STUDY OF FAIRNESS IN THE PHILIPPINE APTITUDE CLASSIFICATION TEST

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Abstract

Test fairness, according to Standards, has four characteristics. These are equitable treatment of all examinees in the testing process, the absence of bias, the equality of testing outcomes for examinee subgroups and equity in opportunity to learn the material covered in an achievement test.

The development of the Philippine Aptitude Classification Test (PACT) considered giving fair treatment to all examinees in terms of context, purpose of testing and the manner in which the test scores were used. The absence of bias, however, was not examined. Hence, the purpose of this study is to gather baseline data on the extent to which PACT is an unbiased instrument using the three widely used differential item functioning (DIF) procedures: Rasch Model (RM), Mantel-Haenszel procedure (MH) and the Logistic Regression procedure (LR).

A sample of 2,296 examinees was drawn from a total of 52,006 high school examinees who took the PACT in SY 2007-08. The sample had an equal ratio of male and female examinees while the ratio of Metro Manila and non-Metro Manila group was approximately, six is to four.

At the test level, the study showed that the differences in scores between gender groups and between geographic groups are very minimal with scores ranging from 10% to 16% of one (1) standard deviation. On the item level, a large number of items, with respect to gender (73 out of 240 items) and geographic groups (47 out of 240 items) displayed DIF for the b-parameter (difficulty) ($p \leq .01$). The presence of DIF on these items, however, is not sufficient evidence to conclude that the items are biased. The results of the study recommends further substantive investigation, like a replication, to determine if performance differences that have been observed are, in fact, due to impact and not due to bias in the items.

Background

The Philippine Aptitude Classification Test, or PACT, is an instrument used for career guidance developed by the Center for Educational Measurement, Inc. (CEM). The PACT is designed to predict a student's chances of success in a chosen occupational field (TDD, 2007). Although its goodness as an instrument for its intended purpose has been established, the issue of bias with respect to specific characteristics of its target group has not been examined.

This study is a preliminary investigation of the extent of PACT's impartiality as a test instrument using the three widely used DIF procedures: (1) the Rasch Model (RM), (2) the Mantel-Haenszel procedure (MH) and (3) the Logistic Regression procedure (LR). The study focuses on gender (Caoli-Rodriguez, 2007) and geographic (Hicap, 2006) DIF since studies have shown significant differences among Filipino students on these two variables.

As an initial attempt, the researchers do not look into whether gender DIF or geographic DIF is due to bias or impact. It is unusually difficult to account for DIF

(Angoff, 1993). Extensive research is needed to substantively interpret DIF statistical outcomes in gender and geographic differences.

Definition of Terms

Differential Item Functioning (DIF) occurs when examinees from different groups show differing probabilities of success on (or endorsing) the item after them matching on the underlying ability that the item is intended to measure.

Item Impact is evident when examinees from different groups have differing probabilities of responding correctly to (or endorsing) an item because there are true differences between the groups in the underlying ability being measured by the item.

Item Bias occurs when examinees of one group are less likely to answer an item correctly (or endorse an item) than examinees of another group because of some characteristics of the test item or testing situation that is not relevant to the test purpose. DIF is required, but not sufficient, for item bias.

The Mantel-Haenszel Procedure

The Mantel-Haenszel (MH) is one of the widely-used approaches for identifying DIF using contingency tables (Clauser & Mazor, 1998; Holland & Thayer, 1988), where a chi-square test with one degree of freedom is yielded to test the null hypothesis that there is no relation between group membership and test performance on one item after controlling for ability. MH is computed by matching examinees in each group on their total test scores and then forming a 2-by-2-by-*K* contingency table for each item, where *K* is the total number of score levels on the matching variable, namely the total test score. At each score level *j*, a 2-by-2 contingency table is created for each item *i*.

$$\chi^2_{MH} = \frac{\{|\sum_j [A_j - \xi(A_j)]\ |^{-0.5}\}^2}{\sum_j var(A_j)}$$

where,

$$\xi(A_j) = \frac{N_{r_j}\ T_{1_j}}{T_j}$$

and,

$$var(A_j) = \frac{N_{r_j}\ N_{f_j}\ T_{1_j}\ T_{0_j}}{T_j^2\ (T_j - 1)}$$

The MH procedure also estimates the constant odds ratio that yields a measure of effect size for evaluating the magnitude of DIF. The odds ratio is calculated as follows:

$$a_{MH} = \frac{\sum_j A_j D_j / T_j}{\sum_j B_j C_j / T_j}$$

The α_{MH} is the ratio of the odds that a reference group examinee will get the item correct compared to the odds for a matched focal group examinee. The α_{MH} is often transformed to the Δ_{MH} to enhance the interpretability of the result using the formula,

$$\Delta_{MH} = -(2.35) \ln (\alpha_{MH}).$$

Based on this transformation, Zwich and Ercikan (1989) proposed the following interpretation guidelines to evaluate the DIF effect size:

- Negligible DIF: $|\Delta_{MH}| < 1$, or MH test is not statistically significant,
- Intermediate DIF: $1 \leq |\Delta_{MH}| < 1.5$ and MH test is statistically significant,
- Large DIF: $|\Delta_{MH}| \geq 1.5$ and MH test is statistically significant.

The Rasch Model

The Rasch Model (RM) is a parametric method relying strongly on the assumption of unidimensionality in the test. The Rasch model asserts that the easier the item, the more likely it will be affirmed; and the more able the person, the more likely he or she will affirm an item compared with a less able person (Lungrel, et al, 2006). The formula:

$$\ln\left(\frac{P_{nik}}{1 - P_{nik-1}}\right) = \theta_n - b_{ik}$$

which is the log-odds of person *n* affirming category *k* in item *i*; θ is person ability, *b* is the item difficulty parameter, and P_{nik} is the probability for person *n* to answer item *i* in category *k*. The units of measurement obtained from the equation are called "logits", which is a contraction of log-odds probability units. When the observed response pattern coincides with or does not deviate too much from the expected response pattern, then the items constitute a true Rasch scale.

Test of fit to the Rasch model is preceded by a number of overall tests and by tests of fit for individual items. The latter are given in the form of residual values (the standardized difference between the observed and the expected score for each person), which should be between -2.5 and 2.5, and Chi-Square statistics, which should show non-significant deviation from the model expectation.

Three overall summary fit statistics are given; 1) Overall item and 2) person fit statistics approximate a normal distribution with a mean of 0 and standard deviation of 1 when data fit the model and 3) an item trait interaction statistic which tests that the hierarchical ordering of the items remains the same for discrete groups across the trait. This is reported as a chi-square statistic and significance level is tested at an alpha-level of 0.05. Significant difference implies that the probability of

answering the item correctly given the same ability differs in terms of the subgroup, thus, indicates presence of DIF.

The Logistic Regression DIF

Swaminathan and Rogers (1990) applied the logistic regression (LR) procedure, a model-based approach, to identify DIF. It is designed to detect non-uniform DIF. Uniform DIF exists when there is no interaction between ability level and group membership. That is, the probability of answering an item correctly is greater for one group uniformly over all ability levels. Uniform DIF is indicated by parallel item characteristic curves. Non-uniform DIF occurs when there is an interaction between ability level and group membership. In this case, the difference in the probabilities of a correct response for the two groups is not the same at all levels of ability. Non-uniform DIF is indicated by nonparallel item characteristic curves. LR can detect uniform and non-uniform DIF, which may provide an advantage over other approaches.

The equation in LR model for DIF detection is expressed as

$$P(u = 1 \mid \theta, g) = \frac{e^{f(\theta,g)}}{1 + e^{f(\theta,g)}}$$

where $P(u = 1 \mid \theta, g)$ is the conditional probability of obtaining a correct answer given the vector of independent variables (i.e., θ, g). $f(\theta, g)$ is the function that defines the linear combination of the predictor variables, including the observed ability (θ), the group membership (g), and the interaction between the observed ability and the group membership (θg). The $f(\theta, g)$ can be expressed dependent on the steps in the LR procedure.

In step 1, $f(\theta, g)$ equal to $\tau_0 + \tau_1\theta$ (model 1), where the coefficients τ_0, τ_1 represent the intercept and weights for the ability. This serves as the baseline model. In step 2, the presence of uniform DIF is then tested by examining the improvement in chi-square model fit associated with adding a term for group membership (g) against the baseline model. That is, Model 2 (i.e. $f(\theta, g) = \tau_0 + \tau_1\theta + \tau_2 g$) subtracted from Model 1. In step 3, the presence of non-uniform DIF is tested by examining the improvement in chi-square model fit associated with adding a term for group membership (g) and a term for the interaction between test score and group membership (θg) against model 2. That is, Model 3 (i.e. $f(\theta, g) = \tau_0 + \tau_1\theta + \tau_2 g + \tau_3\theta g$) subtracted from Model 2.

Jodoin and Gierl (2001) recently evaluated the use of an effect size measure for uniform DIF detection, called $R^2\Delta$ - U , with logistic regression in an attempt to reduce the inflated Type I errors often associated with this approach (Narayanan & Swaminathan, 1996; Swaminathan & Rogers, 1990). $R^2\Delta$ - U is given as:

$$R^2\Delta - U = R^2_2 - R^2_1 ,$$

where R^2_2 and R^2_1 are the sums of the products of the standardized regression coefficient for each explanatory variable and the correlation between the response and each explanatory variable of the model 2 and model 1. They presented new guidelines for interpreting the results from this approach by comparing $R^2\Delta$ with B. The guidelines are:

- Negligible DIF: $\Delta R^2 < 0.035$
- Intermediate DIF: Null hypothesis is rejected and $0.035 \leq \Delta R^2 < 0.07$
- Large DIF: Null hypothesis is rejected and $\Delta R^2 \geq 0.07$

Method

Data

PACT results from 52,006 third year high school students were used for gender and geographic DIF analysis. For gender DIF analysis, a sample of 2,296 examinees was randomly selected for the reference (male) and focal (female) group. The same sample was also used for the geographic DIF analysis with reference (Metro-Manila) and focal (non-Metro Manila) group.

Metro Manila is the general term for the metropolitan area that includes the City of Manila, as well as sixteen surrounding cities and municipalities. Metro Manila is the political, economic, social and cultural center of the Philippines. Non-Metro Manila refers to the area outside Metro Manila.

The distribution of the sample by gender and geographic location is presented in Table 1.

Table 1.
Distribution of the Sample by Gender and Geographic Location

Particular	Size (*n*)	Percent (%)
By Gender		
Male	1,232.00	53.66
Female	1,064.00	46.34
Total	2,296.00	100.00
By Geographic Location		
Metro Manila	1,327.00	57.80
Non-Metro Manila	969.00	42.20
Total	2,296.00	100.00

The sample has an equal proportion of male and female examinees while for geographic distribution the ratio is 6:4 in favor of Metro Manila group.

Instrument

The PACT is a multiple-choice battery of aptitude tests consisting of two parts. Part 1 is a speed test, *Perceptual Speed* (PS). This is not included in the study since an implicit assumption in IRT is that the test is administered as a power test. The speededness may cause a nontrivial source for individual differences and, therefore, could be viewed as a distinctive dimension (Douglas, Kim, Habing, & Gao, 1998).

Part 2 is a power test composed of seven (7) factors namely *Verbal English* (VE), *General Reasoning* (GR), *Flexibility of Closure* (FC), *Verbal Filipino* (VF), *Spatial Closure* (SC), *Visualization* (V) and *Perceptual Acuity* (PA) (Iledan & Franco, 2003). Appendix A contains the eight aptitude/factor scores with their corresponding reliability indices (r_{tt}).

Statistical Analyses

DIF statistical analyses were conducted for each item using MH, RM and LR. Test statistics for RM and MH were interpreted at an alpha-level of 0.05 while LR was at 0.01 alpha-level. In all the comparisons described below, items with *intermediate* and *large* level ratings were considered DIF items whereas those with *negligible* rating were not. This decision seems justified since *intermediate* and *large* level DIF items are scrutinized for potential bias in tests reviews (Zieky, 1993).

Results

Psychometric Characteristics of the Factors and Items

A summary of the descriptive statistics of the gender groupings on the seven factors is presented in Table 2.

Males consistently scored higher than females in five out of the seven factors, namely, *Verbal English, General Reasoning, Flexibility of Closure, Spatial Closure* and *Visualization*. Females scored higher than males in *Verbal Filipino* and *Perceptual Acuity*. The magnitude of the mean difference favoring males was largest in *Spatial Closure*. Conversely, the magnitude of the mean difference favoring females was largest in *Verbal Filipino*. The score variability and distribution characteristics were similar between males and females in all the seven factors.

Table 2.
Descriptive Statistics By Gender on the Seven Factors

	Verbal English		General Reasoning		Flexibility of Closure		Verbal Filipino	
	Male	Female	Male	Female	Male	Female	Male	Female
No. of Examinees	1232	1064	1232	1064	1232	1064	1232	1064
No. of items	30	30	30	30	30	30	30	30
Mean	15.47	15.16	17.21	15.84	15.76	15.06	13.38	15.31
Std. Deviation	6.01	5.65	6.32	5.80	5.69	5.27	4.90	4.48
Skewness	0.19	0.16	-0.21	0.11	-0.09	0.05	-0.05	-0.22
Kurtosis	-0.71	-0.63	-0.80	-0.75	-0.60	-0.56	-0.29	-0.11

	Spatial Closure		Visualization		Perceptual Acuity	
	Male	Female	Male	Female	Male	Female
No. of Examinees	1232	1064	1232	1064	1232	1064
No. of items	30	30	30	30	30	30
Mean	17.59	15.86	15.62	14.29	13.19	14.25
Std. Deviation	7.92	8.28	6.05	5.09	6.92	6.74
Skewness	-0.36	-0.10	0.06	0.24	0.01	-0.08
Kurtosis	-1.07	-1.40	-0.51	-0.14	-0.71	-0.64

Table 3 shows the summary of descriptive statistics of the geographic groupings on the seven factors. Metro Manila and non-Metro Manila groups scored similarly in all the seven factors except in *Verbal Filipino* where the magnitude of the mean difference was largest in favor of Metro Manila. As in gender groupings, the score variability and distribution characteristics between Metro Manila and non-Metro Manila are comparable.

Table 3.
Descriptive Statistics By Geographic Location on the Seven Factors

	Verbal English		General Reasoning		Flexibility of Closure		Verbal Filipino	
	Metro Manila	Non-Metro Manila	Metro Manila	Non-Metro Manila	Metro Manila	Non-Metro Manila	Metro Manila	Non-Metro Manila
No. of Examinees	1327	969	1327	969	1327	969	1327	969
No. of items	30	30	30	30	30	30	30	30
Mean	15.25	15.44	16.86	16.18	15.15	15.82	15.45	12.66
Std. Deviation	5.72	6.02	6.12	6.11	5.43	5.59	4.58	4.63
Skewness	0.16	0.20	-0.11	0.02	0.03	-0.10	-0.32	0.05
Kurtosis	-0.67	-0.68	-0.84	-0.78	-0.61	-0.53	0.08	-0.23

	Spatial Closure		Visualization		Perceptual Acuity	
	Metro Manila	Non-Metro Manila	Metro Manila	Non-Metro Manila	Metro Manila	Non-Metro Manila
No. of Examinees	1327	969	1327	969	1327	969
No. of items	30	30	30	30	30	30
Mean	16.71	16.88	15.13	14.83	13.47	13.98
Std. Deviation	8.06	8.24	5.50	5.88	6.48	7.33
Skewness	-0.23	-0.27	0.23	0.13	0.01	-0.10
Kurtosis	-1.25	-1.26	-0.40	-0.31	-0.61	-0.80

DIF Outcomes

The sample was evaluated on DIF across gender and geographic groupings using RM, MH and LR procedures. Appendices B1 to B7 and C1 to C7 contain the detailed results of the three DIF techniques on all the items of the seven factors across gender and geographic comparisons, respectively. Table 4 contains the number of identified DIF items based on the three procedures for all the seven factors across gender and geographic groupings.

TABLE 4.
Number of items with Potential DIF across Gender and Geographic Location

DIF Technique	Number of Items with Potential DIF						
	VE	GR	FC	VF	SC	V	PA
BY GENDER							
Rasch Model	16	14	9	11	12	6	17
Mantel-Haenszel Procedure	1	4	1	9	5	1	6
Logistic Regression	9	10	5	5	3	5	12
BY GEOGRAPHIC LOCATION							
Rasch Model	11	8	3	25	3	3	2
Mantel-Haenszel Procedure	2	0	0	11	0	0	0
Logistic Regression	5	3	0	16	3	1	1

For gender differences, MH was the least sensitive among the three procedures identifying the least number of DIF items except in two factors; *Verbal Filipino* and *Spatial Closure*. On the other hand, RM was the most sensitive of the three procedures flagging the largest number of DIF in all the seven factors.

In the same manner, MH identified the least number of geographic DIF items in all the seven subtests while RM flagged the largest number of DIF items with regard to geographic differences.

Since there is little agreement on which DIF statistical procedure is most accurate, the three different methods were used in this study. Table 5 contains the number and percentage of the identified items showing gender DIF. It also presents the number and percentage of DIF items that were identified consistently by each pair of procedure under consideration. For example in Verbal English, of the 30 total items, 16 (53.33%), 1 (3.3%) and 9 (30.00%) items were identified as displaying DIF by RM, MH and LR, respectively. One item was consistently identified as showing DIF by RM and MH. The associated matching percentage was 3.33%. Likewise, the matching percentages between RM and LR and between MH and LR were 26.67% and 3.33%, respectively.

Table 5.
Classification and Consistency among Procedures across Factors for Gender DIF

	Number of Items	Classification			Consistency		
		RM	MH	LR	RM & MH	RM & LR	MH & LR
Verbal English	30	16 (53.33%)	1 (3.33%)	9 (30.00%)	1 (3.33%)	8 (26.67%)	1 (3.33%)
General Reasoning	30	14 (46.67%)	4 (13.33%)	10 (33.33%)	4 (13.33%)	9 (30.00%)	4 (13.33%)
Flexibility of Closure	30	9 (30.00%)	1 (3.33%)	5 (16.67%)	1 (3.33%)	5 (16.67%)	1 (3.33%)
Verbal Filipino	30	11 (36.67%)	9 (30.00%)	5 (16.67%)	6 (20.00%)	5 (16.67%)	3 (10.00%)
Spatial Closure	30	12 (40.00%)	5 (16.67%)	3 (10.00%)	5 (16.67%)	3 (10.00%)	2 (6.67%)
Visualization	30	6(20.00%)	1 (3.33%)	5 (16.67%)	1 (3.33%)	2 (6.67%)	1 (3.33%)
Perceptual Acuity	30	17 (56.67%)	6 (20.00%)	12 (40.00%)	6 (20.00%)	11 (36.67%)	6 (20.00%)

A high matching percentage suggests that the two procedures are consistent in terms of identifying DIF items. It appears that the RM and LR combination, which yielded the largest number of identical DIF items, is robust when compared to the other two combinations.

Using the RM and LR combination, *Perceptual Acuity* (11), *General Reasoning* (9) and *Verbal English* (8) were identified as the factors with the most number of gender DIF items while *Visualization* (2) and *Spatial Closure* (3) had the least number of gender DIF items.

Table 6.
Classification and Consistency among Procedures across Factors for Geographic DIF

	Number of Items	Classification			Consistency		
		RM	MH	LR	RM & MH	RM & LR	MH & LR
Verbal English	30	11 (36.67%)	2 (6.67%)	5 (16.67%)	2 (6.67%)	4 (13.33%)	2 (6.67%)
General Reasoning	30	8 (26.67%)	0 (0.00%)	3 (10.00%)	0 (0.00%)	3 (10.00%)	0 (0.00%)
Flexibility of Closure	30	3 (10.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Verbal Filipino	30	25 (83.33%)	11 (36.67%)	16 (53.33%)	9 (30.00%)	16 (53.33%)	5 (16.67%)
Spatial Closure	30	3 (10.00%)	0 (0.00%)	3 (10.00%)	0 (0.00%)	1 (3.33%)	0 (0.00%)
Visualization	30	3 (10.00%)	0 (0.00%)	1 (3.33%)	0 (0.00%)	1 (3.33%)	0 (0.00%)
Perceptual Acuity	30	2 (6.67%)	0 (0.00%)	1 (3.33%)	0 (0.00%)	1 (3.33%)	0 (0.00%)

The number and percentage of the identified items showing geographic DIF is presented in Table 6. Similar to the findings for gender DIF, the RM and LR combination identified the largest number of common DIF items for all the seven factors.

Evaluating the consistency among procedures is an important step so as to address the occurrence of type I error. A high matching percentage indicates that the studied procedures tend to have a low type I error rate.

Summary and Implications

The number of items flagged with DIF varied according to the statistical procedure applied across factors. For gender DIF, classification consistency varied across factor and statistical procedure. RM, MH and LR flagged a comparable number of items across the seven factors although MH tended to be more conservative than either RM or LR.

For geographic DIF, the results also varied across factor and statistical procedure. MH consistently flagged the smallest number of items, RM the largest number of items, and LR was in between.

The classification consistency rates indicate that the three DIF methods used in this study produce results that are relatively consistent but not identical. Moreover, those outcomes suggest that the three procedures produce relatively consistent item classification but that two procedures should be used to screen items for DIF.

The results from this study indicate the MH is more conservative (i.e. flags fewer items) than either RM or LR. Test developers should consider these results when choosing a DIF statistical approach since MH will likely identify fewer DIF items (i.e., MH will make fewer Type I errors) but possibly at the expense of power (i.e., MH will make more Type II errors). Both RM and LR consistently identify more DIF items. Researchers who are interested in studying DIF will likely accept a more powerful statistic even at the risk of identifying non-DIF items. Test developers and practitioners who are often pressed for time and resources may not accept such a trade-off and opt for a more conservative approach.

The study revealed that the number of gender DIF items tended to be greater in *Perceptual Acuity* and *Verbal English*. This trend implies that a review of PACT should anticipate more gender DIF in *Verbal English* and *Perceptual Acuity*. Perhaps the review panel should be forewarned of this trend and encouraged to be more attentive to possible gender DIF and gender bias.

Interpreting PACT DIF items becomes the next important step. Recall, DIF is not synonymous with bias. If the performance differences can be attributed to construct irrelevant test difficulty which unfairly affects the test performance for members of one group, then the item is biased. If, on the other hand, the performance difference can be attributed to actual knowledge and experience differences the test is designed to measure, then the outcome can be interpreted as item impact.

The distinction between DIF, item bias, and item impact is important since DIF is a statistical concept while bias and item impact are substantive concepts, requiring qualitative analysis. Typically, explanations for DIF are sought from panels of content specialists who study the items and try to identify why some items are more difficult for one group of examinees compared to another group (Berk, 1982; Ramsey, 1993). However, experience and research have shown that it is difficult to account for DIF using judgmental analyses (e.g., Angoff, 1993; Camilli & Shepard, 1994). Thus, more research is needed to substantively interpret DIF statistical outcomes.

Finally, statistical and substantive methods for detecting differential item functioning should be an essential part of test development and test evaluation efforts of PACT. Moreover, quantitative and qualitative analyses that can inform the test development process should be conducted after the administration of a test. These types of studies focusing on item, test and DIF analyses are often not routine since they are guided by specific questions applicable to a particular content area or test administration. Yet, these studies are essential since they help establish a feedback loop between developers and psychometricians so that information gained from each test administration can be used to improve the existing test development process.

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Appendix A

Philippine Aptitude Classification Test:
Subtest Composition, Number of Items,
Name of Aptitude/Factor Scores and Reliability Estimates

Subtest	No. of Items	Aptitude/Factor Score	r_{tt}
Part I			
1. Matching Letters/Numbers	15	1. Perceptual Speed	.879
2. Form Matching	15		
Part II			
1. Vocabulary	15	2. Verbal English	.855
2. Analogies	15		
3. Numeric	10	3. General Reasoning	.844
4. Number Series	10		
5. Figural Reasoning	10		
6. Paper Form Board	15	4. Flexibility of Closure	.790
7. Hidden Figure	15		
8. Talasalitaan	15	5. Verbal Filipino	.775
9. Mga Salitang Magkaugnay	15		
10. Hidden Blocks I	15	6. Spatial Closure	.927
11. Hidden Blocks II	15		
12. Patterns	10	7. Visualization	.765
13. Mechanical Motion	10		
14. Assembly	10		
15. Figure Series	15	8. Perceptual Acuity	.848
16. Proofreading	15		
T O T A L	240		

Test Length: 240 Items
Testing Time: Part I – 4 minutes
Part II – 1 hour and 45 minutes
Intended User: Second year high school students, but not lower. May be administered to the same purpose to students in the higher levels up to at most first year college. The test is most recommended for third year high school students.

Appendix B.1
Gender DIF Analysis on Verbal English Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Male	Female	$\Delta_M - \Delta_F$	$\Delta_M - \Delta_F$ Std'ised			Chi Sq	Sig			$R^2(1)$	$R^2(3)$	$R^2(2)$ $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,232)*	*(N=1,064)*													
1	-0.86	-0.89	-0.83	-0.06	-0.58	0.34	0.56	0.853	0.356	0.204		0.233	0.234	0.001	1.539	0.463
2	-0.45	-0.32	-0.60	0.27	2.92	8.53	0.00	4.773	0.029	-0.449	*Neg*	0.188	0.192	0.004	8.968	0.011
3	0.32	0.25	0.41	-0.15	-1.62	2.62	0.11	4.832	0.028	0.444	*Neg*	0.248	0.250	0.002	3.780	0.151
4	0.23	0.28	0.18	0.10	1.06	1.12	0.29	0.062	0.804	-0.056		0.294	0.295	0.001	1.144	0.564
5	0.57	0.57	0.58	-0.01	-0.15	0.02	0.88	0.797	0.372	0.188		0.418	0.418	0.000	0.735	0.692
6	0.68	0.57	0.81	-0.24	-2.53	6.38	0.01	9.803	0.002	0.649	*Neg*	0.326	0.329	0.003	8.357	0.015
7	0.66	0.58	0.77	-0.20	-2.04	4.15	0.04	7.158	0.007	0.555	*Neg*	0.165	0.169	0.004	7.794	0.020
8	**-1.56**	**-2.14**	**-1.06**	**-1.07**	**-9.14**	**83.54**	**0.00**	**84.921**	**0.000**	**2.343**	***Large***	**0.248**	**0.306**	**0.058**	**101.465**	**0.000**
9	-0.57	-0.62	-0.52	-0.10	-1.04	1.08	0.30	2.036	0.154	0.298		0.089	0.090	0.001	1.602	0.449
10	0.16	0.42	-0.13	0.55	5.94	35.23	0.00	23.016	0.000	-0.956	*Neg*	0.326	0.343	0.017	39.191	0.000
11	-0.20	-0.06	-0.35	0.30	3.18	10.11	0.00	5.570	0.018	-0.477	*Neg*	0.151	0.155	0.004	8.903	0.012
12	-0.15	-0.11	-0.20	0.09	0.93	0.87	0.35	0.054	0.816	-0.054		0.179	0.180	0.001	0.554	0.758
13	0.47	0.67	0.26	0.41	4.36	18.99	0.00	10.597	0.001	-0.658	*Neg*	0.203	0.212	0.009	17.294	0.000
14	0.90	0.94	0.85	0.09	0.91	0.84	0.36	0.001	0.978	0.005		0.160	0.164	0.004	6.487	0.039
15	0.76	0.73	0.80	-0.07	-0.70	0.49	0.48	2.097	0.148	0.308		0.289	0.290	0.001	1.730	0.421
16	-1.03	-0.88	-1.22	0.34	3.34	11.18	0.00	7.723	0.005	-0.623	*Neg*	0.213	0.220	0.007	12.631	0.002
17	-1.35	-1.49	-1.19	-0.30	-2.75	7.59	0.01	8.468	0.004	0.691	*Neg*	0.372	0.378	0.006	11.414	0.003
18	-1.43	-1.38	-1.47	0.09	0.85	0.73	0.39	0.240	0.625	-0.129		0.348	0.349	0.001	1.695	0.428
19	-0.32	-0.27	-0.37	0.10	1.11	1.24	0.27	0.197	0.657	-0.096		0.184	0.187	0.003	4.825	0.090
20	-0.91	-0.77	-1.08	0.31	3.14	9.89	0.00	6.515	0.011	-0.559	*Neg*	0.111	0.117	0.006	10.647	0.005
21	-0.28	-0.37	-0.17	-0.20	-2.14	4.59	0.03	6.448	0.011	0.512	*Neg*	0.291	0.294	0.003	6.923	0.031
22	-0.36	-0.27	-0.45	0.18	1.94	3.75	0.05	1.488	0.222	-0.251		0.379	0.381	0.002	4.163	0.125
23	-0.66	-0.71	-0.60	-0.11	-1.14	1.30	0.25	2.234	0.135	0.317		0.147	0.165	0.018	33.605	0.000
24	-0.02	-0.16	0.15	-0.31	-3.29	10.81	0.00	13.641	0.000	0.736	*Neg*	0.262	0.269	0.007	14.043	0.001
25	0.72	0.85	0.57	0.28	2.95	8.72	0.00	3.554	0.059	-0.392		0.126	0.131	0.005	8.220	0.016
26	0.43	0.34	0.53	-0.19	-2.00	3.99	0.05	6.663	0.010	0.524	*Neg*	0.383	0.388	0.005	10.559	0.005
27	1.15	1.15	1.16	-0.01	-0.06	0.00	0.95	0.865	0.352	0.214		0.248	0.249	0.001	0.412	0.814
28	1.30	1.21	1.43	-0.23	-2.13	4.55	0.03	8.334	0.004	0.665	*Neg*	0.367	0.369	0.002	5.989	0.050
29	0.86	0.76	0.99	-0.24	-2.41	5.80	0.02	9.398	0.002	0.651	*Neg*	0.219	0.222	0.003	7.525	0.023
30	0.93	1.10	0.75	0.34	3.48	12.14	0.00	5.506	0.019	-0.501	*Neg*	0.074	0.078	0.004	8.243	0.016

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix B.2
Gender DIF Analysis on General Reasoning Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Male	Female	$\Delta_M - \Delta_F$	$\Delta_M - \Delta_F$ Std'ised			Chi Sq	Sig			$R^2(1)$	$R^2(3)$	$R^2(2)$ $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,232)*	*(N=1,064)*													
1	-1.47	-1.34	-1.61	0.27	2.29	5.26	0.02	0.675	0.411	-0.223		0.144	0.148	0.004	6.509	0.039
2	-0.44	-0.38	-0.49	0.11	1.15	1.33	0.25	0.830	0.362	0.195		0.263	0.264	0.001	2.130	0.345
3	0.07	0.11	0.03	0.08	0.84	0.71	0.40	2.183	0.140	0.301		0.231	0.231	0.000	0.876	0.645
4	-0.16	0.03	-0.37	0.41	4.31	18.62	0.00	3.319	0.068	-0.374		0.246	0.256	0.010	22.804	0.000
5	0.21	0.31	0.10	0.21	2.30	5.29	0.02	0.028	0.866	0.042		0.214	0.217	0.003	5.244	0.073
6	0.30	0.33	0.26	0.07	0.77	0.59	0.44	2.677	0.102	0.331		0.478	0.480	0.002	7.200	0.027
7	-0.05	-0.02	-0.07	0.05	0.50	0.25	0.61	3.008	0.083	0.353		0.383	0.384	0.001	2.399	0.301
8	-0.21	-0.02	-0.43	0.42	4.44	19.73	0.00	3.804	0.051	-0.402		0.151	0.159	0.008	16.830	0.000
9	0.56	0.55	0.58	-0.03	-0.37	0.14	0.71	7.602	0.006	0.557	*Neg*	0.372	0.375	0.003	5.293	0.071
10	0.49	0.55	0.44	0.11	1.17	1.36	0.24	1.703	0.192	0.266		0.194	0.196	0.002	3.576	0.167
11	-0.90	-0.89	-0.92	0.03	0.27	0.07	0.78	2.047	0.152	0.327		0.307	0.308	0.001	0.717	0.699
12	-0.94	-0.98	-0.91	-0.07	-0.67	0.45	0.50	5.255	0.022	0.522	*Neg*	0.360	0.360	0.000	0.029	0.986
13	-0.93	-0.82	-1.04	0.22	2.11	4.46	0.03	0.063	0.802	-0.066		0.181	0.188	0.007	11.838	0.003
14	-0.04	-0.08	0.00	-0.08	-0.86	0.73	0.39	9.035	0.003	0.604	*Neg*	0.269	0.269	0.000	1.018	0.601
15	-0.64	-0.59	-0.69	0.09	0.96	0.92	0.34	0.920	0.337	0.212		0.281	0.282	0.001	1.778	0.411
16	**-0.11**	**-0.27**	**0.05**	**-0.32**	**-3.42**	**11.72**	**0.00**	**28.847**	**0.000**	**1.081**	***Int***	**0.363**	**0.368**	**0.005**	**11.274**	**0.004**
17	-0.10	-0.11	-0.08	-0.03	-0.35	0.12	0.73	6.308	0.012	0.508	*Neg*	0.294	0.295	0.001	1.788	0.409
18	-0.11	-0.13	-0.08	-0.05	-0.53	0.28	0.60	7.100	0.008	0.538	*Neg*	0.291	0.291	0.000	1.290	0.525
19	**0.77**	**0.54**	**1.06**	**-0.52**	**-5.32**	**28.35**	**0.00**	**55.217**	**0.000**	**1.528**	***Large***	**0.353**	**0.365**	**0.012**	**27.489**	**0.000**
20	0.52	0.50	0.55	-0.05	-0.58	0.34	0.56	8.698	0.003	0.595	*Neg*	0.313	0.313	0.000	0.798	0.671
21	-0.10	-0.23	0.05	-0.28	-3.00	8.99	0.00	24.667	0.000	0.999	*Neg*	0.081	0.090	0.009	15.961	0.000
22	**-0.02**	**-0.17**	**0.14**	**-0.31**	**-3.32**	**11.02**	**0.00**	**28.240**	**0.000**	**1.065**	***Int***	**0.175**	**0.182**	**0.007**	**13.604**	**0.001**
23	**0.27**	**0.11**	**0.45**	**-0.34**	**-3.61**	**13.02**	**0.00**	**32.487**	**0.000**	**1.135**	***Int***	**0.247**	**0.254**	**0.007**	**14.267**	**0.001**
24	-0.15	-0.18	-0.12	-0.07	-0.72	0.52	0.47	7.983	0.005	0.573	*Neg*	0.308	0.309	0.001	0.893	0.640
25	-0.12	-0.19	-0.05	-0.15	-1.56	2.44	0.12	13.147	0.000	0.731	*Neg*	0.258	0.259	0.001	2.306	0.316
26	-0.17	0.00	-0.36	0.37	3.88	15.05	0.00	1.988	0.159	-0.291		0.247	0.256	0.009	18.353	0.000
27	0.56	0.55	0.57	-0.02	-0.22	0.05	0.82	6.868	0.009	0.529	*Neg*	0.051	0.057	0.006	10.523	0.005
28	1.01	0.91	1.14	-0.22	-2.29	5.25	0.02	21.039	0.000	0.966	*Neg*	0.160	0.164	0.004	8.023	0.018
29	0.79	0.68	0.92	-0.24	-2.55	6.51	0.01	23.136	0.000	0.985	*Neg*	0.199	0.203	0.004	8.153	0.017
30	1.09	1.26	0.89	0.37	3.72	13.86	0.00	0.872	0.350	-0.204		0.049	0.052	0.003	4.540	0.103

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix B.3
Gender DIF Analysis on Flexibility of Closure Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Male	Female	$\Delta_M - \Delta_F$	$\Delta_M - \Delta_F$ Std'ised			Chi Sq	Sig			$R^2(1)$	$R^2(3)$	$R^2(2)$ $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,232)*	*(N=1,064)*													
1	-1.68	-1.68	-1.67	-0.01	-0.09	0.01	0.93	0.321	0.571	0.160		0.162	0.162	0.000	0.240	0.887
2	-0.92	-0.97	-0.86	-0.12	-1.19	1.42	0.23	3.819	0.051	0.430		0.184	0.186	0.002	2.243	0.326
3	-0.53	-0.42	-0.65	0.24	2.53	6.39	0.01	1.870	0.171	-0.287		0.209	0.212	0.003	7.402	0.025
4	-0.46	-0.47	-0.45	-0.02	-0.21	0.04	0.84	1.417	0.234	0.249		0.126	0.127	0.001	1.887	0.389
5	-0.14	-0.05	-0.24	0.19	2.11	4.45	0.03	0.694	0.405	-0.174		0.182	0.185	0.003	4.840	0.089
6	-0.36	-0.31	-0.40	0.09	0.93	0.87	0.35	0.022	0.882	0.038		0.203	0.203	0.000	1.472	0.479
7	-0.25	-0.24	-0.25	0.00	0.05	0.00	0.96	1.060	0.303	0.214		0.260	0.261	0.001	1.489	0.475
8	0.23	0.36	0.07	0.29	3.22	10.38	0.00	3.157	0.076	-0.360		0.121	0.125	0.004	8.741	0.013
9	0.12	0.08	0.16	-0.09	-0.94	0.88	0.35	4.323	0.038	0.418	*Neg*	0.255	0.255	0.000	1.028	0.598
10	-0.12	-0.19	-0.03	-0.16	-1.74	3.04	0.08	7.706	0.006	0.557	*Neg*	0.247	0.250	0.003	5.701	0.058
11	0.06	0.04	0.08	-0.04	-0.45	0.21	0.65	2.584	0.108	0.324		0.283	0.284	0.001	2.113	0.348
12	-0.17	-0.17	-0.18	0.00	0.04	0.00	0.97	1.107	0.293	0.216		0.267	0.268	0.001	2.268	0.322
13	0.74	0.73	0.76	-0.04	-0.41	0.17	0.68	2.900	0.089	0.360		0.159	0.159	0.000	0.410	0.815
14	0.95	0.94	0.95	-0.01	-0.11	0.01	0.91	2.035	0.154	0.313		0.221	0.221	0.000	0.375	0.829
15	0.20	0.16	0.25	-0.09	-0.96	0.93	0.33	4.525	0.033	0.428		0.196	0.199	0.003	5.898	0.052
16	-0.87	-0.71	-1.05	0.35	3.55	12.57	0.00	6.219	0.013	-0.545	*Neg*	0.246	0.255	0.009	16.339	0.000
17	**-0.74**	**-0.96**	**-0.51**	**-0.46**	**-4.74**	**22.46**	**0.00**	**29.651**	**0.000**	**1.149**	***Int***	**0.376**	**0.387**	**0.011**	**24.904**	**0.000**
18	-0.62	-0.56	-0.69	0.13	1.33	1.76	0.18	0.063	0.802	-0.061		0.159	0.160	0.001	1.965	0.374
19	-0.44	-0.52	-0.35	-0.17	-1.80	3.24	0.07	7.445	0.006	0.559	*Neg*	0.303	0.304	0.001	2.806	0.246
20	-0.30	-0.33	-0.25	-0.08	-0.87	0.76	0.38	3.575	0.059	0.385		0.197	0.197	0.000	1.050	0.592
21	0.16	0.15	0.17	-0.03	-0.29	0.08	0.77	2.166	0.141	0.298		0.266	0.267	0.001	2.669	0.263
22	0.55	0.64	0.46	0.18	1.91	3.65	0.06	0.202	0.653	-0.099		0.109	0.112	0.003	6.366	0.041
23	0.08	0.10	0.05	0.05	0.52	0.27	0.60	0.461	0.497	0.141		0.306	0.306	0.000	1.435	0.488
24	-0.01	-0.15	0.15	-0.30	-3.23	10.46	0.00	17.882	0.000	0.844	*Neg*	0.256	0.263	0.007	14.628	0.001
25	0.40	0.60	0.17	0.43	4.72	22.28	0.00	10.087	0.001	-0.639	*Neg*	0.195	0.207	0.012	24.069	0.000
26	0.05	-0.05	0.16	-0.22	-2.38	5.66	0.02	11.809	0.001	0.686	*Neg*	0.189	0.192	0.003	6.327	0.042
27	0.81	0.88	0.74	0.14	1.47	2.15	0.14	0.000	0.991	-0.007		0.074	0.075	0.001	0.707	0.702
28	0.98	0.86	1.13	-0.26	-2.68	7.19	0.01	15.060	0.000	0.841	*Neg*	0.094	0.101	0.007	12.780	0.002
29	0.89	0.93	0.85	0.08	0.87	0.76	0.38	0.236	0.627	0.110		0.148	0.148	0.000	0.649	0.723
30	1.38	1.33	1.43	-0.10	-0.91	0.83	0.36	4.770	0.029	0.517	*Neg*	0.066	0.069	0.003	5.746	0.057

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix B.4
Gender DIF Analysis on Verbal Filipino Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Male	Female	$\Delta_M - \Delta_F$	$\Delta_M - \Delta_F$ Std'ised			Chi Sq	Sig			$R^2(1)$	$R^2(3)$	$R^2(2)$ $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,232)*	*(N=1,064)*													
1	-1.56	-1.57	-1.54	-0.03	-0.27	0.07	0.79	8.994	0.003	-0.743		0.312	0.314	0.002	3.596	0.166
2	-0.80	-0.69	-0.93	0.24	2.48	6.14	0.01	35.092	0.000	-1.250	*Int*	0.382	0.382	0.000	0.812	0.666
3	0.59	0.68	0.50	0.18	1.95	3.80	0.05	26.813	0.000	-1.076	*Int*	0.213	0.216	0.003	5.867	0.053
4	0.84	0.80	0.88	-0.09	-0.89	0.80	0.37	5.165	0.023	-0.496	*Neg*	0.148	0.148	0.000	0.751	0.687
5	-0.15	-0.21	-0.07	-0.14	-1.56	2.42	0.12	4.240	0.039	-0.414	*Neg*	0.114	0.114	0.000	0.967	0.617
6	**0.46**	**0.66**	**0.25**	**0.41**	**4.37**	**19.11**	**0.00**	**58.131**	**0.000**	**-1.560**	***Large***	**0.133**	**0.147**	**0.014**	**26.287**	**0.000**
7	0.96	1.07	0.85	0.22	2.22	4.94	0.03	27.245	0.000	-1.154	*Int*	0.120	0.129	0.009	14.992	0.001
8	0.99	0.82	1.17	-0.35	-3.50	12.24	0.00	0.105	0.746	0.082		0.037	0.039	0.002	3.809	0.149
9	-0.47	-0.49	-0.44	-0.05	-0.56	0.31	0.58	9.415	0.002	-0.623	*Neg*	0.347	0.349	0.002	5.492	0.064
10	-0.74	-0.60	-0.92	0.32	3.34	11.13	0.00	45.530	0.000	-1.415	*Int*	0.300	0.302	0.002	5.909	0.052
11	-1.29	-1.23	-1.36	0.14	1.31	1.72	0.19	21.663	0.000	-1.076	*Int*	0.240	0.241	0.001	0.689	0.709
12	0.31	0.31	0.30	0.01	0.15	0.02	0.88	12.851	0.000	-0.724	*Neg*	0.213	0.213	0.000	0.033	0.984
13	0.02	-0.01	0.06	-0.06	-0.70	0.49	0.48	8.108	0.004	-0.569	*Neg*	0.129	0.130	0.001	2.781	0.249
14	0.81	0.74	0.88	-0.14	-1.43	2.06	0.15	3.090	0.079	-0.383		0.088	0.089	0.001	1.768	0.413
15	1.12	1.10	1.15	-0.05	-0.48	0.23	0.63	6.072	0.014	-0.569	*Neg*	0.090	0.090	0.000	0.424	0.809
16	-2.09	-2.01	-2.19	0.18	1.35	1.83	0.18	18.019	0.000	-1.246	*Int*	0.233	0.236	0.003	4.053	0.132
17	**-1.54**	**-1.37**	**-1.81**	**0.44**	**3.88**	**15.06**	**0.00**	**48.793**	**0.000**	**-1.753**	***Large***	**0.278**	**0.283**	**0.005**	**9.533**	**0.009**
18	-1.91	-1.91	-1.90	-0.01	-0.05	0.00	0.96	9.144	0.002	-0.832	*Neg*	0.218	0.221	0.003	4.064	0.131
19	-0.59	-0.69	-0.46	-0.23	-2.48	6.14	0.01	1.479	0.224	-0.254		0.362	0.372	0.010	23.073	0.000
20	0.25	0.29	0.21	0.08	0.87	0.76	0.38	18.398	0.000	-0.862	*Neg*	0.222	0.226	0.004	7.010	0.030
21	0.02	0.16	-0.14	0.30	3.30	10.90	0.00	44.984	0.000	-1.337	*Int*	0.302	0.305	0.003	7.002	0.030
22	-0.27	-0.28	-0.25	-0.03	-0.39	0.15	0.70	10.354	0.001	-0.644	*Neg*	0.230	0.233	0.003	7.658	0.022
23	-0.40	-0.41	-0.39	-0.02	-0.27	0.07	0.78	11.061	0.001	-0.672	*Neg*	0.176	0.178	0.002	4.496	0.106
24	0.68	0.66	0.70	-0.04	-0.40	0.16	0.69	8.116	0.004	-0.602	*Neg*	0.125	0.125	0.000	0.984	0.611
25	0.40	0.28	0.55	-0.27	-2.96	8.75	0.00	0.255	0.614	-0.110		0.158	0.163	0.005	8.553	0.014
26	0.58	0.65	0.51	0.14	1.54	2.38	0.12	22.977	0.000	-0.994	*Neg*	0.126	0.129	0.003	6.238	0.044
27	0.86	0.76	0.98	-0.22	-2.26	5.11	0.02	0.847	0.358	-0.207		0.082	0.084	0.002	3.078	0.215
28	0.74	0.68	0.80	-0.12	-1.27	1.60	0.21	3.895	0.048	-0.209	*Neg*	0.046	0.047	0.001	0.137	0.934
29	1.09	1.04	1.14	-0.10	-1.01	1.02	0.31	3.876	0.049	-0.454	*Neg*	0.056	0.056	0.000	1.044	0.593
30	1.10	0.77	1.48	-0.70	-6.84	46.74	0.00	13.737	0.000	0.858	*Neg*	0.026	0.043	0.017	26.631	0.000

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix B.5
Gender DIF Analysis on Spatial Closure Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Male	Female	$\Delta_M - \Delta_F$	$\Delta_M - \Delta_F$ Std'ised			Chi Sq	Sig			$R^2(1)$	$R^2(3)$	$R^2(2)$ $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,232)*	*(N=1,064)*													
1	-1.69	-1.64	-1.74	0.10	0.78	0.60	0.44	2.855	0.091	0.437		0.269	0.271	0.002	3.992	0.136
2	-0.79	-0.83	-0.75	-0.08	-0.69	0.48	0.49	11.834	0.001	0.740	*Neg*	0.523	0.523	0.000	0.190	0.909
3	-0.79	-0.93	-0.64	-0.29	-2.59	6.72	0.01	25.695	0.000	1.088	*Int*	0.568	0.570	0.002	4.284	0.117
4	-0.62	-0.71	-0.52	-0.19	-1.79	3.19	0.07	19.411	0.000	0.926	*Neg*	0.519	0.520	0.001	2.266	0.322
5	-1.22	-1.27	-1.17	-0.10	-0.87	0.75	0.39	11.704	0.001	0.790	*Neg*	0.577	0.577	0.000	1.673	0.433
6	-0.83	-0.99	-0.67	-0.33	-2.95	8.73	0.00	28.814	0.000	1.159	*Int*	0.633	0.634	0.001	5.011	0.082
7	**-0.45**	**-0.62**	**-0.27**	**-0.35**	**-3.27**	**10.68**	**0.00**	**32.428**	**0.000**	**1.177**	***Int***	**0.493**	**0.497**	**0.004**	**10.027**	**0.007**
8	**-0.54**	**-0.69**	**-0.37**	**-0.31**	**-2.92**	**8.53**	**0.00**	**28.966**	**0.000**	**1.121**	***Int***	**0.496**	**0.503**	**0.007**	**17.584**	**0.000**
9	-0.44	-0.52	-0.35	-0.17	-1.59	2.54	0.11	18.219	0.000	0.881	*Neg*	0.366	0.367	0.001	3.683	0.159
10	-0.67	-0.75	-0.58	-0.17	-1.60	2.55	0.11	17.959	0.000	0.898	*Neg*	0.429	0.431	0.002	5.830	0.054
11	-0.21	-0.12	-0.31	0.19	1.81	3.27	0.07	2.048	0.152	0.296		0.416	0.417	0.001	3.679	0.159
12	-0.28	-0.15	-0.42	0.27	2.59	6.70	0.01	0.572	0.450	0.162		0.423	0.426	0.003	7.673	0.022
13	-0.23	-0.23	-0.23	0.01	0.06	0.00	0.95	8.416	0.004	0.592	*Neg*	0.398	0.399	0.001	2.162	0.339
14	-0.27	-0.40	-0.13	-0.28	-2.63	6.90	0.01	26.359	0.000	1.046	*Int*	0.530	0.533	0.003	8.056	0.018
15	0.40	0.35	0.45	-0.10	-0.96	0.92	0.34	13.808	0.000	0.740	*Neg*	0.345	0.349	0.004	8.994	0.011
16	0.18	0.23	0.13	0.10	0.96	0.91	0.34	4.511	0.034	0.428	*Neg*	0.435	0.437	0.002	4.854	0.088
17	0.46	0.53	0.38	0.15	1.47	2.17	0.14	2.753	0.097	0.336		0.335	0.335	0.000	0.974	0.614
18	0.30	0.28	0.32	-0.04	-0.37	0.14	0.71	10.373	0.001	0.644	*Neg*	0.450	0.451	0.001	0.359	0.836
19	0.67	0.59	0.78	-0.19	-1.89	3.57	0.06	19.807	0.000	0.893	*Neg*	0.382	0.384	0.002	4.975	0.083
20	0.52	0.45	0.60	-0.14	-1.40	1.97	0.16	16.598	0.000	0.813	*Neg*	0.399	0.401	0.002	4.246	0.120
21	0.60	0.71	0.47	0.24	2.33	5.43	0.02	0.821	0.365	0.188		0.261	0.263	0.002	3.049	0.218
22	0.45	0.43	0.47	-0.04	-0.35	0.12	0.73	10.191	0.001	0.637	*Neg*	0.305	0.306	0.001	0.872	0.647
23	0.19	0.31	0.05	0.26	2.54	6.43	0.01	0.562	0.454	0.155		0.367	0.369	0.002	5.443	0.066
24	0.38	0.44	0.31	0.12	1.19	1.42	0.23	3.446	0.063	0.374		0.430	0.432	0.002	3.410	0.182
25	0.26	0.45	0.04	0.41	3.98	15.83	0.00	0.178	0.673	-0.092		0.408	0.417	0.009	22.392	0.000
26	0.76	0.86	0.65	0.22	2.09	4.37	0.04	1.063	0.302	0.214		0.450	0.453	0.003	6.020	0.049
27	1.15	1.22	1.07	0.15	1.44	2.08	0.15	2.240	0.135	0.315		0.353	0.354	0.001	2.175	0.337
28	1.33	1.44	1.21	0.23	2.20	4.82	0.03	0.661	0.416	0.179		0.222	0.223	0.001	1.562	0.458
29	0.06	0.11	0.01	0.10	1.01	1.02	0.31	4.116	0.042	0.409	*Neg*	0.274	0.275	0.001	1.727	0.422
30	1.34	1.44	1.22	0.22	2.07	4.28	0.04	0.825	0.364	-0.200		0.307	0.308	0.001	3.245	0.197

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix B.6
Gender DIF Analysis on Visualization Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Male	Female	$\Delta_M - \Delta_F$	$\Delta_M - \Delta_F$ Std'ised			Chi Sq	Sig			$R^2(1)$	$R^2(3)$	$R^2(2)$ $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,232)*	*(N=1,064)*													
1	-0.72	-0.56	-0.90	0.35	3.66	13.40	0.00	2.624	0.105	-0.345		0.072	0.077	0.005	9.602	0.008
2	-0.58	-0.59	-0.56	-0.02	-0.27	0.07	0.79	4.741	0.029	0.451	*Neg*	0.243	0.243	0.000	0.374	0.829
3	0.69	0.66	0.73	-0.07	-0.74	0.54	0.46	10.572	0.001	0.682	*Neg*	0.161	0.163	0.002	2.351	0.309
4	**0.27**	**0.11**	**0.45**	**-0.34**	**-3.72**	**13.87**	**0.00**	**35.385**	**0.000**	**1.196**	***Int***	**0.225**	**0.232**	**0.007**	**15.430**	**0.000**
5	0.18	0.30	0.05	0.25	2.77	7.69	0.01	0.041	0.839	-0.049		0.188	0.192	0.004	8.910	0.012
6	0.34	0.40	0.28	0.12	1.26	1.59	0.21	1.503	0.220	0.251		0.134	0.134	0.000	0.617	0.735
7	0.32	0.24	0.42	-0.18	-1.95	3.79	0.05	17.985	0.000	0.855	*Neg*	0.165	0.168	0.003	6.192	0.045
8	0.58	0.50	0.68	-0.17	-1.86	3.47	0.06	18.091	0.000	0.879	*Neg*	0.222	0.224	0.002	3.967	0.138
9	0.74	0.72	0.77	-0.05	-0.49	0.24	0.62	8.757	0.003	0.625	*Neg*	0.134	0.137	0.003	4.893	0.087
10	0.20	0.28	0.12	0.16	1.71	2.92	0.09	0.402	0.526	0.134		0.094	0.096	0.002	3.169	0.205
11	-0.29	-0.35	-0.24	-0.11	-1.19	1.42	0.23	9.692	0.002	0.627	*Neg*	0.112	0.117	0.005	10.265	0.006
12	-0.39	-0.35	-0.43	0.08	0.83	0.68	0.41	1.168	0.280	0.223		0.162	0.162	0.000	0.632	0.729
13	-0.26	-0.21	-0.32	0.11	1.19	1.43	0.23	0.654	0.419	0.169		0.128	0.129	0.001	2.260	0.323
14	-0.18	-0.22	-0.14	-0.08	-0.92	0.84	0.36	8.179	0.004	0.573	*Neg*	0.201	0.213	0.012	24.118	0.000
15	-0.37	-0.31	-0.43	0.12	1.35	1.82	0.18	0.322	0.570	0.122		0.101	0.102	0.001	1.686	0.430
16	-0.01	-0.04	0.03	-0.07	-0.72	0.52	0.47	7.791	0.005	0.557	*Neg*	0.138	0.140	0.002	3.588	0.166
17	-0.07	0.02	-0.16	0.18	2.00	4.00	0.05	0.011	0.916	0.028		0.190	0.194	0.004	8.079	0.018
18	-0.16	-0.27	-0.05	-0.22	-2.40	5.76	0.02	18.332	0.000	0.855	*Neg*	0.196	0.200	0.004	7.099	0.029
19	-0.05	0.07	-0.18	0.24	2.67	7.15	0.01	0.164	0.685	-0.087		0.120	0.124	0.004	7.180	0.028
20	0.22	0.15	0.29	-0.14	-1.54	2.38	0.12	13.724	0.000	0.743	*Neg*	0.143	0.149	0.006	11.074	0.004
21	-0.10	-0.14	-0.05	-0.09	-0.98	0.95	0.33	8.767	0.003	0.592	*Neg*	0.340	0.340	0.000	0.073	0.964
22	-0.40	-0.39	-0.41	0.02	0.25	0.06	0.80	2.354	0.125	0.315		0.394	0.395	0.001	1.977	0.372
23	-0.29	-0.27	-0.32	0.05	0.56	0.31	0.58	1.696	0.193	0.266		0.345	0.346	0.001	2.625	0.269
24	-0.32	-0.28	-0.35	0.07	0.74	0.55	0.46	1.219	0.269	0.228		0.287	0.288	0.001	2.085	0.353
25	-0.07	-0.05	-0.09	0.04	0.44	0.19	0.66	2.411	0.121	0.315		0.346	0.347	0.001	2.969	0.227
26	-0.16	-0.17	-0.15	-0.02	-0.19	0.03	0.85	4.210	0.040	0.414	*Neg*	0.331	0.331	0.000	0.900	0.638
27	0.41	0.42	0.39	0.03	0.31	0.10	0.75	3.741	0.053	0.397		0.287	0.288	0.001	1.410	0.494
28	0.04	-0.06	0.14	-0.20	-2.22	4.95	0.03	16.971	0.000	0.823	*Neg*	0.188	0.190	0.002	4.778	0.092
29	0.35	0.33	0.36	-0.04	-0.39	0.15	0.70	6.807	0.009	0.529	*Neg*	0.209	0.210	0.001	1.699	0.428
30	0.06	0.05	0.07	-0.02	-0.19	0.03	0.85	5.212	0.022	0.458	*Neg*	0.241	0.241	0.000	0.306	0.858

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix B.7
Gender DIF Analysis on Perceptual Acuity Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Male	Female	$\Delta_M - \Delta_F$	$\Delta_M - \Delta_F$ Std'ised			Chi Sq	Sig			$R^2(1)$	$R^2(3)$	$R^2(2)$ $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,232)*	*(N=1,064)*													
1	-0.72	-0.60	-0.51	-0.09	-0.93	0.87	0.35	1.215	0.270	-0.228		0.228	0.228	0.000	0.410	0.815
2	-0.58	-0.52	-0.61	0.09	0.92	0.85	0.36	7.604	0.006	-0.559	*Neg*	0.244	0.247	0.003	4.547	0.103
3	0.69	-0.98	-0.76	-0.22	-2.21	4.89	0.03	0.001	0.974	0.002		0.344	0.349	0.005	12.310	0.002
4	0.27	-0.44	-0.43	-0.01	-0.10	0.01	0.92	3.205	0.073	-0.362		0.356	0.359	0.003	5.718	0.057
5	0.18	-0.15	0.24	-0.39	-4.04	16.35	0.00	3.069	0.080	0.355		0.260	0.268	0.008	16.798	0.000
6	0.34	-0.19	0.21	-0.40	-4.15	17.20	0.00	3.208	0.073	0.362		0.248	0.255	0.007	15.362	0.000
7	0.32	-0.14	0.06	-0.20	-2.11	4.45	0.03	0.001	0.980	0.002		0.326	0.328	0.002	4.887	0.087
8	0.58	-0.47	-0.06	-0.41	-4.21	17.72	0.00	3.220	0.073	0.362		0.413	0.425	0.012	30.270	0.000
9	0.74	-0.33	0.02	-0.36	-3.71	13.77	0.00	1.992	0.158	0.287		0.300	0.306	0.006	13.703	0.001
10	0.20	-0.18	-0.08	-0.10	-1.05	1.10	0.29	0.769	0.381	-0.181		0.381	0.383	0.002	5.046	0.080
11	-0.29	0.15	0.35	-0.20	-2.05	4.22	0.04	0.000	0.996	0.009		0.239	0.242	0.003	6.295	0.043
12	-0.39	0.78	0.80	-0.02	-0.20	0.04	0.84	2.196	0.138	-0.322		0.271	0.271	0.000	0.323	0.851
13	-0.26	0.33	0.32	0.00	0.03	0.00	0.98	3.348	0.067	-0.376		0.247	0.249	0.002	4.562	0.102
14	-0.18	0.00	0.12	-0.11	-1.17	1.36	0.24	0.649	0.420	-0.167		0.280	0.281	0.001	2.243	0.326
15	-0.37	0.45	0.73	-0.28	-2.80	7.82	0.01	0.593	0.441	0.169		0.158	0.161	0.003	6.289	0.043
16	**-0.01**	**-1.40**	**-1.79**	**0.40**	**3.42**	**11.67**	**0.00**	**22.937**	**0.000**	**-1.088**	***Int***	**0.536**	**0.541**	**0.005**	**12.518**	**0.002**
17	-0.07	0.87	0.99	-0.12	-1.17	1.36	0.24	0.305	0.581	-0.129		0.236	0.239	0.003	4.615	0.100
18	**-0.16**	**-1.04**	**-1.45**	**0.41**	**3.75**	**14.09**	**0.00**	**27.962**	**0.000**	**-1.128**	***Int***	**0.489**	**0.495**	**0.006**	**15.680**	**0.000**
19	**-0.05**	**-0.55**	**-0.92**	**0.37**	**3.63**	**13.16**	**0.00**	**26.630**	**0.000**	**-1.046**	***Int***	**0.422**	**0.430**	**0.008**	**18.127**	**0.000**
20	0.22	-0.64	-0.81	0.17	1.67	2.79	0.10	11.900	0.001	-0.698	*Neg*	0.442	0.444	0.002	4.761	0.093
21	**-0.10**	**-0.57**	**-0.96**	**0.39**	**3.77**	**14.19**	**0.00**	**27.675**	**0.000**	**-1.067**	***Int***	**0.412**	**0.419**	**0.007**	**17.686**	**0.000**
22	**-0.40**	**-0.51**	**-0.96**	**0.46**	**4.45**	**19.79**	**0.00**	**34.896**	**0.000**	**-1.194**	***Int***	**0.390**	**0.401**	**0.011**	**25.134**	**0.000**
23	-0.29	0.63	0.41	0.22	2.13	4.54	0.03	13.699	0.000	-0.773	*Neg*	0.399	0.403	0.004	9.233	0.010
24	-0.32	0.61	0.56	0.05	0.46	0.21	0.65	4.781	0.029	-0.465	*Neg*	0.281	0.284	0.003	5.706	0.058
25	**-0.07**	**-0.46**	**-0.89**	**0.43**	**4.15**	**17.19**	**0.00**	**28.275**	**0.000**	**-1.079**	***Int***	**0.359**	**0.367**	**0.008**	**18.796**	**0.000**
26	-0.16	0.51	0.49	0.02	0.17	0.03	0.87	3.814	0.051	-0.411		0.228	0.233	0.005	8.912	0.012
27	0.41	0.81	0.52	0.29	2.78	7.73	0.01	17.540	0.000	-0.895	*Neg*	0.300	0.304	0.004	9.392	0.009
28	0.04	1.59	1.53	0.06	0.53	0.28	0.60	3.756	0.053	-0.505		0.282	0.285	0.003	6.273	0.043
29	0.35	0.98	1.29	-0.31	-2.83	7.99	0.00	0.722	0.395	0.207		0.183	0.186	0.003	5.212	0.074
30	0.06	1.46	1.58	-0.12	-0.99	0.98	0.32	0.315	0.575	-0.155		0.193	0.194	0.001	1.709	0.425

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix C.1
Geographic DIF Analysis on Verbal English Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Metro Manila	Outside M.Mla.	Δ_{MM}-Δ_{OMM}	Δ_{MM}-Δ_{OMM} Std'ised			Chi Sq	Sig			R^2(1)	R^2(3)	R^2(2) $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,327)*	*(N=969)*													
1	**-0.86**	**-0.66**	**-1.17**	**0.50**	**4.95**	**24.50**	**0.00**	**23.434**	**0.000**	**-1.067**	***Int***	**0.233**	**0.250**	**0.017**	**33.876**	**0.000**
2	-0.45	-0.43	-0.49	0.06	0.66	0.44	0.51	0.630	0.427	-0.172		0.188	0.188	0.000	1.339	0.512
3	0.32	0.32	0.32	0.00	-0.04	0.00	0.97	0.073	0.787	-0.063		0.248	0.250	0.002	3.955	0.138
4	0.23	0.34	0.09	0.25	2.70	7.31	0.01	7.829	0.005	-0.566	*Neg*	0.294	0.298	0.004	8.234	0.016
5	0.57	0.55	0.61	-0.06	-0.66	0.43	0.51	0.031	0.861	0.045		0.418	0.418	0.000	1.086	0.581
6	0.68	0.87	0.43	0.44	4.52	20.39	0.00	20.827	0.000	-0.942	*Neg*	0.326	0.339	0.013	30.633	0.000
7	0.66	0.81	0.48	0.33	3.40	11.56	0.00	12.610	0.000	-0.736	*Neg*	0.165	0.173	0.008	15.429	0.000
8	-1.56	-1.68	-1.41	-0.27	-2.37	5.64	0.02	4.596	0.032	0.545	*Neg*	0.248	0.252	0.004	6.108	0.047
9	-0.57	-0.70	-0.40	-0.30	-3.10	9.64	0.00	7.114	0.008	0.557	*Neg*	0.089	0.094	0.005	8.827	0.012
10	0.16	0.17	0.14	0.02	0.23	0.05	0.82	0.244	0.622	-0.106		0.326	0.326	0.000	0.080	0.961
11	-0.20	-0.23	-0.15	-0.08	-0.81	0.65	0.42	0.205	0.650	0.099		0.151	0.153	0.002	4.392	0.111
12	-0.15	-0.18	-0.12	-0.06	-0.65	0.42	0.52	0.087	0.768	0.068		0.179	0.180	0.001	0.379	0.827
13	0.47	0.45	0.50	-0.04	-0.47	0.22	0.64	0.001	0.981	0.014		0.203	0.204	0.001	2.747	0.253
14	0.90	0.87	0.93	-0.06	-0.65	0.43	0.51	0.013	0.911	0.033		0.160	0.163	0.003	5.800	0.055
15	0.76	0.77	0.75	0.02	0.18	0.03	0.85	0.306	0.580	-0.125		0.289	0.289	0.000	0.057	0.972
16	-1.03	-1.05	-1.01	-0.04	-0.38	0.15	0.70	0.031	0.861	0.049		0.213	0.213	0.000	0.259	0.879
17	-1.35	-1.40	-1.27	-0.13	-1.22	1.48	0.22	0.998	0.318	0.247		0.372	0.377	0.005	9.021	0.011
18	-1.43	-1.48	-1.35	-0.13	-1.20	1.44	0.23	1.000	0.317	0.251		0.348	0.349	0.001	1.853	0.396
19	-0.32	-0.38	-0.24	-0.14	-1.46	2.14	0.14	1.173	0.279	0.226		0.184	0.186	0.002	2.897	0.235
20	-0.91	-0.96	-0.85	-0.12	-1.16	1.34	0.25	0.805	0.370	0.204		0.111	0.112	0.001	1.605	0.448
21	**-0.28**	**-0.06**	**-0.59**	**0.54**	**5.58**	**31.13**	**0.00**	**30.038**	**0.000**	**-1.121**	***Int***	**0.291**	**0.309**	**0.018**	**40.898**	**0.000**
22	-0.36	-0.45	-0.23	-0.22	-2.28	5.21	0.02	3.510	0.061	0.385		0.379	0.383	0.004	8.662	0.013
23	-0.66	-0.71	-0.58	-0.14	-1.42	2.02	0.16	1.221	0.269	0.240		0.147	0.148	0.001	2.565	0.277
24	-0.02	-0.05	0.02	-0.07	-0.72	0.51	0.47	0.117	0.733	0.075		0.262	0.265	0.003	5.711	0.058
25	0.72	0.61	0.86	-0.25	-2.52	6.34	0.01	3.588	0.058	0.402		0.126	0.130	0.004	6.875	0.032
26	0.43	0.24	0.70	-0.47	-4.86	23.61	0.00	17.060	0.000	0.846	*Neg*	0.383	0.399	0.016	37.194	0.000
27	1.15	1.27	1.00	0.27	2.63	6.91	0.01	8.447	0.004	-0.646	*Neg*	0.248	0.253	0.005	8.852	0.012
28	1.30	1.33	1.27	0.06	0.57	0.32	0.57	1.003	0.317	-0.237		0.367	0.367	0.000	0.442	0.802
29	0.86	0.92	0.79	0.13	1.33	1.77	0.18	2.708	0.100	-0.355		0.219	0.220	0.001	2.102	0.350
30	0.93	0.91	0.96	-0.05	-0.53	0.28	0.60	0.000	0.994	0.007		0.074	0.074	0.000	1.121	0.571

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix C.2
Geographic DIF Analysis on General Reasoning Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Metro Manila	Outside M.Mla.	Δ_{MM}-Δ_{OMM}	Δ_{MM}-Δ_{OMM} Std'ised			Chi Sq	Sig			R^2(1)	R^2(3)	R^2(2) $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,327)*	*(N=969)*													
1	-1.47	-1.46	-1.47	0.01	0.09	0.01	0.93	0.555	0.456	0.204		0.144	0.144	0.000	0.117	0.943
2	-0.44	-0.40	-0.49	0.09	0.89	0.78	0.38	0.040	0.841	0.052		0.263	0.264	0.001	1.279	0.528
3	0.07	0.12	0.00	0.12	1.24	1.54	0.21	0.000	0.983	-0.005		0.231	0.232	0.001	1.625	0.444
4	-0.16	-0.19	-0.12	-0.06	-0.66	0.44	0.51	2.852	0.091	0.350		0.246	0.246	0.000	1.526	0.466
5	0.21	0.25	0.15	0.10	1.05	1.10	0.29	0.014	0.906	0.033		0.214	0.215	0.001	1.058	0.589
6	0.30	0.16	0.48	-0.31	-3.34	11.14	0.00	17.616	0.000	0.846	*Neg*	0.478	0.482	0.004	11.985	0.002
7	-0.05	-0.11	0.03	-0.14	-1.48	2.20	0.14	6.058	0.014	0.501	*Neg*	0.383	0.384	0.001	1.882	0.390
8	-0.21	-0.10	-0.37	0.27	2.85	8.13	0.00	2.348	0.125	-0.320		0.151	0.154	0.003	6.917	0.031
9	0.56	0.54	0.59	-0.06	-0.59	0.35	0.55	2.637	0.104	0.334		0.372	0.373	0.001	0.412	0.814
10	0.49	0.63	0.31	0.32	3.38	11.46	0.00	3.954	0.047	-0.404	*Neg*	0.194	0.200	0.006	11.992	0.002
11	-0.90	-0.85	-0.98	0.13	1.23	1.50	0.22	0.012	0.912	-0.035		0.307	0.309	0.002	3.705	0.157
12	-0.94	-0.96	-0.92	-0.04	-0.43	0.19	0.67	1.846	0.174	0.315		0.360	0.360	0.000	0.060	0.970
13	-0.93	-0.91	-0.95	0.04	0.34	0.11	0.73	0.402	0.526	0.153		0.181	0.181	0.000	0.582	0.748
14	-0.04	-0.03	-0.06	0.03	0.33	0.11	0.74	0.593	0.441	0.162		0.269	0.269	0.000	0.537	0.765
15	-0.64	-0.56	-0.75	0.18	1.85	3.43	0.06	0.423	0.515	-0.148		0.281	0.284	0.003	7.265	0.026
16	-0.11	-0.08	-0.16	0.08	0.83	0.69	0.41	0.084	0.772	0.066		0.363	0.363	0.000	1.614	0.446
17	-0.10	-0.12	-0.06	-0.06	-0.67	0.45	0.50	2.926	0.087	0.353		0.294	0.294	0.000	0.455	0.797
18	-0.11	-0.05	-0.19	0.14	1.45	2.11	0.15	0.044	0.834	-0.052		0.291	0.292	0.001	2.919	0.232
19	0.77	0.73	0.84	-0.11	-1.12	1.25	0.26	4.406	0.036	0.437	*Neg*	0.353	0.355	0.002	2.893	0.235
20	0.52	0.53	0.52	0.01	0.10	0.01	0.92	0.983	0.321	0.207		0.313	0.314	0.001	3.605	0.165
21	-0.10	-0.19	0.03	-0.22	-2.33	5.44	0.02	10.556	0.001	0.660	*Neg*	0.081	0.086	0.005	8.371	0.015
22	-0.02	-0.12	0.13	-0.25	-2.66	7.09	0.01	12.755	0.000	0.721	*Neg*	0.175	0.179	0.004	8.127	0.017
23	0.27	0.19	0.39	-0.20	-2.16	4.67	0.03	9.634	0.002	0.625	*Neg*	0.247	0.249	0.002	4.884	0.087
24	-0.15	-0.12	-0.19	0.07	0.72	0.51	0.47	0.153	0.695	0.087		0.308	0.309	0.001	1.210	0.546
25	-0.12	-0.11	-0.14	0.03	0.35	0.12	0.73	0.549	0.459	0.157		0.258	0.259	0.001	0.479	0.787
26	-0.17	-0.20	-0.13	-0.06	-0.64	0.41	0.52	2.766	0.096	0.343		0.247	0.248	0.001	1.996	0.369
27	0.56	0.66	0.41	0.25	2.58	6.65	0.01	1.558	0.212	-0.259		0.051	0.053	0.002	3.415	0.181
28	1.01	0.91	1.16	-0.24	-2.44	5.96	0.01	10.839	0.001	0.703	*Neg*	0.160	0.166	0.006	12.437	0.002
29	0.79	0.75	0.85	-0.10	-1.00	1.01	0.32	3.933	0.047	0.414	*Neg*	0.199	0.200	0.001	1.176	0.555
30	1.09	1.10	1.08	0.01	0.14	0.02	0.89	0.768	0.381	0.195		0.049	0.049	0.000	0.193	0.908

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix C.3
Geographic DIF Analysis on Flexibility of Closure Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Metro Manila	Outside M.Mla.	Δ_{MM}-Δ_{OMM}	Δ_{MM}-Δ_{OMM} Std'ised			Chi Sq	Sig			R^2(1)	R^2(3)	R^2(2) $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,327)*	*(N=969)*													
1	-1.68	-1.69	-1.66	-0.03	-0.27	0.07	0.79	0.136	0.712	-0.110		0.162	0.162	0.000	0.828	0.661
2	-0.92	-0.89	-0.96	0.07	0.70	0.50	0.48	2.375	0.123	-0.348		0.184	0.185	0.001	0.430	0.807
3	-0.53	-0.49	-0.58	0.08	0.86	0.74	0.39	3.212	0.073	-0.378		0.209	0.209	0.000	1.112	0.573
4	-0.46	-0.49	-0.43	-0.06	-0.62	0.39	0.53	0.158	0.691	-0.089		0.126	0.127	0.001	1.436	0.488
5	-0.14	-0.15	-0.12	-0.03	-0.32	0.10	0.75	0.563	0.453	-0.157		0.182	0.183	0.001	1.084	0.582
6	-0.36	-0.33	-0.39	0.06	0.61	0.37	0.54	2.537	0.111	-0.331		0.203	0.203	0.000	0.571	0.752
7	-0.25	-0.22	-0.28	0.06	0.69	0.48	0.49	2.881	0.090	-0.350		0.260	0.260	0.000	0.645	0.724
8	0.23	0.30	0.13	0.17	1.81	3.28	0.07	8.047	0.005	-0.573	*Neg*	0.121	0.124	0.003	5.750	0.056
9	0.12	0.13	0.10	0.04	0.42	0.18	0.67	2.239	0.135	-0.306		0.255	0.255	0.000	0.065	0.968
10	-0.12	-0.15	-0.07	-0.07	-0.81	0.66	0.42	0.080	0.778	-0.066		0.247	0.248	0.001	1.147	0.564
11	0.06	0.04	0.08	-0.03	-0.38	0.14	0.71	0.531	0.466	-0.153		0.283	0.283	0.000	1.012	0.603
12	-0.17	-0.15	-0.21	0.06	0.69	0.48	0.49	2.915	0.088	-0.350		0.267	0.267	0.000	0.233	0.890
13	0.74	0.83	0.62	0.21	2.18	4.73	0.03	10.316	0.001	-0.672	*Neg*	0.159	0.163	0.004	7.990	0.018
14	0.95	0.97	0.92	0.05	0.46	0.21	0.64	2.454	0.117	-0.343		0.221	0.222	0.001	1.724	0.422
15	0.20	0.18	0.23	-0.05	-0.50	0.25	0.62	0.396	0.529	-0.134		0.196	0.196	0.000	0.285	0.867
16	-0.87	-0.81	-0.95	0.13	1.34	1.79	0.18	4.657	0.031	-0.479	*Neg*	0.246	0.250	0.004	6.545	0.038
17	-0.74	-0.78	-0.68	-0.11	-1.10	1.21	0.27	0.002	0.969	0.019		0.376	0.378	0.002	3.461	0.177
18	-0.62	-0.59	-0.66	0.07	0.70	0.49	0.48	2.632	0.105	-0.348		0.159	0.159	0.000	0.704	0.703
19	-0.44	-0.38	-0.51	0.13	1.32	1.75	0.19	5.095	0.024	-0.470	*Neg*	0.303	0.303	0.000	1.291	0.524
20	-0.30	-0.27	-0.34	0.07	0.79	0.62	0.43	3.159	0.076	-0.367		0.197	0.197	0.000	0.618	0.734
21	0.16	0.20	0.11	0.09	0.99	0.98	0.32	4.169	0.041	-0.414	*Neg*	0.266	0.266	0.000	1.369	0.504
22	0.55	0.50	0.63	-0.14	-1.46	2.14	0.14	0.034	0.854	0.047		0.109	0.110	0.001	1.288	0.525
23	0.08	0.07	0.10	-0.03	-0.32	0.11	0.75	0.613	0.434	-0.165		0.306	0.306	0.000	0.540	0.763
24	-0.01	-0.05	0.04	-0.09	-0.99	0.97	0.32	0.021	0.886	-0.038		0.256	0.257	0.001	3.377	0.185
25	0.40	0.45	0.33	0.12	1.29	1.67	0.20	5.457	0.019	-0.477		0.195	0.198	0.003	5.565	0.062
26	0.05	-0.01	0.13	-0.15	-1.58	2.50	0.11	0.118	0.731	0.078		0.189	0.190	0.001	2.987	0.225
27	0.81	0.71	0.95	-0.24	-2.44	5.97	0.01	1.234	0.267	0.242		0.074	0.077	0.003	4.080	0.130
28	0.98	0.87	1.13	-0.26	-2.64	6.98	0.01	1.732	0.188	0.294		0.094	0.098	0.004	6.805	0.033
29	0.89	0.89	0.89	-0.01	-0.08	0.01	0.94	1.109	0.292	-0.233		0.148	0.148	0.000	0.012	0.994
30	1.38	1.33	1.44	-0.11	-1.07	1.15	0.28	0.003	0.958	-0.024		0.066	0.067	0.001	2.221	0.329

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix C.4
Geographic DIF Analysis on Verbal Filipino Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total *(N=2,296)*	Metro Manila *(N=1,327)*	Outside M.Mla. *(N=969)*	Δ_{MM}-Δ_{OMM}	Δ_{MM}-Δ_{OMM} Std'ised			Chi Sq	Sig			$R^2(1)$	$R^2(3)$	$R^2(2)$ *$[R^2(3)-R^2(1)]$*	c2 (2)	*df=2*
1	-1.56	-1.71	-1.42	-0.29	-2.65	7.01	0.01	46.395	0.000	1.652	*Large*	0.312	0.312	0.000	1.594	0.451
2	-0.80	-0.99	-0.57	-0.42	-4.38	19.17	0.00	81.274	0.000	1.887	*Large*	0.382	0.383	0.001	3.727	0.155
3	0.59	0.56	0.63	-0.07	-0.69	0.47	0.49	28.471	0.000	1.137	*Int*	0.213	0.213	0.000	0.580	0.748
4	**0.84**	**0.44**	**1.65**	**-1.21**	**-10.68**	**113.98**	**0.00**	**222.388**	**0.000**	**3.659**	***Large***	**0.148**	**0.226**	**0.078**	**146.748**	**0.000**
5	-0.15	-0.05	-0.28	0.22	2.46	6.03	0.01	6.716	0.010	0.524	*Neg*	0.114	0.118	0.004	7.581	0.023
6	0.46	0.42	0.51	-0.09	-0.97	0.95	0.33	32.342	0.000	1.191	*Int*	0.133	0.135	0.002	3.039	0.219
7	0.96	1.05	0.82	0.23	2.28	5.21	0.02	4.872	0.027	0.503	*Neg*	0.120	0.130	0.010	16.681	0.000
8	0.99	1.11	0.80	0.31	3.12	9.74	0.00	1.855	0.173	0.315		0.037	0.038	0.001	0.939	0.625
9	**-0.47**	**-0.87**	**0.01**	**-0.88**	**-9.24**	**85.46**	**0.00**	**193.636**	**0.000**	**2.865**	***Large***	**0.347**	**0.378**	**0.031**	**71.383**	**0.000**
10	-0.74	-0.89	-0.56	-0.33	-3.47	12.05	0.00	66.717	0.000	1.697	*Large*	0.300	0.301	0.001	3.469	0.176
11	-1.29	-1.16	-1.45	0.29	2.83	8.02	0.00	2.959	0.085	0.400		0.240	0.251	0.011	20.037	0.000
12	0.31	0.31	0.31	0.00	-0.03	0.00	0.97	23.580	0.000	0.999	*Neg*	0.213	0.214	0.001	1.988	0.370
13	0.02	0.23	-0.28	0.51	5.57	31.05	0.00	0.127	0.722	-0.080		0.129	0.146	0.017	32.490	0.000
14	0.81	1.00	0.52	0.48	4.95	24.49	0.00	0.024	0.877	-0.042		0.088	0.099	0.011	20.102	0.000
15	1.12	1.30	0.86	0.44	4.21	17.71	0.00	0.029	0.864	0.049		0.090	0.098	0.008	14.302	0.001
16	-2.09	-1.94	-2.26	0.32	2.53	6.42	0.01	1.478	0.224	0.360		0.233	0.246	0.013	18.275	0.000
17	-1.54	-1.41	-1.70	0.28	2.56	6.55	0.01	3.012	0.083	0.430	*Neg*	0.278	0.292	0.014	25.259	0.000
18	-1.91	-1.88	-1.95	0.07	0.61	0.37	0.54	10.820	0.001	0.886	*Neg*	0.218	0.220	0.002	3.321	0.190
19	**-0.59**	**-0.92**	**-0.19**	**-0.74**	**-7.75**	**60.13**	**0.00**	**153.172**	**0.000**	**2.554**	***Large***	**0.362**	**0.377**	**0.015**	**35.748**	**0.000**
20	**0.25**	**-0.07**	**0.76**	**-0.84**	**-8.62**	**74.29**	**0.00**	**173.219**	**0.000**	**2.782**	***Large***	**0.222**	**0.261**	**0.039**	**80.107**	**0.000**
21	0.02	-0.09	0.17	-0.26	-2.76	7.64	0.01	57.478	0.000	1.535	*Large*	0.302	0.303	0.001	1.754	0.416
22	**-0.27**	**-0.50**	**0.04**	**-0.54**	**-5.82**	**33.84**	**0.00**	**111.190**	**0.000**	**2.136**	***Large***	**0.230**	**0.244**	**0.014**	**29.638**	**0.000**
23	-0.40	-0.26	-0.59	0.33	3.56	12.70	0.00	2.236	0.135	0.308		0.176	0.184	0.008	15.972	0.000
24	0.68	0.76	0.55	0.21	2.20	4.84	0.03	6.303	0.012	0.543	*Neg*	0.125	0.127	0.002	4.610	0.100
25	0.40	0.53	0.22	0.31	3.37	11.33	0.00	2.404	0.121	0.324		0.158	0.167	0.009	17.721	0.000
26	0.58	0.62	0.51	0.11	1.15	1.33	0.25	12.761	0.000	0.759	*Neg*	0.126	0.126	0.000	0.677	0.713
27	h	0.95	0.73	0.22	2.21	4.89	0.03	5.586	0.018	0.529	*Neg*	0.082	0.083	0.001	1.281	0.527
28	0.74	0.86	0.56	0.29	3.03	9.20	0.00	2.764	0.096	0.364		0.046	0.048	0.002	2.848	0.241
29	1.09	1.27	0.81	0.46	4.54	20.61	0.00	0.000	0.994	-0.009		0.056	0.069	0.013	21.615	0.000
30	1.10	1.33	0.76	0.57	5.60	31.39	0.00	1.058	0.304	-0.244		0.026	0.032	0.006	9.417	0.009

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix C.5
Geographic DIF Analysis on Spatial Closure Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Metro Manila	Outside M.Mla.	Δ_{MM}-Δ_{OMM}	Δ_{MM}-Δ_{OMM} Std'ised			Chi Sq	Sig			$R^2(1)$	$R^2(3)$	$R^2(2)$ [$R^2(3)$-$R^2(1)$]	c2 (2)	*df=2*
	(N=2,296)	*(N=1,327)*	*(N=969)*													
1	-1.69	-1.65	-1.75	0.10	0.80	0.63	0.43	0.341	0.559	-0.162		0.269	0.269	0.000	0.533	0.766
2	-0.79	-0.83	-0.73	-0.10	-0.89	0.79	0.38	0.345	0.557	0.136		0.523	0.523	0.000	1.024	0.599
3	-0.79	-0.78	-0.80	0.02	0.18	0.03	0.86	0.055	0.814	-0.061		0.568	0.572	0.004	9.467	0.009
4	-0.62	-0.62	-0.61	-0.01	-0.10	0.01	0.92	0.001	0.978	-0.016		0.519	0.519	0.000	0.015	0.993
5	-1.22	-1.21	-1.24	0.03	0.27	0.07	0.79	0.047	0.828	-0.061		0.577	0.577	0.000	1.057	0.589
6	-0.83	-0.87	-0.79	-0.08	-0.69	0.48	0.49	0.192	0.662	0.103		0.633	0.638	0.005	15.164	0.001
7	-0.45	-0.44	-0.47	0.03	0.25	0.06	0.80	0.137	0.711	-0.085		0.493	0.493	0.000	0.829	0.661
8	-0.54	-0.57	-0.49	-0.08	-0.73	0.53	0.47	0.155	0.693	0.092		0.496	0.497	0.001	0.803	0.669
9	-0.44	-0.38	-0.52	0.14	1.30	1.68	0.19	1.582	0.209	-0.270		0.366	0.367	0.001	1.868	0.393
10	-0.67	-0.69	-0.64	-0.06	-0.51	0.26	0.61	0.059	0.808	0.061		0.429	0.429	0.000	0.444	0.801
11	-0.21	-0.18	-0.24	0.06	0.58	0.33	0.56	0.480	0.488	-0.150		0.416	0.416	0.000	0.753	0.686
12	-0.28	-0.19	-0.40	0.21	1.93	3.74	0.05	3.328	0.068	-0.381		0.423	0.424	0.001	4.304	0.116
13	-0.23	-0.27	-0.17	-0.10	-0.94	0.88	0.35	0.247	0.619	0.110		0.398	0.398	0.000	0.914	0.633
14	-0.27	-0.28	-0.26	-0.02	-0.20	0.04	0.84	0.000	0.994	-0.007		0.530	0.531	0.001	0.994	0.608
15	0.40	0.26	0.59	-0.32	-3.12	9.73	0.00	4.960	0.026	0.451	*Neg*	0.345	0.350	0.005	10.749	0.005
16	0.18	0.23	0.12	0.12	1.11	1.24	0.27	1.444	0.230	-0.247		0.435	0.436	0.001	2.439	0.295
17	0.46	0.51	0.39	0.12	1.14	1.30	0.25	1.650	0.199	-0.263		0.335	0.336	0.001	2.656	0.265
18	0.30	0.34	0.23	0.11	1.07	1.15	0.28	1.437	0.231	-0.247		0.450	0.451	0.001	1.551	0.460
19	0.67	0.69	0.65	0.03	0.34	0.11	0.74	0.422	0.516	-0.139		0.382	0.382	0.000	0.157	0.925
20	0.52	0.46	0.59	-0.13	-1.26	1.58	0.21	0.405	0.525	0.134		0.399	0.400	0.001	3.081	0.214
21	0.60	0.54	0.68	-0.14	-1.32	1.75	0.19	0.462	0.497	0.143		0.261	0.264	0.003	5.174	0.075
22	0.45	0.38	0.54	-0.16	-1.57	2.48	0.12	0.851	0.356	0.193		0.305	0.307	0.002	2.795	0.247
23	0.19	0.18	0.20	-0.02	-0.20	0.04	0.84	0.015	0.902	-0.033		0.367	0.367	0.000	0.544	0.762
24	0.38	0.40	0.34	0.06	0.60	0.36	0.55	0.730	0.393	-0.179		0.430	0.433	0.003	6.652	0.036
25	0.26	0.24	0.29	-0.05	-0.47	0.22	0.64	0.001	0.981	0.005		0.408	0.409	0.001	2.161	0.339
26	0.76	0.76	0.77	-0.01	-0.11	0.01	0.92	0.107	0.743	-0.075		0.450	0.451	0.001	1.075	0.584
27	1.15	1.07	1.26	-0.19	-1.82	3.30	0.07	1.005	0.316	0.216		0.353	0.356	0.003	6.900	0.032
28	1.33	1.39	1.26	0.13	1.20	1.43	0.23	2.266	0.132	-0.324		0.222	0.223	0.001	3.040	0.219
29	0.06	0.18	-0.11	0.29	2.72	7.40	0.01	6.651	0.010	-0.524	*Neg*	0.274	0.278	0.004	8.198	0.017
30	1.34	1.35	1.32	0.03	0.24	0.06	0.81	0.472	0.492	-0.153		0.307	0.307	0.000	0.846	0.655

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix C.6
Geographic DIF Analysis on Visualization Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Metro Manila	Outside M.Mla.	Δ_{MM}-Δ_{OMM}	Δ_{MM}-Δ_{OMM} Std'ised			Chi Sq	Sig			R^2(1)	R^2(3)	R^2(2) $[R^2(3)-R^2(1)]$	c2 (2)	*df=2*
	(N=2,296)	*(N=1,327)*	*(N=969)*													
1	-0.72	-0.84	-0.56	-0.29	-2.98	8.88	0.00	10.318	0.001	0.679	*Neg*	0.072	0.077	0.005	9.107	0.011
2	-0.58	-0.56	-0.61	0.05	0.57	0.33	0.57	0.021	0.885	-0.038		0.243	0.246	0.003	7.462	0.024
3	0.69	0.71	0.67	0.04	0.45	0.20	0.65	0.050	0.823	-0.056		0.161	0.162	0.001	0.729	0.695
4	0.27	0.26	0.28	-0.02	-0.20	0.04	0.84	0.140	0.708	0.082		0.225	0.226	0.001	2.104	0.349
5	0.18	0.21	0.14	0.07	0.79	0.62	0.43	0.213	0.644	-0.101		0.188	0.189	0.001	2.991	0.224
6	0.34	0.41	0.25	0.17	1.83	3.36	0.07	2.160	0.142	-0.303		0.134	0.137	0.003	5.426	0.066
7	0.32	0.30	0.35	-0.05	-0.53	0.28	0.60	0.485	0.486	0.148		0.165	0.165	0.000	0.464	0.793
8	0.58	0.65	0.49	0.16	1.66	2.76	0.10	1.846	0.174	-0.287		0.222	0.224	0.002	3.731	0.155
9	0.74	0.78	0.70	0.08	0.83	0.69	0.41	0.293	0.588	-0.122		0.134	0.137	0.003	5.890	0.053
10	0.20	0.15	0.28	-0.13	-1.42	2.01	0.16	2.613	0.106	0.331		0.094	0.095	0.001	2.843	0.241
11	-0.29	-0.28	-0.31	0.04	0.39	0.15	0.70	0.000	1.000	0.009		0.112	0.113	0.001	1.501	0.472
12	-0.39	-0.42	-0.34	-0.09	-0.91	0.84	0.36	1.881	0.170	0.284		0.162	0.164	0.002	3.374	0.185
13	-0.26	-0.25	-0.27	0.01	0.16	0.03	0.87	0.091	0.762	0.068		0.128	0.128	0.000	0.503	0.778
14	-0.18	-0.20	-0.16	-0.04	-0.46	0.21	0.65	0.819	0.366	0.188		0.201	0.202	0.001	1.942	0.379
15	-0.37	-0.35	-0.39	0.04	0.45	0.20	0.65	0.016	0.898	0.035		0.101	0.102	0.001	0.072	0.965
16	-0.01	0.04	-0.06	0.10	1.06	1.12	0.29	0.201	0.654	-0.099		0.138	0.138	0.000	0.890	0.641
17	-0.07	-0.07	-0.06	-0.01	-0.14	0.02	0.89	0.386	0.534	0.132		0.190	0.190	0.000	0.860	0.651
18	-0.16	-0.25	-0.05	-0.20	-2.14	4.57	0.03	6.537	0.011	0.517	*Neg*	0.196	0.199	0.003	5.366	0.068
19	-0.05	0.00	-0.11	0.11	1.17	1.37	0.24	0.283	0.595	-0.115		0.120	0.122	0.002	3.482	0.175
20	0.22	0.16	0.29	-0.12	-1.33	1.78	0.18	2.927	0.087	0.350		0.143	0.145	0.002	2.234	0.327
21	-0.10	-0.14	-0.04	-0.10	-1.09	1.20	0.27	2.579	0.108	0.327		0.340	0.342	0.002	4.144	0.126
22	-0.40	-0.40	-0.39	-0.01	-0.09	0.01	0.93	0.564	0.453	0.160		0.394	0.395	0.001	1.247	0.536
23	-0.29	-0.25	-0.36	0.10	1.13	1.28	0.26	0.102	0.749	-0.073		0.345	0.346	0.001	1.534	0.464
24	-0.32	-0.33	-0.29	-0.04	-0.42	0.18	0.67	1.127	0.288	0.221		0.287	0.288	0.001	0.918	0.632
25	-0.07	-0.05	-0.11	0.06	0.68	0.46	0.50	0.000	0.998	-0.009		0.346	0.346	0.000	0.912	0.634
26	-0.16	-0.16	-0.16	-0.01	-0.08	0.01	0.94	0.472	0.492	0.146		0.331	0.332	0.001	2.625	0.269
27	0.41	0.38	0.45	-0.07	-0.77	0.59	0.44	1.438	0.230	0.251		0.287	0.288	0.001	1.735	0.420
28	0.04	0.12	-0.08	0.20	2.12	4.49	0.03	1.592	0.207	-0.259		0.188	0.195	0.007	14.638	0.001
29	0.35	0.32	0.38	-0.06	-0.65	0.42	0.51	1.421	0.233	0.249		0.209	0.211	0.002	3.579	0.167
30	0.06	0.06	0.06	-0.01	-0.05	0.00	0.96	0.547	0.460	0.155		0.241	0.241	0.000	0.121	0.941

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items

Appendix C.7
Geographic DIF Analysis on Perceptual Acuity Items

Item Number	RASCH MODEL							MANTEL-HAENSZEL PROCEDURE				LOGISTIC REGRESSION				
	Item Difficulty			Differences		Chi Sq	Sig.	Mantel-Haenszel Test		DIF Size	*Remark*	Nagelkerke R^2			Chi Sq	Sig
	Total	Metro Manila	Outside M.Mla.	Δ_{MM}-Δ_{OMM}	Δ_{MM}-Δ_{OMM} Std'ised			Chi Sq	Sig			R^2(1)	R^2(3)	R^2(2)	c2 (2)	*df=2*
	(N=2,296)	*(N=1,327)*	*(N=969)*											*[R^2 (3)-R^2 (1)]*		
1	-0.56	-0.50	-0.66	0.16	1.58	2.49	0.11	4.527	0.033	-0.437	*Neg*	0.228	0.231	0.003	5.267	0.072
2	-0.57	-0.62	-0.50	-0.12	-1.22	1.50	0.22	0.092	0.762	0.071		0.244	0.245	0.001	1.386	0.500
3	-0.88	-0.94	-0.78	-0.16	-1.60	2.57	0.11	0.810	0.368	0.195		0.344	0.345	0.001	3.032	0.220
4	-0.43	-0.48	-0.37	-0.11	-1.13	1.28	0.26	0.041	0.840	0.049		0.356	0.357	0.001	2.154	0.341
5	0.03	-0.03	0.11	-0.14	-1.44	2.07	0.15	0.010	0.921	0.028		0.260	0.261	0.001	2.209	0.331
6	0.00	-0.03	0.03	-0.07	-0.68	0.46	0.50	0.251	0.616	-0.108		0.248	0.251	0.003	4.874	0.087
7	-0.05	-0.07	-0.01	-0.07	-0.68	0.46	0.50	0.203	0.652	-0.099		0.326	0.326	0.000	0.442	0.802
8	-0.28	-0.29	-0.27	-0.01	-0.13	0.02	0.90	0.694	0.405	-0.174		0.413	0.413	0.000	0.047	0.977
9	-0.17	-0.22	-0.09	-0.13	-1.35	1.81	0.18	0.004	0.947	0.021		0.300	0.303	0.003	6.412	0.041
10	-0.13	-0.13	-0.14	0.01	0.10	0.01	0.92	1.364	0.243	-0.240		0.381	0.382	0.001	2.200	0.333
11	0.24	0.26	0.20	0.06	0.60	0.36	0.55	3.381	0.066	-0.378		0.239	0.241	0.002	2.780	0.249
12	0.78	0.86	0.68	0.17	1.68	2.83	0.09	9.210	0.002	-0.656	*Neg*	0.271	0.273	0.002	5.506	0.064
13	0.32	0.33	0.31	0.01	0.13	0.02	0.90	1.717	0.190	-0.275		0.247	0.247	0.000	0.356	0.837
14	0.06	-0.03	0.17	-0.19	-1.97	3.90	0.05	0.347	0.556	0.127		0.280	0.282	0.002	3.835	0.147
15	0.58	0.58	0.58	0.00	-0.03	0.00	0.98	1.839	0.175	-0.291		0.158	0.159	0.001	1.661	0.436
16	-1.57	-1.60	-1.52	-0.08	-0.72	0.52	0.47	0.308	0.579	0.134		0.536	0.537	0.001	0.770	0.680
17	0.92	1.02	0.78	0.24	2.30	5.30	0.02	11.385	0.001	-0.747	*Neg*	0.236	0.240	0.004	5.945	0.051
18	-1.22	-1.29	-1.11	-0.19	-1.70	2.89	0.09	2.623	0.105	0.350		0.489	0.491	0.002	7.392	0.025
19	-0.71	-0.64	-0.83	0.18	1.77	3.15	0.08	3.259	0.071	-0.374		0.422	0.423	0.001	1.674	0.433
20	-0.72	-0.70	-0.74	0.04	0.43	0.18	0.67	0.442	0.506	-0.143		0.442	0.443	0.001	2.250	0.325
21	-0.74	-0.76	-0.72	-0.04	-0.36	0.13	0.72	0.003	0.958	0.019		0.412	0.412	0.000	1.581	0.454
22	-0.71	-0.76	-0.64	-0.13	-1.24	1.54	0.21	0.539	0.463	0.155		0.390	0.392	0.002	3.679	0.159
23	0.52	0.60	0.41	0.19	1.83	3.35	0.07	7.567	0.006	-0.580	*Neg*	0.399	0.401	0.002	6.238	0.044
24	0.58	0.66	0.46	0.20	1.94	3.77	0.05	7.961	0.005	-0.599	*Neg*	0.281	0.284	0.003	5.795	0.055
25	-0.65	-0.76	-0.49	-0.27	-2.64	6.97	0.01	4.267	0.039	0.421	*Neg*	0.359	0.364	0.005	12.325	0.002
26	0.49	0.57	0.39	0.18	1.70	2.89	0.09	5.859	0.015	-0.512	*Neg*	0.228	0.231	0.003	5.217	0.074
27	0.67	0.69	0.64	0.05	0.50	0.25	0.62	1.990	0.158	-0.310		0.300	0.300	0.000	0.100	0.951
28	1.56	1.53	1.59	-0.06	-0.52	0.27	0.60	0.487	0.485	-0.193		0.282	0.283	0.001	1.548	0.461
29	1.12	1.16	1.06	0.10	0.88	0.78	0.38	3.250	0.071	-0.428		0.183	0.184	0.001	1.806	0.405
30	1.51	1.59	1.41	0.18	1.50	2.26	0.13	6.216	0.013	-0.642	*Neg*	0.193	0.196	0.003	5.443	0.066

Remark: *Neg* - Negligible
Int - Intermediate
Large - Large
DIF items