

Bridging the Gap

Optimising a Feedback System for Monitoring Learner Performance

by Elizabeth Archer 2010

Presented in partial fulfilment of the requirements for the

degree

DOCTORATE OF EDUCATION

(ASSESSMENT AND QUALITY ASSURANCE)

Faculty of Education University of Pretoria

Supervisors

Professor SJ Howie Professor B Smit

© University of Pretoria



This thesis is dedicated to my beautiful, lowing wife. Catherine.

We made it, babes!



Acknowledgements

Many people directly and indirectly contributed to the process of creating this thesis. I cannot thank all of you individually, but thank you for helping me on this journey. I would however like to thank some very special people:

- All the teachers, HoDs and principals who gave so freely of their time and expertise to help build this feedback system and who contributed to this thesis. Thank you for sharing your expertise, insights and passion.
- Sarah, I really enjoyed our thinking sessions and the way you challenged me intellectually. Thank you for so generously providing me with the time and support I needed for my thesis. The opportunities you have created for me are deeply appreciated.
- Brigitte, it was your mentorship and guidance which first stimulated my interest in research nearly a decade ago. Thank you for opening this door to the world of rigorous enquiry for me.
- Vanessa, you are an amazing friend. Thank you for always listening, supporting and providing advice. You are a technical advisor *par excellence*. May God bless you richly.
- Prof Tjeerd Plomp, thank you for being a critical friend and true mentor.
 I was blessed to benefit from your guidance and wisdom. I hope my retirement one day will be a bit more quiet than yours [©].
- Prof Roel Bosker, thank you for your guidance and support as well as the learning opportunities you made possible at GION at the University of Groningen.
- My fellow PhD sufferers, Kim and Lisa. Our impromptu debriefing, support, consultation and therapy sessions always nourished my emotional well-being. Thank you for being there and sharing the load.



- The South African Netherlands Research Programme on Alternatives in Development (SANPAD), who generously funded the SAMP project. Thank you also for the opportunity to attend the SANPAD Advanced Research Capacity Initiative, which stimulated my growth as a researcher. The collaboration with our Dutch partners has been invaluable.
- The National Research Foundation (NRF), thank you for providing the funding for this thesis and initial funding for the PIPSSA project.
 Without funders such as the NRF post-graduate studies would be out of reach for most South Africans.
- Most of all I want to say thank you Catherine. Without your love and support this would not have been possible. Thank you for believing in me, supporting me, looking after me and putting up with me. I love you always.



Abstract

Globally, a wealth of educational data has been collected on learner performance in a bid to improve and monitor the quality of education. Unfortunately, the data seem to have had only limited influence on learning and teaching in classrooms. This thesis aimed to bridge this gap between the availability of learner performance data and their use in informing planning and action in schools. A design research approach was used to optimise the feedback system for the South African Monitoring system for Primary schools (SAMP).

Design research aims to produce both an intervention to address a complex real-world challenge and to develop design guidelines to support other designers faced with similar challenges in their own context. In this research, the process of developing and improving the feedback system was also used to examine ways of facilitating the use of the feedback. Multiple cycles of design, implementation and evaluation of four different prototypes of the feedback system were conducted, employing evaluations from both experts (e.g. Dutch and South African academics, research and educational psychologists, instrument designers and teacher trainers) as well as school users (teachers, principals and HoDs).

Mixed methods were employed throughout the study, with different subsamples of school users sampled from the population of 22 schools (English, Afrikaans and Sepedi) in the Tshwane region participating in SAMP. The various research cycles incorporated interviews, observations, journals, questionnaires, the Delphi technique and expert evaluations to examine not only data-use, but also aspects such as problem-solving, planning, dataliteracy and attitudes towards evidence-based practice in the schools. Data was analysed using Rasch Modelling, descriptive statistics and computeraided qualitative data analysis.

The study showed that an effective feedback system facilitates appropriate use through a gradual process of enlightenment, is flexible and responsive to user inputs, values collaboration and includes instrument, reporting and



support components in its design. An optimum feedback system also positively influences school feedback and monitoring culture by providing opportunities for positive experiences with feedback and increasing dataliteracy. This improves the chances of feedback being used for planning, decision-making and action in the schools. An effective feedback system must also offer a comprehensive package to accommodate different users, with various levels of data sophistication, functioning in diverse contexts. The research also showed that an effective feedback system mediates thinking about educational instruction and curriculum and can therefore be a potent change agent. Use of clear, simple, intuitive data presentation in the feedback system allows for experiential learning to increase user data-literacy.

The design research approach employed in this study offers an appropriate and powerful approach to adapting, developing and optimising a feedback User involvement in design research system. ensures greater contextualisation and familiarity with the system, while engendering trust and a greater sense of ownership, all of which increase the receptiveness and responsiveness of users to feedback. Finally, the research also contributed design guidelines for other developers of feedback systems, an integrated conceptual framework for use of monitoring feedback and a functioning feedback system employed by 22 schools in the Tshwane region.

Keywords: Feedback use; Data use; Data-literacy; Statistical-literacy; Learner performance monitoring; Feedback system; School Performance Feedback System (SPFS); Evidence-based practice; Design Research; Enlightenment



TABLE OF CONTENTS

LIST OF FIGURES		VI	
LIST	T OF TABLES	VIII	
LIST	LIST OF ABBREVIATIONS		
	APTER ONE RODUCTION AND OVERVIEW	-1-	
1.1	Definition of Terms	- 2 -	
1.2	The SAMP Project	- 5 -	
1.3	Problem Statement and Rationale	- 11 -	
1.4	Research Questions	- 17 -	
1.5	Research Methodology	- 20 -	
1.6	Presentation Style	- 22 -	
1.7	Structure of this Thesis	- 22 -	

CHAPTER TWO THE SOUTH AFRICAN MONITORING SYSTEM FOR PRIMARY SCHOOLS - 26 -

2.1	The PIPS	Instrument	- 26 -
2.2	The Sout	h African Birth of SAMP	- 30 -
2	.2.1 The	e Importance of Value-Added Measures	- 32 -
2	.2.2 Cor	ntextualisation and Adaptation of SAMP	- 34 -
	2.2.2.1	The PIPS Instrument in South Africa Prior to 2006	- 35 -
	2.2.2.2	Adaptation of PIPS into SAMP during 2006	- 39 -
	2.2.2.3	SAMP 2008	- 50 -
2.3	Conclusio	on	- 52 -



- 54 -

- 92 -

CHAPTER THREE CONTEXTUALISATION, LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

3.1 The	Educational Landscape in South Africa	- 54 -
3.1.1	Resource Availability	- 55 -
3.1.2	Challenges to School Attendance	- 57 -
3.1.3	The Impact of Social Problems	- 58 -
3.1.4	Issues of Diversity	- 58 -
3.1.5	Educator Related Issues	- 59 -
3.1.6	General Education and Training in South Africa, the Foundation phase	- 59 -
3.2 Moi	nitoring and Feedback in South African Education	- 60 -
3.3 Lite	rature Review	- 65 -
3.3.1	Possible Purposes of Monitoring and Feedback Systems	- 66 -
3.3.2	Types of Monitoring and Feedback Systems in Education	- 67 -
3.3.3	School Performance Feedback Systems	- 68 -
3.3.	3.1 United Kingdom – CEM Suite	- 68 -
3.3.	3.2 New Zealand – asTTle	- 69 -
3.3.	3.3 Netherlands - Zebo	- 70 -
3.3.	3.4 America, Louisiana – School Analysis Model (SAM)	- 71 -
3.4 Use	of feedback in schools	- 74 -
3.5 Con	ceptual Framework	- 78 -
3.5.1	External Environment and Context of the Use of the Feedback System	- 82 -
3.5.2	Internal Environment and Context of the Use of the Feedback System	- 82 -
3.5.3	The Complexity of Change	- 89 -
3.6 Con	clusion	- 91 -

CHAPTER FOUR OVERVIEW OF THE RESEARCH DESIGN

4.1 Res	earch Paradigm	- 92 -
4.1.1	Ontology	- 94 -
4.1.2	Epistemology	- 95 -
4.1.3	Axiology	- 96 -
4.1.4	Methodology	- 97 -
4.2 Res	earch Design	- 98 -
4.2.1	Design Research	- 99 -
4.2.2	Evaluative Criteria in Design Research	- 102 -
4.2.3	Application of Design Research for this Inquiry	- 105 -
4.2.4	Population for the Design Research	- 110 -
4.2.5	Research Procedures	- 112 -
4.2.6	Shifts in Emphasis in the Design Research Process	- 112 -
4.3 Me	thodological Quality	- 115 -
4.3.1	Role of the Researcher	- 118 -
4.3.2	Realm of Application	- 120 -
4.4 Con	clusion	- 121 -



CHAPTER FIVE PRELIMINARY PHASE: PROBLEM IDENTIFICATION, NEEDS AND CONTEXT ANALYSIS - 123 -

5.1	Resear	ch Cycles	- 124 -
5.2	Prior D	evelopment, Needs and Context Analysis	- 126 -
5.	2.1 P	re-Existing Feedback System (Prior to 2006)	- 127 -
5.	2.2 R	eports – Pre-Existing Feedback System	- 129 -
5.	2.3 F	eedback Sessions – Pre-Existing Feedback System	- 132 -
5.	2.4 lr	nformal Evaluation of - Pre-Existing Feedback System	- 133 -
	5.2.4.1	Reports	- 133 -
	5.2.4.2	Feedback Sessions	- 135 -
5.	2.5 D	esign Principles from Literature Review	- 135 -
5.	2.6 E	xemplary Case Study – asTTle, New Zealand	- 136 -
	5.2.6.1	Literature Review	- 138 -
	5.2.6.2	Sampling	- 144 -
	5.2.6.3	Data Collection	- 145 -
	5.2.6.4	Data Capturing	- 145 -
	5.2.6.5	Data Analysis	- 145 -
	5.2.6.6	Discussion	- 148 -
5.	2.7 D	esign Principles from the Exemplary Case Study	- 160 -
5.3	Conclu	sion	- 163 -

CHAPTER SIX PROTOTYPING PHASE: ESTABLISHING CONDITIONS FOR USE (CYCLE 1-2) - 165 -

6.1	Cycle 1 (P	rototype I - Baseline 2008)	- 167 -
6.1	.1 Prot	totype I – Baseline 2008	- 168 -
	6.1.1.1	Reports	- 169 -
	6.1.1.2	Feedback Sessions	- 176 -
6.1	.2 Forr	mative Evaluation of Prototype I	- 176 -
	6.1.2.1	Selection of Participants	- 177 -
	6.1.2.2	Data Collection	- 178 -
	6.1.2.3	Data Capturing and Analysis	- 180 -
	6.1.2.4	Results and Design Guidelines-Expert Evaluators	- 180 -
	6.1.2.5	Results and Design Guidelines-Delphi Technique	- 182 -
6.1	.3 Cycl	le 2 (Prototype II, Follow-up 2008)	- 188 -
6.1	.4 Prot	totype II – Follow-up 2008	- 189 -
	6.1.4.1	Reports	- 190 -
	6.1.4.2	Feedback Sessions	- 191 -
6.1	.5 Forr	mative Evaluation of Prototype II	- 192 -
	6.1.5.1	Sampling	- 192 -
	6.1.5.2	Data Collection	- 193 -
	6.1.5.3	Data Capturing	- 193 -
	6.1.5.4	Data Analysis	- 193 -
	6.1.5.5	Results and Design Guidelines	- 194 -
6.2	Conclusio	n	- 199 -



PR	APTER SEVEN DTOTYPING PHASE: TRANSFORMING CONDITIONS FOR USE INTO (CLE 3)	- 200 - USE - 200 -
7.1	Cycle 3 (Prototype III - Baseline 2009)	- 202 -

7.	1.1 Pro	totype III – Baseline 2009	- 203 -
	7.1.1.1	Reports	- 204 -
	7.1.1.2	Instrument Manuals	- 208 -
	7.1.1.3	Feedback Session	- 209 -
	7.1.1.4	Electronic Resource	- 211 -
7.	1.2 For	mative Evaluation of Prototype III	- 212 -
	7.1.2.1	Sampling	- 212 -
	7.1.2.2	Data Collection	- 213 -
	7.1.2.3	Data Capturing	- 214 -
	7.1.2.4	Data Analysis	- 215 -
	7.1.2.5	Results and Findings - Report Evaluation Questionnaire	- 215 -
	7.1.2.6	Exemplary Cases	- 225 -
	7.1.2.7	Discussion and Design Guidelines	- 235 -
7.2	Conclusio	on	- 239 -

CHAPTER EIGHT ASSESSMENT PHASE: CYCLE 4

8.1	Research	Cycles	- 240 -
8.2	Cycle 4 (P	rototype IV – Follow-up 2009)	- 242 -
8.	2.1 Prot	totype IV – Follow-up 2009	- 243 -
	8.2.1.1	Reports	- 244 -
	8.2.1.2	Instrument Manuals	- 246 -
	8.2.1.3	Feedback Sessions	- 247 -
	8.2.1.4	Website	- 249 -
8.	2.2 Sem	ni-summative Evaluation of Prototype IV	- 250 -
	8.2.2.1	Sampling	- 250 -
	8.2.2.2	Data Collection	- 251 -
	8.2.2.3	Data Capturing	- 252 -
	8.2.2.4	Data Analysis	- 252 -
	8.2.2.5	Results and Findings - Expert Evaluators' Reports	- 253 -
	8.2.2.6	Results and Findings - Teachers and Management Questionnaires	- 255 -
	8.2.2.7	Design Guidelines from the Evaluator Reports	- 281 -
	8.2.2.8	Design Guidelines from the Final Evaluation Questionnaire	- 281 -

8.3 Conclusion

- 240 -



- 284 -

CHAPTER NINE CONCLUSIONS AND RECOMMENDATIONS

9.1	Summary of Research Process	- 285 -
9.2	Reflections on the Conceptual Framework	- 290 -
9.3	Summary of Results 3.1 Sub-question 1	- 296 - - 296 -
	3.2 Sub-question 2	- 297 -
	3.3 Sub-question 3	- 300 -
9.	3.4 Sub-question 4	- 302 -
9.	3.5 Sub-question 5	- 303 -
9.	3.6 Sub-question 6	- 303 -
9.4	Reflections on Methodology	- 306 -
9.5	Reflections on the Role of the Researcher	- 308 -
9.6	Conclusions	- 311 -
9.7	Recommendations	- 316 -
REF	FERENCES	- 320 -



LIST OF FIGURES

TITLE

PAGE

Figure 1.1: History of the SAMP project	- 8 -
Figure 1.2: SAMP Baseline and follow-up assessment	
Figure 2.1: Contributions to learners' achievement variance	
Figure 2.2: Differential item functioning for the Vocabulary subtest for the different languages	00
groups	- 46 -
Figure 3.1: Infrastructure changes in the South African education system 1996-2006 (public	40
ordinary schools)	- 56 -
Figure 3.2: Grade 12 pass rate per year mapped against with number of candidates enrolled	- 63 -
Figure 3.3: Some influences on the South African monitoring and feedback culture	
Figure 3.4: Preliminary conceptual framework for monitoring feedback use	
Figure 4.1: Wademan's Generic Design Research Model	
Figure 4.2: Layers of formative evaluation	
Figure 4.2: Layers of formative evaluation Figure 4.3: Interaction between design phase, design activities and evaluative focus in Design	102 -
research	104
Figure 4.4: Design research cycles for this thesis	
Figure 4.5: Design research process followed	
Figure 5.1: Design research process – focus for Chapter 5, Preliminary Phase	
Figure 5.2: Report outline – pre-existing system	
Figure 5.3: Description of the Vocabulary subtest – pre-existing system	
Figure 5.4: Mathematics Scale results across schools - pre-existing system	
Figure 5.5: Overall performance for the school - pre-existing system	
Figure 5.6: Easiest Reading easiest items – pre-existing system	
Figure 5.7: Individual learner result tables – pre-existing system	
Figure 5.8: Components facilitating the success of the asTTle SPFS in New Zealand	
Figure 6.1: Design research process – focus for Chapter 6, Prototyping Phase Cycle 1-2	
Figure 6.2: Composition of the Baseline Assessment – Prototype I	170 -
Figure 6.3: Description of the Vocabulary subtest – Prototype I	171 -
Figure 6.4: Comparative tables per language group for scale and subtest scores - Prototype I	172 -
Figure 6.5: Early Phonics scale and constituent subtest results across schools - Prototype I	- 173 -
Figure 6.6: School's performance across the scale – Prototype I	
Figure 6.7: Individual learner result tables – Prototype I	
Figure 6.8: Histograms and identification of learners in need of additional support - Prototype I	
Figure 6.9: Overall school performance in terms of gains and losses in percentage correct -	
Prototype II	- 190 -
Figure 6.10: Attitudinal information for learners on school-level –	
Figure 7.1: Design research process -focus of Chapter 7	
Figure 7.2: Example of comparative results per language group per scale - comparison of	
2009 school results to 2008-2009 – Prototype III	- 205 -
Figure 7.3: Example of overall performance graph for school 3 compared to English medium	200
schools – Prototype III	- 207 -
Figure 7.4: Expanded Conclusion Section – Prototype III	- 207 -
Figure 7.5: Manual- Excerpt from the Quality of Data Section – Prototype III	
Figure 7.6: Manual- Excerpt from the Notes on Interpretation Section – Prototype III	
Figure 7.7: Excerpt from datasheet – Prototype III	
Figure 7.8: Electronic resource – Prototype III	
Figure 7.9: Electronic dataset – Prototype III	
Figure 7.10: School A/E - Team Approach data path	
Figure 7.11: School E – Cascade Approach data path	
Figure 7.12: School S – Top-down Approach data path	
Figure 8.1: Design research process – focus for Chapter 8, Assessment Phase	241 -



•
246 -
248 -
249 -
289 -
291 -
294 -



LIST OF TABLES

TITLE

Table 2.1: CEM information systems	28 -
Table 2.2: Difference between paper-based and computer-based modes of delivery of the	
PIPSSSA assessment	39 -
Table 2.3: Reliability coefficients for the computer-based 2005 PIPSSA subtests overall and	
according to language of assessment	
Table 2.4: Difficulty and discrimination values for items overall and across languages	
Table 2.5: Difficulty and values indicated by teachers and assessment of fairness of items	47 -
Table 2.6: Changes proposed to items by expert evaluation panel	49 -
Table 2.7: Reliability coefficients for the three SAMP scales follow-up 2008 and PIPS scales	
for the UK	51 -
Table 2.8: Summary of contextualisation and adaptation of Vocabulary subtest	53 -
Table 3.1: Time allocation for Foundation Phase.	
Table 3.2: Purposes and functions of information systems	
Table 3.3: Types of monitoring and educational information systems and their purposes	
Table 3.4: Examples of data elements for the ABC+ matrix used in SAM	
Table 4.1: Quality criteria for the feedback system	
Table 4.2: Quality emphasis per development stage	
Table 4.2: Quality emphasis per development stage	1 1
Table 4.3. Establishment of trustworthness in quantative research	
Table 5.2: Principles emerging from the international SPFSs	
Table 5.3: Comparison of the South African and New Zealand educational landscapes	
Table 5.4: Participants in exemplary case study	
Table 5.5: Combined design guidelines from the Preliminary Phase	
Table 6.1: Prototype I – Baseline 2008 components	
Table 6.2: Response analysis for Delphi technique – Prototype II	
Table 6.3: Delphi - Priorities for improving feedback sessions –Prototype I	
Table 6.4: Delphi - Priorities for improving reports-Prototype I	
Table 6.5: Delphi - Priorities for improving support-Prototype I	
Table 6.6: Prototype II – Follow-up 2008 components	
Table 6.7: Number of respondents for feedback questionnaire – Prototype II	
Table 6.8: Cycle 3 - Summary of feedback questionnaire results	195 -
Table 7.1: Prototype III – Baseline 2009 components	204 -
Table 7.2: Response analysis for Report Questionnaire – Prototype III	
Table 7.3: Report Evaluation Questionnaire Data	
Table 7.4: Summary of schools use of the SAMP data	
Table 8.1: Prototype IV – Follow-up 2009 components	
Table 8.2: Response rates for the Teacher Questionnaire and the Management Questionnaire	
Table 8.3: Evaluation Questionnaire Data Teacher and Management – Background	
information	- 256 -
Table 8.4: Frequencies of teacher and management views of the assessment component	
Table 8.5: Frequencies of teacher and management views of the report component (bound	. 201
and electronic)	250
Table 8.6: Frequencies of teacher and management views of the manual component	
	202 -
Table 8.7: Frequencies of teacher and management views of the electronic resource	000
component (CD/DVD)	263 -
Table 8.8: Frequencies of teacher and management views of the website component	265 -
Table 8.9: Frequencies of teacher and management views of the feedback session	
component	267 -
Table 8.10: Open-ended questions on teacher and management views about overall	
conditions required for use of the feedback	
Table 8.11: Frequencies of teacher and management use of feedback	270 -
Table 8.12: Open-ended questions on teacher and management views about use of the	
feedback	273 -



Table 8.13: Teacher rating of Feedback System Components – Histogram, Mean (Me) and Mode (Mo)	- 277 -
Table 8.14: Management rating of Feedback System Components - Histogram, Mean (Me) and Mode (Mo)	
Table 8.15: Open-ended questions on teacher and management views about the effectiveness of the feedback system	



LIST OF ABBREVIATIONS

450 Support	Forms to be completed when child is identified as at risk of failure and submitted to the DoE, must be accompanied by an individualised support program.
ABC+	Attitudinal/Behavioural/Cognitive Indicators, plus Context
ABEL	Assessment for Better Learning
AIDS	Acquired Immune Deficiency Syndrome
ALIS	A Level Information System
ARB	Assessment Resource Bank
ASPECTS	Assessment Profile on Entry for Children and Toddlers
asTTle	assessment Tools for Teaching and learning
AtoL	Assess to Learn
CAQDAS	Computer Aided Qualitative Data Analysis
CASS	Continuous assessment
CD	Compact Disc
CEA	Centre for Evaluation & Assessment
CEM	Centre for Evaluation and Monitoring
CREATE	Consortium for Research on Education, Access, Transitions & Equity
DIF	Differential Item Functioning
DoE	Department of Education (South Africa)
DVD	Digital Video Disc
ERO	Education Review Office
GDE	Gauteng Department of Education
GDP	Gross Domestic Product
GET	General Education and Training
HIV	Human Immune Deficiency Virus
HoD	Head of Department



HSRC	Human Science Research Council
ICT	Information and Computer Technology
InCAS	Interactive Computer Assessment System
IQMS	Integrated Quality Management System
LEAs	Local Education Authorities
LOLT	Language of Learning and Teaching
MidYIS	Middle Years Information System
MLA	Monitoring Learning Achievement
NEIMS	National Education Infrastructure Management System
NEMP	National Education Monitoring Project
NQF	National Qualifications Framework
NRF	National Research Foundation
NZ MoE	New Zealand Ministry of Education
NZ	New Zealand
OBE	Outcomes Based Education
OECD	Organization for Economic Co-operation and Development
OFSTED	Office for Standards in Education
ОТ	Occupational Therapist
PAT	Progressive Achievement Tests
PD	Professional Development
PIPS	Performance Indicators in Primary Schools
PIPSSA	Performance Indicators in Primary Schools in South Africa
PIRLS	Progress in International Reading Literacy Survey
PISA	Programme of International Student Assessment
RSA	Republic of South Africa



SACMEQ	Southern African Consortium for Monitoring Educational Quality
SAM	School Analysis Model
SAMP	South African Monitoring system for Primary schools
SANPAD	South African Netherlands Research Programme on Alternatives in Development
SAQA	South African Qualifications Authority
SASSIS	South African Secondary School Information System
SBST	School Based Support Team
SGB	School Governing Body
SIOP	Sheltered Instruction Observation Protocol
SITES	Second Information Technology in Education Study
SOLO	Structure of Observed Learning Outcomes
SPFS	School Performance Feedback System
STAR	Supplementary Test of Achievement in Reading
TIMSS	Third/Trends in International Mathematics and Science Study
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UP	University of Pretoria
USA	United States of America
YELLIS	Year 11 Information System
ZEBO	Zelf Evaluatie in het Basis Onderwijs ¹

¹ English translation: *Self-Evaluation in Primary Education*