UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Exploring how objects used in a Picture Vocabulary Test influence validity

by Ilse de Bruin

Submitted in fulfilment of the
requirements for the degree

Magister Educationis

in

Assessment and Quality Assurance

Department of Science, Mathematics and
Technology in Education

Faculty of Education

University of Pretoria

Supervisor:

Dr Vanessa Scherman,

September 2010

© University of Pretoria

ABSTRACT

Multilingualism in the classroom is one of the many challenges found in the cumbersome bag that the South African education system is carrying over its shoulders at present. Globalisation and migration have added to the burden as factors adding further diversity to the already diverse classroom. In South Africa the spotlight is focused on equality. Equality is expected in the education system, and in the classroom and especially in tests. With 11 official languages excluding the additional languages from foreign learners it has become a daunting task to create tests that are fair across multilingual learners in one classroom. Items in tests that function differently from one group to another can provide biased marks. An investigation was done in order to detect any biased items present in a Picture Vocabulary Test. The study was lead by the main research question being: How do objects used in a Picture Vocabulary Test influence the level of validity? The first sub research question was: How do objects used in a Picture Vocabulary Test influence the level of validity? The next sub question was: To what extent is an undimensional trait measured by a Picture Vocabulary Test? The final subquestion was To what extent do the items in a Picture Vocabulary Test perform the same for the different language groups? This Picture Vocabulary Test was administered to Grade 1 learners in Afrikaans, English or Sepedi speaking schools within Pretoria, Gauteng. The sample totalling 1361 learners. The process involved a statistical procedure known as Rasch analyses. With the help of Rasch a Differential Item Functioning (DIF) analysis was done to investigate whether biased items were present in the test. The aim of this study it is to create greater awareness as to how biased items in tests can be detected and resolved. The results showed that the items in the Picture Vocabulary Test all tested vocabulary. Although items were detected that did indeed perform differently across the three language groups participating in the study.

Keywords: test, bias, Differential Item Functioning (DIF), fairness, multilingual, items, equality, culture, language, visual literacy.

ACKNOWLEDGEMENTS

First and most important I would like to thank my Father who was at my side, holding my hand on this arduous three year journey. Thank you for giving me health, a fit mind and the will to carry on when things were going really tough and it would have been easy to give up. Thank you for your Sabbath days when I know I can rest and recover because You gave the Sabbath especially for resting. Thank You for loving me.

To Christo, my husband, we have gone through deep waters these past three years. Thank you for helping out with the boys when I had to sit in front of the computer. Thanks for the hugs when Word decided to hang for the umpteenth time. Thanks for insisting I have a break and taking me for coffee when you see the statistics are driving me crazy. Lief vir jou.

To my two sons, Pierre and Milan, dankie vir julle liefde. Pierre who always says: “Mamma, jy moet jou Meesters geniet”, when he goes off to school. And Milan who always asks: “Mamma hoekom sit jy net voor die ‘nekenaar’ die heeltyd?” Ek is baie, baie lief vir my twee seuntjies!!!

Thank you to my parents for teaching me perseverance – to finish what I started and having faith in me. Dankie dat Mamma my altyd motiveer en rigting gee waneer ek nie weet watter kant toe met my studies nie.

Thank you to Vanessa. We have also walked a long road together. I feel that as we walked the winding pathway upwards you became just as much a friend as a supervisor. Thanks for the chats, advice and ‘light bulb moments’ and the help in times of need - it still means a lot to me.

I am extremely grateful to the University of Pretoria and the CEA for their financial assistance and the opportunity to complete my M. Thank you so much to my friends at the CEA for their support, upstairs Ronald and Gabriel and downstairs Zaneletjie.

Then to my brand new friends: Yvette and Fires and their daughters Danet and Carah. Baie dankie vir die heerlike aandetes wat julle onverwags ons vir oornooi. Dankie dat julle my ‘n breek gee van die rekenaar. Ons geniet julle wonderlike geselskap en die lekker lag. Maar meeste van als dankie dat jul omgee mense is.

TABLE OF CONTENTS

TITLE **PAGE**

ABSTRACT ..... **I**
ACKNOWLEDGEMENTS ..... **II**
TABLE OF CONTENTS ..... **IV**
LIST OF FIGURES ..... **VIII**
LIST OF TABLES ..... **X**
LIST OF ABBREVIATIONS ..... **XII**
GLOSSARY OF TERMS ..... **XIII**

CHAPTER 1

1 INTRODUCTION **1**
1.1 VALIDITY OF ASSESSMENTS ACROSS LANGUAGE GROUPS **3**
1.2 BACKGROUND TO THE STUDY **4**
1.2.1 Performance indicators in primary schools (PIPS) 4
1.2.2 The PIPS Assessment 5
1.2.3 The National Research Foundation Value-Added Project 9
1.2.4 South African Monitoring in Primary Schools (SAMP) project 10
1.3 PROBLEM STATEMENT **11**
1.4 RATIONALE FOR THE STUDY **12**
1.5 AIMS AND OBJECTIVES OF THE STUDY **14**
1.6 RESEARCH QUESTIONS **15**
1.6.1 Sub Research Questions 15
1.7 CONCLUSION **16**

CHAPTER 2

2 LITERATURE REVIEW **18**
INTRODUCTION **18**
2.1 **18**
2.2 BACKGROUND TO FOUNDATION PHASE EDUCATION IN SOUTH AFRICA **19**
2.2.1 The Teaching of Literacy at the Foundation Phase 20

2.2.2 Assessment in the Foundation Phase 22
2.3 VISUAL LITERACY (VL) 24
2.3.1 Identifying Factors of Visual Literacy Competency 28
2.3.2 Developing Visual Literacy 29
2.3.3 Furthering the Development of Visual Literacy 31
2.4 THE ROLE OF PICTURES IN LITERACY 33
2.5 THE ROLE OF LANGUAGE AND CULTURE IN A PICTURE VOCABULARY TEST 37
2.5.1 The Role of Language in a Picture Vocabulary Test 37
2.5.2 The Role of Culture in a Picture Vocabulary Test 41
2.6 CONCEPTUAL FRAMEWORK 45
2.7 CONCLUSION 47

CHAPTER 3

3 VALIDITY AND RELIABILITY 49
3.1 INTRODUCTION 49
3.2 VALIDITY 49
3.2.1 Validity 49
3.2.2 Construct Validity 52
3.3 RELIABILITY 54
3.4 CONCLUSION 55

CHAPTER 4

4 METHODOLOGY 56
4.1 INTRODUCTION 56
4.2 RESEARCH METHODOLOGY 57
4.2.1 Positivism 57
4.2.2 Rationale for working with Positivism 60
4.3 RESEARCH METHODOLOGY 61
4.3.1 The SAMP Sample 62
4.3.2 Instrument 63
4.3.3 Data collection 63
4.3.4 Data analysis 64
4.3.5 Descriptive statistics 65

4.3.6 Rasch Analysis 65
4.3.7 Differential Item Functioning (DIF) 76
4.3.8 WINSTEPS 78
4.4 ETHICAL CONSIDERATIONS 79
4.5 CONCLUSION 79

CHAPTER 5

5 DATA ANALYSIS 81
5.1 INTRODUCTION 81
5.2 SAMPLE 82
5.3 UNDERSTANDING RASCH ANALYSES 83
5.4 PICTURE 1 – PICTURE OF KITCHEN 85
5.4.1 Findings across all three language groups for Picture 1 86
5.4.2 Afrikaans learners' results for the Baseline assessment of Picture 1 89
5.4.3 English learners results for Baseline assessment of Picture 1 94
5.4.4 Sepedi learners results for Baseline assessment of Picture 1 99
5.4.5 Summary of Picture 1 across all groups 104
5.5 PICTURE 2 – PICTURE OF THE OUTDOORS 106
5.5.1 Findings across all three language groups for Picture 2 107
5.5.2 Afrikaans learners results for Baseline assessment of Picture 2 110
5.5.3 English learners results for Baseline assessment of Picture 2 114
5.5.4 Sepedi learners results for Baseline assessment of Picture 2 118
5.5.5 Summary of Picture 2 across all groups 123
5.6 PICTURE 3 – PICTURE OF BEDROOM 125
5.6.1 Findings across all three language groups for Picture 3 126
5.6.2 Afrikaans learners results for Baseline assessment of Picture 3 128
5.6.3 English learners results for Baseline assessment of Picture 3 131
5.6.4 Sepedi learners results for Baseline assessment of Picture 3 135
5.6.5 Summary of Picture 3 across all groups 139
5.7 ALL OBJECTS DIFFICULTY ORDER ACROSS ALL LANGUAGES 141
5.8 DIFFERENTIAL ITEM FUNCTIONING (DIF) ANALYSIS 146
5.9 CONCLUSION 150

CHAPTER 6

6 REFLECTIONS ON STUDY 152
6.1 INTRODUCTION 152
6.2 REFLECTION ON CONSTRUCT VALIDITY 152
6.3 REFLECTION ON LITERATURE AND CONCEPTUAL FRAMEWORK. 155
6.4 CONCLUSION 166

CHAPTER 7

7 CONCLUSION 167
7.1 INTRODUCTION 167
7.2 SUMMARY OF THE RESEARCH DESIGN 168
7.3 SUMMARY OF RESULTS PER RESEARCH QUESTION 169
7.4 IMPLICATIONS 176
7.5 RECOMMENDATIONS FOR FUTURE RESEARCH 177
7.6 LIMITATIONS TO STUDY 178
7.7 CONCLUSION 179

8 REFERENCES 180

9 APPENDICES I
9.1 APPENDIX A – PICTURE 1 ITEMS I
9.2 APPENDIX B – ITEM - LEARNER STATISTICS – ALL LEARNERS I
9.3 APPENDIX C – PICTURE 1 OBJECT STATISTICS – ALL LANGUAGES III
9.4 APPENDIX D LEARNER – ITEM STATISTICS AFRIKAANS PICTURE 1.. I
9.5 APPENDIX E –OBJECT STATISTICS AFRIKAANS – PICTURE 1 II
9.6 APPENDIX F – OBJECT ORDER AFRIKAANS PICTURE 1 I
9.7 APPENDIX G – LEARNER – ITEM STATISTICS ENGLISH PICTURE 1 ... II
9.8 APPENDIX H –ITEM STATISTICS ENGLISH PICTURE 1 IV
9.9 APPENDIX I –ITEM ORDER PICTURE 1 ENGLISH V
9.10 APPENDIX J – LEARNER – ITEM STATISTICS SEPEDI PICTURE 1 IV
9.11 APPENDIX K – OBJECT STATISTICS SEPEDI PICTURE 1 IV
9.12 APPENDIX L – OBJECT ORDER SEPEDI PICTURE 1 V
9.13 APPENDIX M– PICTURE 2 ITEMS IV
9.14 APPENDIX N – LEARNER – ITEM STATISTICS ALL LANGUAGES PIC 2IV
9.15 APPENDIX O – ITEM STATISTICS ALL LANGUAGES PIC 2 VI

9.16 APPENDIX P - LEARNER – ITEM STATISTICS AFRIKAANS PICTURE 2IV
9.17 APPENDIX Q - ITEM STATISTICS AFRIKAANS PICTURE 2 IV
9.18 APPENDIX R - ITEM ORDER AFRIKAANS PICTURE 2 V
9.19 APPENDIX S – LEARNER - ITEM STATISTICS PICTURE 2 ENGLISH ... VI
9.20 APPENDIX T - ITEM STATISTICS ENGLISH PICTURE 2 VIII
9.21 APPENDIX U - ITEM ORDER ENGLISH PICTURE 2 IX
9.22 APPENDIX V – LEARNER - ITEM STATISTICS PICTURE 2 SEPEDI X
9.23 APPENDIX W – ITEM STATISTICS PICTURE 2 SEPEDI IV
9.24 APPENDIX X – ITEM ORDER PICTURE 2 SEPEDI IV
9.25 APPENDIX Y – PICTURE 3 ITEMS IV
9.26 APPENDIX Z – LEARNER – ITEM STATISTICS ALL LANGUAGES PIC 3IV
9.27 APPENDIX AA – ITEM STATISTICS ALL LANGUAGES PIC 3 VI
9.28 APPENDIX BB – LEARNER-OBJECT STATISTICS AFRIKAANS – PICTURE 3 IV
9.29 APPENDIX CC – OBJECT STATISTICS AFRIKAANS – PICTURE 3 IV
9.30 APPENDIX DD – OBJECT ORDER AFRIKAANS – PICTURE 3 IV
9.31 APPENDIX EE – LEARNER-OBJECT STATISTICS ENGLISH – PICTURE 3 IV
9.32 APPENDIX FF – OBJECT STATISTICS ENGLISH – PICTURE 3 IV
9.33 APPENDIX GG - OBJECT ORDER ENGLISH – PICTURE 3 IV
9.34 APPENDIX HH – LEARNER-OBJECT STATISTICS SEPEDI – PICTURE 3IV
9.35 APPENDIX II – OBJECT STATISTICS SEPEDI – PICTURE 3 IV
9.36 APPENDIX JJ – OBJECT ORDER SEPEDI – PICTURE 3 IV
9.37 APPENDIX KK – LEARNER-OBJECT STATISITICS ALL LANGUAGES & PICTURES IV
9.38 APPENDIX LL – OBJECT STATISTICS ALL LANGUAGES & PICTURESIV
9.39 APPENDIX MM - DIF IV

LIST OF FIGURES

TITLE **PAGE**

Figure 2.1: Foundation of Visual Literacy *30*
Figure 2.2: Culture & language & assessment influence *43*

Figure 2.3: Conceptual Framework 46
Figure 4.1: Item Characteristic Curve.....67
Figure 4.2: Item Development Pathway.....74
Figure 5.1: Picture 1 86
Figure 5.2: Item-Learner Map for all languages – Picture1 89
Figure 5.3: Item-Learner Map for Afrikaans – Picture1 92
Figure 5.4: Item Development Pathway for Picture 1 – Afrikaans group 93
Figure 5.5: Item-Learner Map for English – Picture1 97
Figure 5.6: IDP for English group – Picture 1 98
Figure 5.7: Item-Learner Map for Sepedi – Picture1 102
Figure 5.8: IDP for Sepedi group – Picture 1 103
Figure 5.9: Picture 2 106
Figure 5.10: Item-Learner Map for all languages– Picture 2 109
Figure 5.11: Item-Learner Map for Afrikaans– Picture 2 112
Figure 5.12: IDP for Afrikaans group – Picture 2 113
Figure 5.13: Item-Learner Map for Picture 2 - English group 116
Figure 5.14: IDP for English group – Picture 2.....117
Figure 5.15: Item-Learner Map for Picture 2 - Sepedi group.....120
Figure 5.16: IDP for Sepedi group – Picture 2 121
Figure 5.17: Picture 3 125
Figure 5.18: Item-Learner Map for all languages– Picture 2 127
Figure 5.19: Item-Learner Map for Picture 3 - Afrikaans group 129
Figure 5.20: IDP for Afrikaans group – Picture 3 130
Figure 5.21: Item-Learner Map for Picture 3 - English group 133
Figure 5.22: IDP for English group – Picture 3.....134
Figure 5.23: Item-Learner Map for Picture 3 - Sepedi group.....137
Figure 5.24: IDP for Sepedi group – Picture 3 138
Figure 5.25: Item-Learner Map for Picture 3 for all languages 143
Figure 5.26: Differential Item Functioning Graph.....147
Figure 5.27: Item Characteristic Curves.....148
Figure 6.1: Original Conceptual Framework.....165
Figure 6.2: Adapted Conceptual Framework.....166

LIST OF TABLES

TITLE ..... PAGE

Table 3.1: PIPS Assessment Content 7
Table 3.2: Definitions of Visual Literacy 26
Table 4.1: Positivism linked to the research study 59
Table 4.2 Research questions, instrument and analysis 62
Table 5.1: Learner & Item statistics for all learners for Picture 1 87
Table 5.2: Object statistics for all 3 language groups for Picture 1 87
Table 5.3: Learner & Item statistics for Afrikaans learners for Picture 1 90
Table 5.4: Object statistics for Afrikaans learners for Picture 1 91
Table 5.5: Object order for Picture 1 - Afrikaans group 94
Table 5.6: Learner & Item statistics for English learners for Picture 1 95
Table 5.7: Object statistics for English learners for Picture 1 96
Table 5.8: Object order for Picture 1 - English group 99
Table 5.9: Learner & Item statistics for Sepedi learners for Picture 1 100
Table 5.10: Object statistics for Sepedi learners for Picture 1 101
Table 5.11: Object order for Picture 1 - Sepedi group 104
Table 5.12: Object order for Picture 1 for all three language groups 105
Table 5.13: Learner & Item statistics for all language groups for Picture 2 107
Table 5.14: Object statistics for all language groups for Picture 2 108
Table 5.15: Learner & Item statistics for Afrikaans learners for Picture 2 110
Table 5.16: Object statistics for Afrikaans learners for Picture 2 111
Table 5.17: Object order for Picture 2 - Afrikaans group 114
Table 5.18: Learner & Item statistics for English learners for Picture 2 115
Table 5.19: Object statistics for English learners for Picture 2 115
Table 5.20: Object order for Picture 2 - English group 118
Table 5.21: Learner & Item statistics for Sepedi learners for Picture 2 119
Table 5.22: Object statistics for Sepedi learners for Picture 2 119
Table 5.23: Object order for Picture 2 - Sepedi group 122
Table 5.24: Object order for Picture 2 for all three language groups 123
Table 5.25: Learner & Item statistics for all language groups for Picture 3 126
Table 5.26: Object statistics for all three languages for Picture 3 126
Table 5.27: Learner & Item statistics for Afrikaans learners for Picture 3 128

Table 5.28: Object statistics for Afrikaans learners for Picture 3 128
Table 5.29: Object order for Picture 3 - Afrikaans group 131
Table 5.30: Learner & Item statistics for English learners for Picture 3.....132
Table 5.31: Object statistics for English learners for Picture 3.....132
Table 5.32: Object order for Picture 3 - English group.....135
Table 5.33: Learner & Item statistics for Sepedi learners for Picture 3.....136
Table 5.34 Object statistics for Sepedi learners for Picture 3 136
Table 5.35: Object order for Picture 3 - Sepedi group.....139
Table 5.36: Object order for Picture 3 – for all three groups 140
Table 5.37: Statistics for all objects and learners for all pictures.....141
Table 5.38: Object statistics for all learners for all pictures & all objects.....142
Table 5.39: Order for all the objects across the three language groups.....144

LIST OF ABBREVIATIONS

CEA	Centre for Evaluation & Assessment
CEM	Curriculum, Evaluation and Management Centre
DoE	Department of Education
FAL	First Additional Language
GET	General Education and Training
LEA	Local Education Authorities
LO	Learning Outcome
MidYIS	Middle Years Information System
NQF	National Qualifications Framework
NRF	National Research Foundation
PIPS	Performance Indicators in Primary Schools
PIPSSA	Progress in Primary Schools South Africa
PIRLS	Progress in International Reading Literacy
RSA	Republic of South Africa
SAMP	South African Monitoring in Primary Schools
SASSIS	South African Secondary School Information Systems
SAQA	South African Qualifications Authority
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
UP	University of Pretoria
VL	Visual Literacy
YELLIS	Year 11 Information System

GLOSSARY OF TERMS

There are various concepts and terms that will be used and referred to in this paper. These are clarified here, and in greater detail in Chapter 2:

Validity: An assessment is high in validity when the results thereof are accurate and trustworthy. Validity is seen as evaluative judgements that are made from the inferences of assessment results. An assessment has a high level of validity when correct interpretations are made and actions are taken about the results (Bond, 2003; Gregory, 2000; Linn, 1998; Mahoney, 2008; Messick, 1989; Popham, 2003; Frederiksen & Collins, 1989; Gay & Airasian, 2003; Sullivan, Karlsson & Ware, 1995).).

Visual Literacy (VL): For the purposes of this study (there are a multitude of definitions) VL is defined as the ability to accurately identify objects and pictures seen in the past when they reoccur in the present in a similar or different manner (Arbuckle, 2004; Bamford, 2003; McDougall, 2004; Avgerinou & Ericson, 1997).

Picture Literacy (PL): Is the ability to understand and interpret a picture (Arbuckle, 2004; DeLoache, 1991; Rowntree, 1990; Carney & Levin, 2002; Hawthorne & Tomlinson, 1997).

Rasch Analysis: Is a statistical procedure that makes use of scientific analysis to evaluate each item that is used in an assessment. By means of a Rasch analysis each item can be analysed to determine its difficulty, value and relevance to a specific test (Boone & Rogan, 2005; de Beer, 2004; Henson, 1999; Pallant & Tennant, 2007).