longer be considered to be part of a student's primary education.)* (Constable, 2011). Secondary education consists of Years Eight to Twelve. Most secondary schools are generally separate institutions to primary schools. There are five universities in Western Australia; Edith Cowan University, Murdoch University, Curtin University, the University of Notre Dame and the University of Western Australia. The University of Notre Dame is the state's only private university (DES, 2010).

Education is compulsory in Western Australia for all children between the ages of six and seventeen. The enrolment of five year olds in pre-primary education is voluntary. *(Late 2011, the Minister of Education announced that beginning 2013, pre-primary education will be compulsory for all five year olds.)* (Constable, 2011) The normal school year for primary and secondary schools is divided into four - ten week school terms, which run from late January until mid-December. A standard week of schooling totals approximately twenty five hours of instructional time. Students enrolled in University or Technical Colleges begin their school year in mid-February and finish in mid-November. Students seeking admission into a university are required to sit a Tertiary Entrance Exam during their twelfth year of schooling. The result of that exam is used to determine a student's Tertiary Entrance Rank and Tertiary Entrance Score, which may determine a student's eligibility for tertiary study. Students having higher level Technical College certificates or/and mature aged students can also at times, depending on previous experiences, gain access to some university programs.

## Sector Schools in Western Australia

Western Australia's education system includes government (public) and non-government (private) sector schools, also known as independent schools. In Western Australia there are about just under 800 government schools and approximately 300 independent schools ranging anywhere from a small community based school to large urban secondary schools and colleges. Approximately 66 per cent of students attend government schools and 34 per cent attend independent schools (Department of Education Services, 2010). Within the independent school sector there are Catholic schools run by the Catholic Education Office, (approx. 18%) and independent schools (approx.16%) which are operated by School Councils that may adhere to certain religious beliefs , such as Protestant, Jewish, Islamic or non-denominational schools and secular educational philosophies such as Montessori or Steiner (Association of Independent Schools of Western Australia, www.ais.wa.edu.au, 2010).

The School Education Act 1999, which governs all aspects of education in West Australia, including the policies and procedures for the registration of non-government schools, recognises a division between non-government schools that belong to a group of registered schools, such the Catholic Education Commission, *(known as 'system schools', see the School Education Act 1999, Part 4)* and those schools that do not belong to a recognised group of schools. Most 'non-system' schools are members of the Association of Independent Schools of Western Australia. This incorporated body advises the Government of Western Australia on non-government school matters and administers the State and Commonwealth funding to non-government schools. The registration of non-government schools, in accordance with the School Education Act 1999 and School Education Regulations 2000, is intended to ensure that all schools meet minimum acceptable education standards (DES, 2010).

## The Process of School Registration

The process of school registration for non-government schools in Western Australia concerns the following seven audit and reporting requirements (DES, 2010):

1. The governing body of the school applying for registration or renewal of registration must submit documentary evidence in the school registration application form;
2. The Western Australia Department of Education Services contracts a panel of consultants to conduct the registration or renewal of registration process;
3. The selected panel completes a desktop audit of the documents provided by the school against the assessment criteria;
4. Evidence assessed through the desktop audit is complemented by observations made during a school visit;
5. The panel analyses the information gathered in relation to the aspects or criteria to make an on-balance judgement on whether the school complies with each of the legislated registration requirements;
6. A report is prepared for the Minister of Education by the panel. It includes recommendations to the Minister about the degree to which the school meets the legislated registration requirements and about the period for future registration; and
7. The Minister of Education considers the report and, if satisfied, the school meets the registration requirements issues a Certificate of Registration.

The following generalised point description serves to further contextualise the above more formal seven steps which were taken from the *School Education Act 1999, Part 4 – Non-Government Schools.*

a) The registration process is managed by the Department of Education Services via the *Office of Non-Government Schools* subdivision.
b) The official registration process is initiated by a letter from the Office of Non-Government Schools requesting the documentary evidence listed as required in the re-registration application.
c) The required documentary evidence, which may be submitted in hard copy or electronically, must be available for a desktop audit at least two weeks prior to the school visit by a panel of consultants.
d) The number of consultants visiting a school and length of their visit is generally dependent upon the school size, e.g. two consultants / one day / 200 students.

e) Schools which were deemed to be highly successful in meeting the required standards for re-registration were given a seven year registration period. Since 2009 that maximum registration renewal period for such schools has been reduced to five years.
f) Schools which struggle or fail to meet the required standards of registration may receive a shorter renewed registration period and be instructed to improve their situation.
g) The exact period or length of registration is dependent upon the recommendation of the Office of Non-Government Schools and the judgement or final decision made by the Minister of Education.

## Research Questions

There are at least two main educational questions which are connected to school improvement through registration with the present study. The first question is: Do School Administrators believe that the school registration process leads to school improvements? And, the second question is: Which aspects of the school registration process lead to school improvements in their opinion? To answer this question, the following sub-questions were posed and these guide the development of 12 questionnaires, the data collection and data analysis.

1. Can a linear unidimensional scale be constructed using a Rasch Measurement Model to measure the attitudes of School Administrators concerning twelve aspects of school registration in relations to the standard of education for students enrolled in non-government schools. These aspects are: (1) governance; (2) financial viability; (3) enrolment and attendance; (4) number of students; (5) time available for instruction; (6) staff; (7) school infrastructure; (8) curriculum; (9) student learning outcomes; (10) levels of care; (11) disputes and complaints; (12) and compliance with written laws.
2. What school improvements are considered to be very easy or moderately easy due to the formal school registration process?
3. What school improvements are considered to be very hard or moderately hard due to the formal school registration process?
4. What is the relationship between the attitudes of school leaders regarding the school improvements and their personal circumstances? The following personal circumstances will be considered; gender, age, school size, school type, school location, qualifications and seniority.
5. What attitudes do school leaders have regarding school improvement and formal school registration that are not addressed by the twelve formal registration criteria?

## Significance of this Study

This study is significant for three main reasons: (1) The re-registration of non-government schools in Western Australia is new and little information about its acceptance in the school communities of Western Australia is available; (2) The re-registration process for non-government schools may need some 'fine-tuning' since it has not been reviewed since implementation; and (3) an 'off-shoot' from the research is the development of a linear measure relating to the 12 aspects of school registration which has not been created before and which may help other researchers in other Australian states.

## Limitations of this Study

There are number of limitations to this study. First, this study is restricted to those school leaders in schools that are members of the Association of Independent Schools in Western Australia. The study ignores systemic independents schools, e.g. the Catholic School Sector. Second, the study does not include the attitudes of several educational stakeholders, such as classroom teachers, students and parents or guardians. The study suggests that school leaders are arguably the key decision-makers in schools (La Pointe, 2006). Lastly the study acknowledges the dynamic nature of school improvement and the changing perceptions of school leaders. School improvement takes time and the attitudes of school leaders are subject to change.

## Data Collection

The study data were collected between 19th March 2011 and the 30th November 2011. There were potentially available 150 non-government member schools of the Association of Independent Schools in Western Australia. One hundred and ten school leaders, constituting approximately 72% of the independent schools, actually completed a questionnaire of administrators' beliefs. Of the 110 participants, only 65 (approximately 59%) completed all twelve parts of the questionnaire and, of those 65, only 60 completed all 120 questions. This left completed data for 60 school administrators based on 60 questions for Actual Beliefs and 60 school administrators for 60 questions based on questions for Expected Beliefs.

## Methodology

The study data were analysed with the computer program Rasch Unidimensional Measurement Models (RUMM 2030) (Andrich, Sheridan & Luo, 2010). Although it is generally considered that Rasch analyses are best done with say 10-20 items and 200+ persons (one cannot estimate item thresholds when some response cells have no data because of insufficient respondents), in the present study, the Rasch analysis was done with many more items (60), but many less persons (60). This was possible because the thresholds were re-parameterised into principal components (not the factor analysis kind), but functions of the threshold frequencies were used as sufficient statistics for those parameters from which the thresholds were recovered readily (see Andrich & Luo, 2003). The standard errors are usually large, as they were in this case.

## Initial Rasch Analysis

In the original data collection, there were four response categories: there was no improvement due to school registration (scored 1); there was some improvement, but it was not due to school registration (scored 2); there was for some improvement due to school registration (scored 3); and there was significant improvement due to school registration (scored 4). The Rasch analysis with this scoring produced disordered thresholds, meaning that the categories were not answered in a consistent and logical way. As a result of this, scoring categories 1 and 2 were combined and re-scored as zero, scoring category 3 was re-scored as 1 and scoring category 4 was re-scored as 2. The Rasch analysis was then continued and the Response (or Scoring) Category Curves then showed that the responses were scored consistently and logically.

Further Rasch analysis revealed that 12 out of 60 items did not fit the Rasch measurement model and these items were deleted through a series of three separate analyses. These were items 2, 4, 18, 22, 26, 40, 44, 46, 76, 84, 90, 100 (see Table 5.1). Though they were initially proposed as content valid, they did not fit the strict requirements of the Rasch measurement model and were therefore deleted before further analysis was continued. The Rasch program does not tell the researcher how to re-word the items so that they fit the measurement model - it only tells the researcher whether the particular wording used for an item produces data that fit the measurement model.

There are several possible reasons why these 12 items did not fit the Rasch model. One reason is that the school administrators did not agree amongst themselves on the difficulty (location) of some items on the Actual School Improvement scale. For example, item 4, *The School Council's appointment and review of management staff*, may have been considered differently, depending on whether the school administrator was a Council Chair or School Principal. Another possible reason for several non-fitting items is the link as to whether the item was strongly influenced by legislative control. For example, item 46, *The number of school days within the school's yearly calendar*, is a pre-determined condition by the Minister of Education and cannot be improved by the school administrator, although it may have been interpreted differently by different school administrators. Also, on re-examining the wording of these non-fitting items, it does appear that some of them, at least, required a clearer description. For example, item 100, *The school's pastoral care program*, appears restrictive and did not include the general notion of 'student support', meaning that it could have been interpreted

differently by different school administrators.

Table 5.1
*Twelve non-fitting items for School Administrators Beliefs That Actual School Improvements Were Due to Formal School Registration*

| No. | Item Wording |
|---|---|
| 2. | The efficiency of School Council meetings actually improved. |
| 4. | The School Council's appointment and review of management staff actually improved |
| 18. | The school's financial risk assessment and analysis actually improved |
| 22. | The daily attendance rate of students at school actually improved |
| 26. | The support of parents for the school's attendance policy and procedures actually improved |
| 40. | The school's student retention rate and tracking system actual improved |
| 44. | The daily instructional times at school actually improved |
| 46. | The number of school days within the school's yearly calendar actually improved |
| 76. | The school's cross-curricular planning and implementation actually improved |
| 84. | The school's use of external tests, e.g. NAPLAN actually improved |
| 90. | The school's learning program for students at risk actually improved |
| 100. | The school's pastoral care program actually improved |

## Final Analysis (N=60, I=48)

### Summary of Fit Statistics

Of the 60 items, 48 items fitted the Rasch model in the final analysis. Table 5.2 is a summary of the fit statistics. It shows the standardized fit residual mean of -0.175 logits with a standard deviation 0.861 logits for the items and a standardized fit residual mean of -0.241 logits with a standard deviation of 0.773 logits for the persons. These are close to the ideal standardized fit residual of mean near zero with a standard deviation near one meaning that the residuals are acceptable and the pattern of responses is acceptable.

Table 5.2 also shows the Cronbach Alpha (0.93) and the Person Separation Index (0.86) for the 48 items. These are constructed essentially in the same way and interpreted in a similar way. However, while Cronbach's Alpha is calculated on the raw response scores, the Separation Index is calculated using Rasch parameter estimates and the standard errors. The maximum value for both the Cronbach Alpha and the Separation Index is 1, and the values of 0.93 and 0.86 are high, indicating that the school improvement measures are reliable and well-separated in comparison to the errors. Based on the Separation Index, the RUMM program rates the overall power of test-of-fit for the 48 items as excellent (see Table 5.2) which means that there is sufficient power to determine any non-agreement amongst the school leaders to the location of the items on the scale.

The item-trait interaction chi-square is 83.763 with df=96 and p.=0.81 (see Table 5.2). This indicates that there is no significant interaction between the responses to the items and the location values along the scale and that there is very good agreement about the item difficulties along the scale. The good item-trait interaction chi-square is an important support for the view that a unidimensional scale has been created because it means that a single parameter for each person (the person measure) and a single parameter for each item (the item difficulty) can be used to accurately predict each person's

response to each item.

Table 5.2
*Summary Statistics of the Rasch-Created Linear Scale of School Administrators Beliefs That Actual School Improvements Were Due to Formal School Registration*

| ITEM-PERSON INTERACTION | | | | |
|---|---|---|---|---|
| | ITEMS | | PERSONS | |
| | Location | Fit Residual | Location | Fit Residual |
| Mean | 0.000 | -0.175 | -4.980 | -0.241 |
| SD | 2.770 | 0.861 | 1.584 | 0.773 |
| Skewness | | 0.888 | | 1.292 |
| Kurtosis | | 0.239 | | 1.869 |
| Correlation | | -0.574 | | 0.297 |
| Complete data df = | | 0.937 | | |

| ITEM-TRAIT INTERACTION | | RELIABILITY INDICES | |
|---|---|---|---|
| Total Item Chi-Square | 83.763 | Separation Index | 0.85765 |
| Total Deg of Freedom | 96.000 | Cronbach Alpha | 0.93274 |
| Total Chi-Square Probability | 0.809324 | | |

| LIKELIHOOD-RATIO TEST | | POWER OF TEST-OF-FIT |
|---|---|---|
| Chi-Square | | Power is EXCELLENT |
| Degrees of Freedom | | [Based on Separation Index of 0.85765] |
| Probability | | |

***Note:***

1.The fit residuals are the difference between the predicted responses from the Rasch Model and the actual responses. When the residuals are standardized and the data fit the Rasch Measurement Model, the fit residuals should have a mean near zero and a SD near 1 (which they have in this case)

2.The item-trait interaction, total chi-square shows the agreement between all the persons to the difficulties of the items along the scale and this is very good (p=0.81). This means that the one parameter can be used for each person (person measure) and one parameter can be used for each item (item difficulty) to accurately predict each person's response to each item.

3.The Separation Index is constructed as the ratio of the estimated true variance among the persons and the estimated observed variance among the persons using the estimates of their locations and the standard errors of these locations. It is interpreted in a similar way to the Cronbach Alpha (Cronbach, 1951). In this case it is very acceptable at 0.86.

## Individual Item-Fit

All 48 items fitted the measurement model with p.> 0.07 (see Table 5.3)

Table 5.3

*Item Difficulties (Locations), Standard Errors (SE), Residuals and Fit to the Measurement for the Linear Scale of School Administrators' Beliefs That Actual School Improvements Were Due to Formal School Registration.*

| Item | Location | SE | Residual | df | Chi-Square | df | Probability |
|---|---|---|---|---|---|---|---|
| 6 | 2.018 | 0.448 | -0.129 | 44.04 | 0.896 | 2 | 0.639 |
| 8 | -2.437 | 0.312 | 0.225 | 44.04 | 0.830 | 2 | 0.660 |
| **10** | -2.655 | 0.300 | -0.464 | 44.04 | 1.441 | 2 | 0.486 |
| **12** | 1.863 | 0.409 | -0.396 | 44.04 | 3.985 | 2 | 0.136 |
| **14** | 2.999 | 0.776 | -0.225 | 44.04 | 1.069 | 2 | 0.586 |
| **16** | 1.987 | 0.447 | -0.613 | 44.04 | 1.307 | 2 | 0.520 |
| **20** | 2.743 | 0.654 | -0.549 | 44.04 | 0.366 | 2 | 0.833 |
| **24** | -2.499 | 0.312 | 1.088 | 44.04 | 3.358 | 2 | 0.186 |
| **28** | 2.611 | 0.555 | 0.005 | 44.04 | 2.560 | 2 | 0.279 |
| **30** | -3.309 | 0.263 | 0.479 | 44.04 | 0.531 | 2 | 0.767 |
| **32** | 2.928 | 1.027 | -0.318 | 44.04 | 0.341 | 2 | 0.843 |
| **24** | 2.928 | 1.027 | -0.318 | 44.04 | 0.341 | 2 | 0.843 |
| **36** | 2.609 | 0.637 | -0.533 | 44.04 | 0.344 | 2 | 0.842 |
| **38** | 2.448 | 0.510 | -1.086 | 44.04 | 0.703 | 2 | 0.703 |
| **42** | -3.464 | 0.257 | 2.266 | 44.04 | 3.083 | 2 | 0.214 |
| **48** | 3.239 | 0.799 | -0.767 | 44.04 | 0.933 | 2 | 0.627 |
| **50** | 3.334 | 0.828 | -1.102 | 44.04 | 1.047 | 2 | 0.593 |
| **52** | 2.154 | 0.447 | -1.057 | 44.04 | 2.169 | 2 | 0.338 |
| **54** | -2.619 | 0.301 | 0.722 | 44.04 | 2.148 | 2 | 0.342 |
| **56** | -1.817 | 0.354 | -0.686 | 44.04 | 1.469 | 2 | 0.480 |
| **58** | 1.912 | 0.511 | 0.136 | 44.04 | 2.464 | 2 | 0.292 |
| **60** | 2.234 | 0.471 | -0.332 | 44.04 | 2.723 | 2 | 0.256 |
| **62** | -3.342 | 0.253 | 0.806 | 44.04 | 1.382 | 2 | 0.501 |
| **64** | -2.296 | 0.315 | 1.235 | 44.04 | 4.553 | 2 | 0.103 |
| **66** | -3.462 | 0.282 | 0.176 | 44.04 | 0.477 | 2 | 0.788 |
| 68 | 3.334 | 0.828 | -1.102 | 44.04 | 1.047 | 2 | 0.592 |
| **70** | 2.806 | 0.649 | -0.708 | 44.04 | 0.357 | 2 | 0.837 |
| **72** | -2.759 | 0.298 | 0.037 | 44.04 | 3.599 | 2 | 0.165 |
| **74** | 3.458 | 0.260 | 1.309 | 44.04 | 2.714 | 2 | 0.257 |
| **78** | -1.767 | 0.355 | -0.298 | 44.04 | 0.303 | 2 | 0.859 |
| **80** | -1.833 | 0.391 | 0.699 | 44.04 | 1.309 | 2 | 0.520 |
| **82** | -2.216 | 0.327 | 1.431 | 44.04 | 6.119 | 2 | 0.047 |
| **86** | 2.323 | 0.478 | -1.192 | 44.04 | 1.335 | 2 | 0.513 |
| **88** | 2.561 | 0.565 | -0.771 | 44.04 | 0.347 | 2 | 0.841 |
| **92** | -2.486 | 0.309 | -0.371 | 44.04 | 1.349 | 2 | 0.509 |
| **94** | 2.489 | 0.574 | -0.935 | 44.04 | 2.299 | 2 | 0.317 |
| **96** | 3.024 | 0.778 | -0.474 | 44.04 | 0.868 | 2 | 0.648 |
| **98** | -3.471 | 0.277 | 0.374 | 44.04 | 2.263 | 2 | 0.323 |
| **102** | 4.023 | 1.276 | -0.854 | 44.04 | 0.713 | 2 | 0.700 |
| **104** | -2.988 | 0.280 | 1.877 | 44.04 | 1.901 | 2 | 0.386 |
| **106** | -1.670 | 0.373 | -0.680 | 44.04 | 1.061 | 2 | 0.588 |
| **108** | 2.942 | 0.756 | 0.364 | 44.04 | 1.011 | 2 | 0.603 |
| **110** | 2.819 | 0.648 | -0.860 | 44.04 | 1.500 | 2 | 0.472 |
| **112** | -2.493 | 0.311 | -0.422 | 44.04 | 0.735 | 2 | 0.692 |
| **114** | -2.019 | 0.322 | -1.637 | 44.04 | 5.242 | 2 | 0.073 |
| **116** | -3.844 | 0.260 | -0.571 | 44.04 | 3.364 | 2 | 0.186 |
| **118** | -2.307 | 0.315 | -0.859 | 44.04 | 1.490 | 2 | 0.475 |
| **120** | -3.118 | 0.273 | -1.318 | 44.04 | 2.318 | 2 | 0.314 |

Notes on Table 5.3

The Difficulty of each item is in logits (the log odds of giving a positive response to an item).

1. SE is standard error in logits.
2. Residual is the difference between the observed and expected response.
3. Probability is based on the chi-square fit to the measurement model and is dependent on sample size.

Table 5.3 has a column that shows the Residuals. These are the differences between the actual response and the response estimated from the Rasch measurement parameters. Standardized residuals are generally expected to be within the range of -2 and +2. Table 5.3 shows that, except for item number 42, all the items have acceptable standardized residuals.

Table 5.3 also has columns showing the chi-square and its associated probability. This is a statistic that is calculated from the discrepancies between the actual item mean and the expected values according to the measurement model. If the probability has a value of less than 0.01, then it implies that the discrepancy between the actual item mean and the expected value is large relative to chance and that item should be examined. There was only one item with a value equal to 0.05. (Item 82, $p$ = 0.05). All other p. values were greater than 0.05.

## Item Threshold Distribution

Table 5.4 shows two thresholds calculated for each item. A threshold is a point between two response categories where there is an equal probability of answering in either category. The first threshold shows the point between response categories '0' and '1', numbered according to the Rasch program, where there is equal probability of responding either '0' or '1'. The second threshold shows the point between categories '1' and '2', numbered according to the Rasch program, where there is equal probability of responding either '1' or '2'. The thresholds are ordered in line with the ordering of the response categories showing that school leaders have answered the response categories consistently and logically.

Table 5.4

*Un-Centralised Item Thresholds for the Linear Scale of School Administrators' Beliefs That Actual School Improvements Were Due to Formal School Registration*

| Item | Location | Threshold Mean | THRESHOLDS 1 | 2 |
|---|---|---|---|---|
| 6 | 2.018 | 2.018 | -2.423 | 6.460 |
| 8 | -2.437 | -2.437 | -3.440 | -1.434 |
| 10 | -2.655 | -2.655 | -4.070 | -1.240 |
| 12 | 1.863 | 1.863 | -2.794 | 6.519 |
| 14 | 2.999 | 2.999 | -.738 | 6.736 |
| 16 | 1.987 | 1.987 | -2.427 | 6.401 |
| 20 | 2.743 | 2.743 | -1.212 | 6.698 |
| 24 | -2.499 | -2.499 | -3.049 | -1.950 |
| 28 | 2.611 | 2.611 | -1.701 | 6.922 |
| 30 | -3.309 | -3.309 | -4.065 | -2.553 |
| 32 | 2.928 | 2.928 | -.012 | 5.869 |
| 34 | 2.928 | 2.928 | -.012 | 5.869 |
| 36 | 2.609 | 2.609 | -1.287 | 6.504 |
| 38 | 2.448 | 2.448 | -1.966 | 6.861 |
| 42 | -3.464 | -3.464 | -4.239 | -2.689 |
| 48 | 3.239 | 3.239 | -.659 | 7.138 |
| 50 | 3.334 | 3.334 | -.565 | 7.233 |
| 52 | 2.154 | 2.154 | -2.428 | 6.737 |
| 54 | -2.618 | -2.618 | -3.591 | -1.646 |
| 56 | -1.817 | -1.817 | -3.048 | -.587 |
| 58 | 1.912 | 1.912 | -1.961 | 5.785 |

*Table 5.4 Cont.*
*Un-Centralised Item Thresholds for the Linear Scale of School Administrators' Beliefs That Actual School Improvements Were Due to Formal School Registration*

| Item | Location | Threshold Mean | THRESHOLDS 1 | 2 |
|---|---|---|---|---|
| 60 | 2.234 | 2.234 | -2.240 | 6.709 |
| 62 | -3.342 | -3.342 | -3.614 | -3.069 |
| 64 | -2.296 | -2.296 | -4.049 | -.543 |
| 66 | -3.461 | -3.461 | -5.056 | -1.867 |
| 68 | 3.334 | 3.334 | -.565 | 7.233 |
| 70 | 2.806 | 2.806 | -1.234 | 6.847 |
| 72 | -2.759 | -2.759 | -4.312 | -1.207 |
| 74 | -3.458 | -3.458 | -4.313 | -2.603 |
| 78 | -1.767 | -1.767 | -3.072 | -.463 |
| 80 | -1.833 | -1.833 | -2.229 | -1.437 |
| 82 | -2.216 | -2.216 | -3.260 | -1.172 |
| 86 | 2.323 | 2.323 | -2.185 | 6.831 |
| 88 | 2.561 | 2.561 | -1.644 | 6.767 |
| 92 | -2.486 | -2.486 | -3.551 | -1.422 |
| 94 | 2.489 | 2.489 | -1.597 | 6.574 |
| 96 | 3.024 | 3.024 | -.731 | 6.780 |
| 98 | -3.471 | -3.471 | -4.937 | -2.004 |
| 102 | 4.023 | 4.023 | .507 | 7.539 |
| 104 | -2.988 | -2.988 | -3.880 | -2.097 |
| 106 | -1.670 | -1.670 | -2.771 | -.569 |
| 108 | 2.942 | 2.942 | -.809 | 6.694 |
| 110 | 2.819 | 2.819 | -1.239 | 6.877 |
| 112 | -2.493 | -2.493 | -4.587 | -.398 |
| 114 | -2.019 | -2.019 | -4.232 | .193 |
| 116 | -3.844 | -3.844 | -5.056 | -2.633 |
| 118 | -2.307 | -2.307 | -4.361 | -.253 |
| 120 | -3.118 | -3.118 | -4.000 | -2.236 |

Figure 5.1 shows the Item Characteristic Curve for item number 10 - The School Council's understanding of the distinction between governance and management was improved due to formal registration. This is a very easy item with which to agree (the location or difficulty is -2.65 logits). The observed means, shown as dots, in the three class intervals are close to the ogive. This shows that the item data fits very well to the theoretical curve of the Rasch model (the chi-square probability of fit is 0.49). It means that the item discriminates between the different measures of the school leaders and that the expected value increases with increasing measures, as specified by the measurement model. The Characteristic Curves for all 48 items were checked and found to be satisfactory.

## Item Characteristic Curve

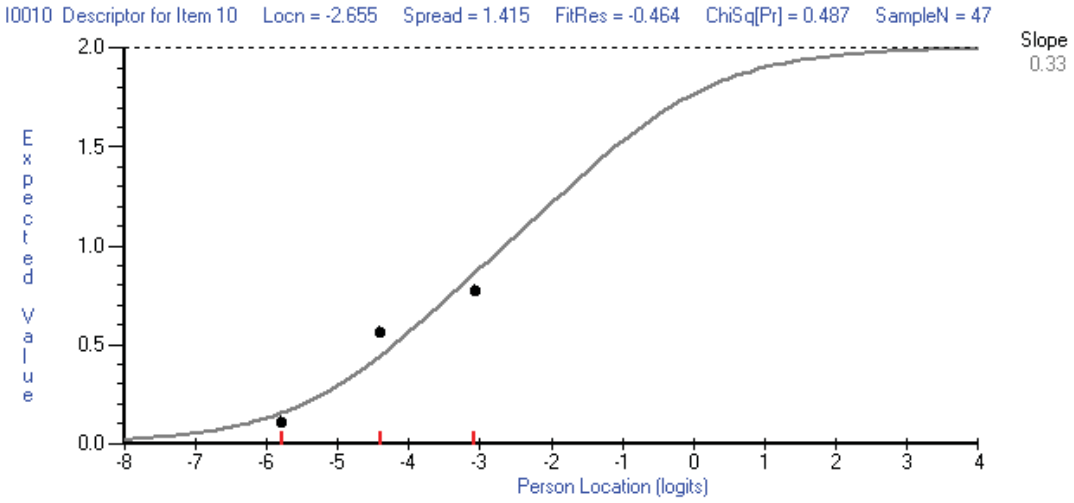


*Figure 5.1* Item characteristic Curve for Item 10 of School Administrators Beliefs That Actual School Improvements Were Due to Formal School Registration

Note on Figure 5.1
This item discriminates well, as specified by the Rasch measurement model.

## Response Category Curves

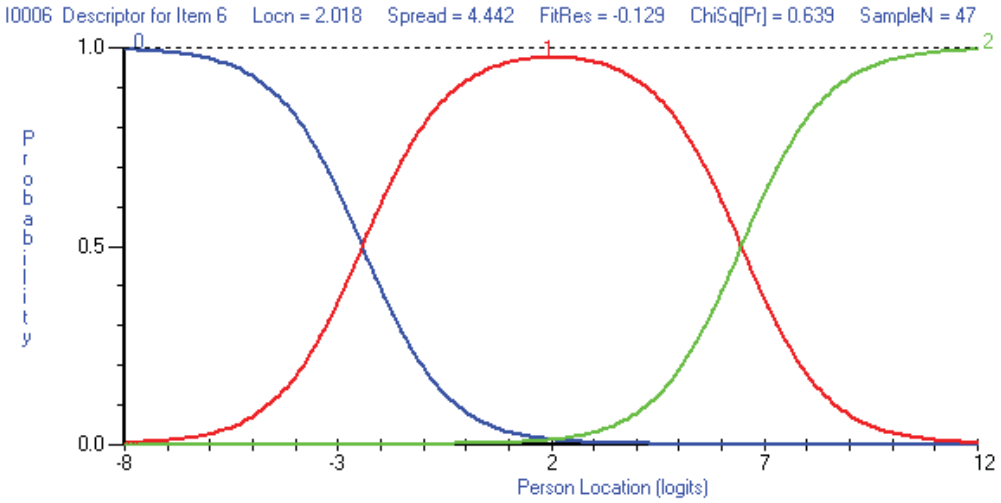


*Figure 5.2* Response Category Curve for Item 6 of School Administrators Beliefs That Actual School Improvements Were Due to Formal School Registration

Figure 5.2 shows the Response Categories Curve for item number 6 - The School Council's community and public relations were improved due to formal school registration. The vertical axis represents the probability of responding in a particular response category and the horizontal axis represents the school leader's location (or measure) in logits. In Figure 5.2, the category 0 response curve indicates that a school leader with a measure of -8.0 logits (Person Location) has a probability of about one of responding in the category (*no improvement due to school registration or improvement but not due to school registration),* whereas a school leader with a measure of +2.0 logits has a near

zero probability of responding in the same category for item 6. The Category 1 curve of Figure 5.2 shows that a school leader with an Actual School Improvement measure of about 2.0 logits has a probability of about 0.99 of responding in the category (*some improvement due to school registration)* for item 6, whereas a school leader with an Actual School Improvement measure of 7.0 logits has a probability of about 0.5 of responding in the same category. Looking at the Category Curve 2, a school leader with an Actual School Improvement measure of +2.0 logits has a probability of near zero of responding in the category *(significant improvement due to school registration)* for item 6, whereas a school leader with an Actual School Improvement measure of 12 .0 logits has a probability of about one of responding in the same category. This shows that the school leaders discriminated logically and consistently using the three response categories for item 6.

When the Response Categories are ordered, it is expected that the boundaries between the Categories should also be ordered. Figure 5.2 shows such a case for the Rasch item number 6 with three ordered categories. The thresholds (T1 and T2), which define the category boundaries are estimated in the model and are ordered. They show the points where the probability of responding either 0 or 1, and 1 or 2 respectively, are equally likely. Item 6, 'The School Council's community and public relations was improved', in the 'what actually happened' perspective, is a hard item (the location is +2.02) and fits the Rasch model moderately well (the chi-square probability is 0.64). The Category Response Curves for all 48 items were checked and they were found to be satisfactory, and operating as they should, when the data fit the measurement model.

## Person-Item Threshold Distribution (Targeting)

Figures 5.3 and 5.4 show the distribution of measures and item thresholds for the 60 school leaders on the same linear scale. The distribution graphs show that there are insufficient persons with very high measures corresponding to the items with very high difficulties and, in any future use of the scale, it would be advisable to obtain more school leaders corresponding to these very high measures. There is no statistically significant difference between male and female measures on this scale (F=0.31, df=1,52, p=0.58).

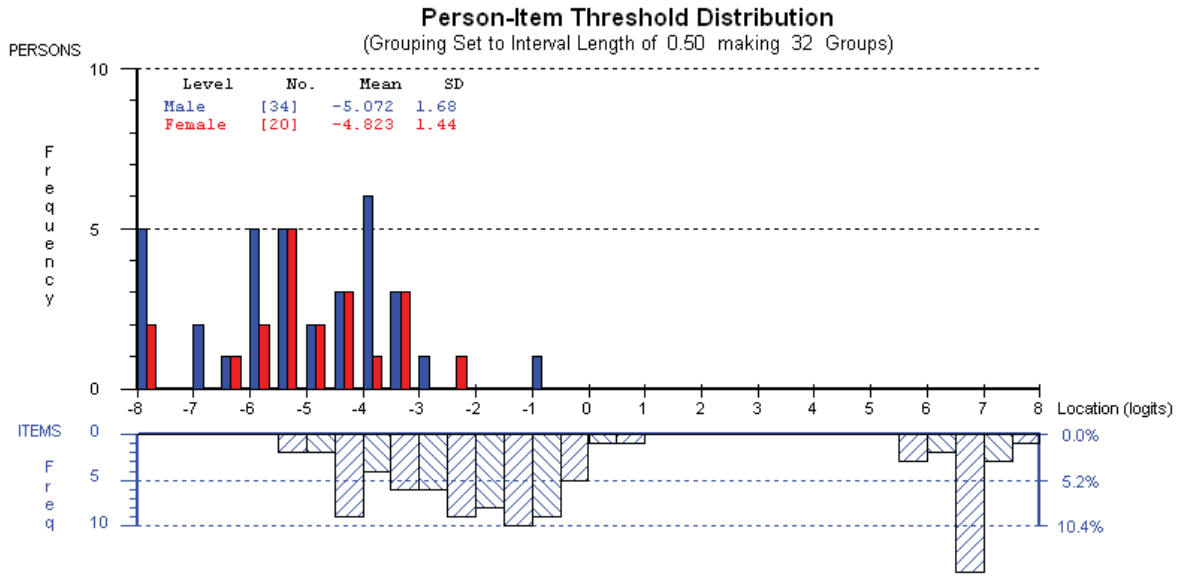


*Figure 5.3* Target Graph by Gender of School Administrators Beliefs That Actual School Improvements Were Due to Formal School Registration

Note: The person measures are ordered form low to high on the topside of the scale and the item difficulties are ordered from easy to hard on the bottom side of the scale.

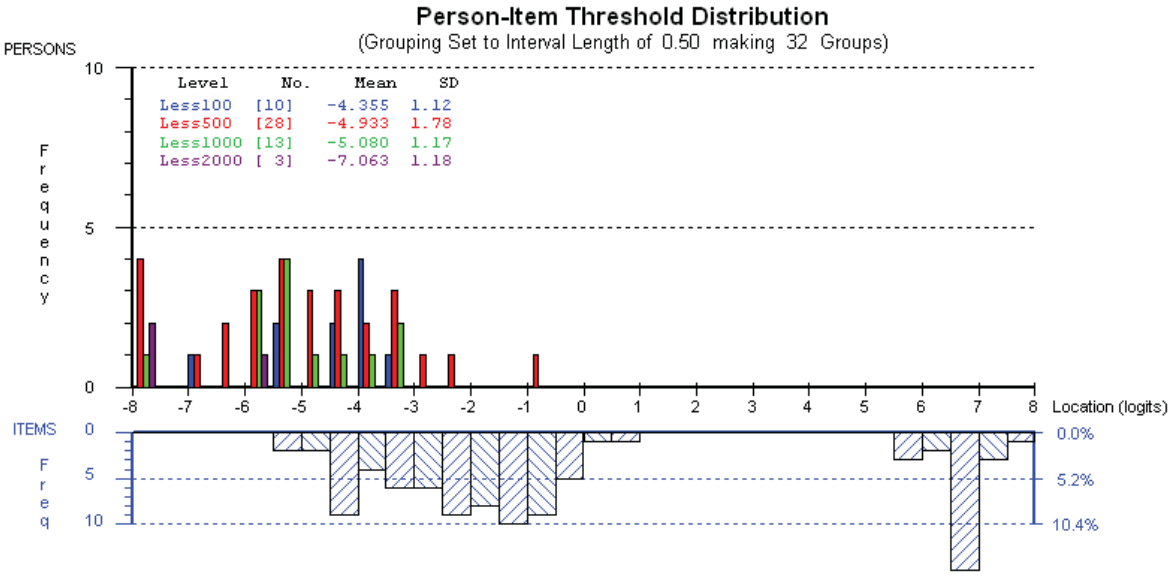


*Figure 5.4* Target Graph by School Size of School Administrators Beliefs That Actual School Improvements Were Due to Formal School Registration

Note: The person measures are ordered form low to high on the topside of the scale and the item difficulties are ordered from easy to hard on the bottom side of the scale.

Figure 5.4 shows that administrators at larger schools have lower measures than those at smaller schools and this is statistically significant (F=2.46, df=3,50, p=0.0007). This is as expected since School Leaders at larger schools have greater access to resources required to meet the criteria of formal school registration.

Figures 5.5 and 5.6 show that school location and school type are not statistically significant (F=3.34, df=2,51, p=0.04) and (F=0.31, df=1,52, p=0.58). This is as expected since the formal school registration process does not change due to location or school type. However, it should be noted that school location tends to mirror school size with smaller schools in remote areas and larger schools in the metropolitan area and this is reflected in the different probabilities.

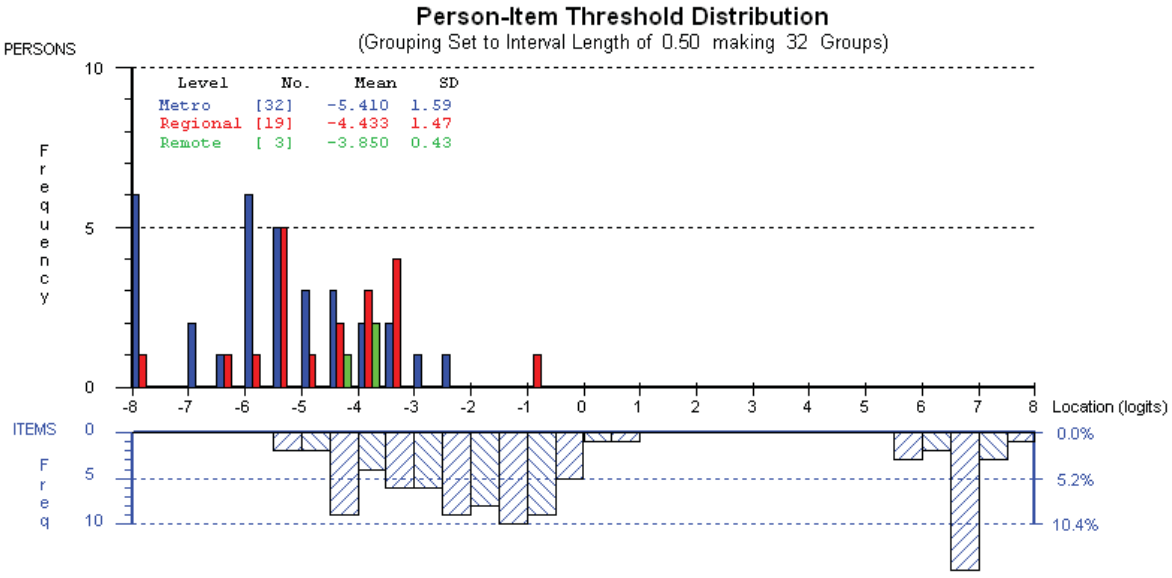


*Figure 5.5* Target Graph by Location of School Administrators Beliefs That Actual School Improvements Were Due to Formal School Registration

Note: The person measures are ordered form low to high on the topside of the scale and the item difficulties are ordered from easy to hard on the bottom side of the scale.

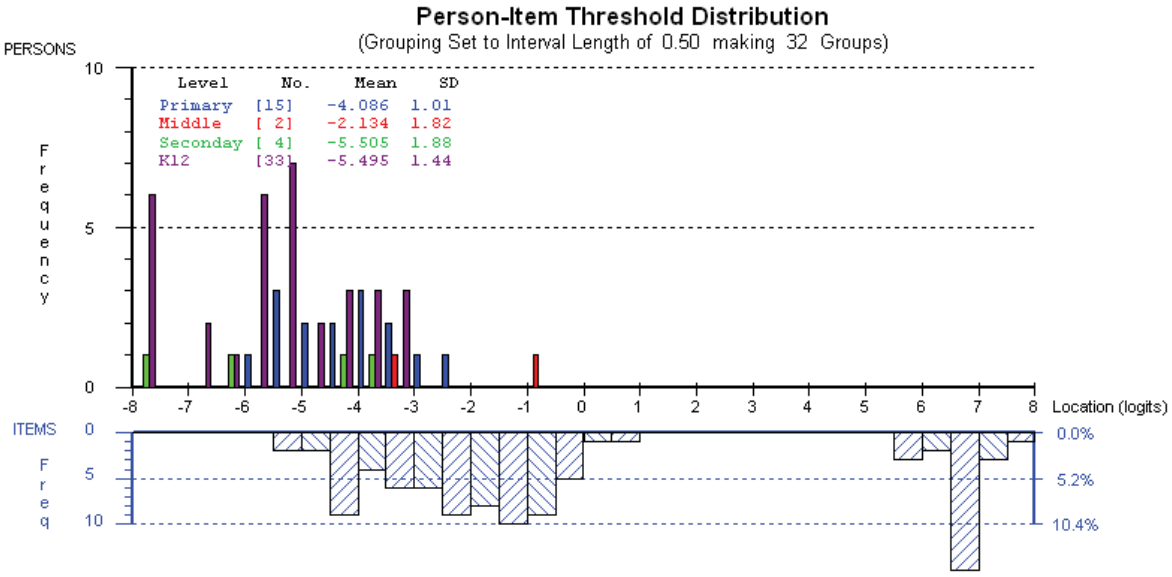


*Figure 5.6* Target Graph by School Type of School Administrators Beliefs That Actual School Improvements Were Due to Formal School Registration

## Good Fitting Items

There were 48 good fitting items and these are ordered form easy to hard on a linear scale. Table 5.5 shows the very easy to moderately easy items. The easiest item is 116, *The school's development of policy to comply with legal requirements was improved due to formal registration* and the hardest item on this part of the scale (although it is still moderately easy) is 106, *The school's commitment to the principles of procedure fairness was improved due to formal registration*. Table 5.6 shows the hard to very hard items ordered on the same linear scale. The easiest of these hard items is 12, *The standard and quality of the school's financial management was improved due to formal registration*. The hardest item is 102, *A reduction in the complaints registered at school improved due to formal registration*.

Items for each of the twelve criteria for school registration fitted the measurement model in the Rasch-Created Linear Scale of School Administrators' Beliefs That Actual School Improvements Were Due to Formal School Registration. Items 116 and 120 pertaining to the twelfth criteria, Legal Compliance, were considered to be very easy (difficulty -3.84 logits and -3.12 logits respectively) (see Table 5.5). Item 106 which was moderately easy (difficulty -1.67 logits) came from the eleventh criteria, Disputes and Complaint, and item 78 which was also moderately easy (difficulty -1.77 logits) came from the eighth criteria, School Curriculum (see Table 5.5).

Table 5.5
*A Rasch-Created Linear Scale of School Administrators' Beliefs That Actual School Improvements Were Due to Formal School Registration*
(This is a block of the easiest items in difficulty order)

Items are ordered from easiest to agree that school improvement was due to formal school registration (top of scale) to hardest to agree that school improvement was due to formal school registration (bottom of the scale)

| Items | Very Easy |
|---|---|
| 116 The school's development of policy to comply with legal requirements was improved | -3.84 |
| 120 The school's commitment to legal compliance was improved | -3.12 |
| 98 The schools' emergency-crisis response policy and procedures was improved | -3.47 |
| 42 The school's compliance to the legal requirements was improved | -3.46 |
| 66 The occupational health and safety standards at school were improved | -3.46 |
| 74 The school's strategic whole-school planning and implementation was improved | -3.46 |
| 62 The cleanliness and appearance of the school were improved | -3.34 |
| 30 The school's enrolment policy and procedures were improved | -3.31 |
| 104 The school's disputes and complaints procedures were improved | -2.99 |
| 72 The school's curriculum programme was improved | -2.76 |
| 10 The School Council's understanding of the distinction between governance and management was improved | -2.65 |

Table 5.5 (Continued):

*A Rasch-Created Linear Scale of School Administrators Beliefs That Actual School Improvements Were Due to Formal School Registration*

Items ordered from easiest to agree that school improvement was due to formal school registration (top of scale) to hardest to agree that school improvement was due to formal school registration (bottom of the scale)

| Items | Very Easy |
|---|---|
| 54 The management and performance review of staff were improved | -2.62 |
| 24 The school's response to truancy situations was improved | -2.50 |
| 112 The school's compliance to legal requirements was improved | -2.49 |
| 92 The management and storage system of student records were improved | -2.49 |
| 8 The expertise of School Council members was improved | -2.44 |
| 118 The school's risk assessment of policies and procedures was improved | -2.31 |
| 64 The school's maintenance schedule and plan was improved | -2.30 |
| 82 The school's policy and procedures for school assessment were improved | -2.20 |
| 114 Staff training on matters on matters dealing with legal requirements was improved | -2.02 |
| 80 The school's communication to parents about education was improved | -1.83 |
| 56 The professional development programme for school staff was improved | -1.82 |
| 78 The school's use of student achievement data for classroom curriculum planning was improved | -1.77 |
| 106 The school's commitment to the principles of procedural fairness was improved | -1.67 |
| | Moderately Easy |

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Items 12 and 16 pertaining to the second criteria, School Financial Viability, were considered to be hard (difficulty +1.86 logits and +1.99 logits respectively) (see Table 5.6). Item 102 which was very hard (difficulty +4..02 logits) came from the eleventh criteria, Disputes and Complaint, and item 68 which was also very hard (difficulty +3.33 logits) came from the seventh criteria, School Infrastructure.

Table 5.6
*A Rasch-Created Linear Scale of School Administrators Beliefs That Actual School Improvements Were Due to Formal School Registration*
(This is a block of the hardest items on the same scale as the more easy items)

Items ordered from hard to agree that school improvement was due to formal school registration (top of scale) to very hard indeed to agree that school improvement was due to formal school registration (bottom of the scale)

| Items | Hard |
|---|---|
| 12 The standard and quality of the school's financial management was improved | +1.86 |
| 58 The moral and professionalism of school staff was improved | +1.91 |
| 16 The school's long term financial planning process and results were improved | +1.99 |
| 6 The School Council's community and public relations was improved | +2.02 |
| 52 The skills and expertise of teaching and non-teaching staff were improved | +2.15 |
| 60 The support of parents and school community for staff at school was improved | +2.23 |
| 86 The school's expectations and standards for student learning were improved | +2.32 |
| 38 The school's student recruitment policy and procedures was improved | +2.45 |
| 94 The procedures to ensure internet safety were improved | +2.49 |
| 88 The school's learning programme for talented and gifted students was improved | +2.56 |
| 28 The school's student enrolment projections were improved | +2.61 |
| 36 The student-teacher ratio at school was improved | +2.61 |
| 20 The school's end-of-year income and expenditure position was improved | +2.74 |
| 70 The schools' welcome and receptiveness to parents and visitors was improved | +2.81 |
| 110 The school's public relations on matters dealing with disputes and complaints improved | +2.82 |
| 32 The number of students in each year group was improved | +2.93 |
| 34 The total number of students at school was improved | +2.93 |
| 108 Parental satisfaction with the school's disputes and complaints was improved | +2.94 |
| 14 The expertise and qualifications of the school's financial management staff improved | +3.00 |
| 96 The management of student behavior at school improved | +3.02 |
| 48 The school's extra-curricular events supporting instructional times was improved | +3.24 |
| 50 A reduction in the number of disruptions at school was improved | +3.33 |
| 68 The number of classrooms and learning spaces at school was improved | +3.33 |
| 102 A reduction in the complaints registered at school improved | +4.02 |
| | Very Hard |

## Summary

Using the computer program Rasch Unidimensional Measurement Models (RUMM, 2030) (Andrich, Sheridan & Luo, 2010), a Rasch-Created Linear Scale of School Administrators' Beliefs That Actual School Improvements Were Due to Formal School Registration was created. The evidence for this was supported by:

1. Good item-person and person-item fit residuals. This is shown by a standardized fit residual mean of -0.18 with standard deviation 0.86 for the items and a standardized fit residual mean of -0.24 with a standard deviation of 0.77 for the persons which are close to the ideal standardized fit residuals of mean near zero and standard deviation near one;

2. High values for Cronbach's Alpha and the Person Separation Index with values of 0.93 and 0.86 respectively. The maximum value for both Cronbach's Alpha and the Separation Index is 1 and these high values of 0.93 and 0.86 showed that the actual school improvement measures are reasonably well-separated in comparison to the errors;

3. Good item-trait interaction given by the Total Chi-square Probability of 0.81 which

   shows no significant interaction along the scale meaning that there was very good agreement about the item difficulties all along the scale;

4. Good individual item fit statistics for the 48 items fitting the measurement model with ordered item thresholds;

5. Good Response Category Curves for the 48 good fitting items showing that the School Leaders used the response categories consistently and logically;

6. Good Item Characteristic Curves for all 48 items fitting the measurement model showing that all the items discriminated appropriately; and

7. Good distribution graphs showing acceptable targeting of the items against the person measures, but some improvement is desirable. There were insufficient persons (school administrators) to cover the hard and very hard items.

As the statistics supported the creation of a reliable scale from the data, it was possible to draw some valid conclusions from the scale data. There was no statistically significant difference between males and females, between school types (primary, middle, secondary and K12 schools), or between school locations (metropolitan, regional or remote schools) in the measures of School Administrators' Beliefs That Actual School Improvements Were Due to Formal School Registration. There was, however, a statistically significant difference in the measure by school size (<100, <500, <1000, <2000) with the larger schools having the higher measures. This was assumed to be due to the greater resources available to school administrators at the larger schools.

The most difficult items (meaning those registration items that did not contribute to any actual school improvements) were identified and the easiest items (meaning those registration items that did contribute to actual school improvements) were also identified. It was also possible to identify the school administrators (although this is not reported here for ethical reasons) who had the lowest measures (meaning that not much school improvement was due to formal registration) and those school administrators who had the highest measures (meaning that a lot of school improvement was due to formal registration).

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