

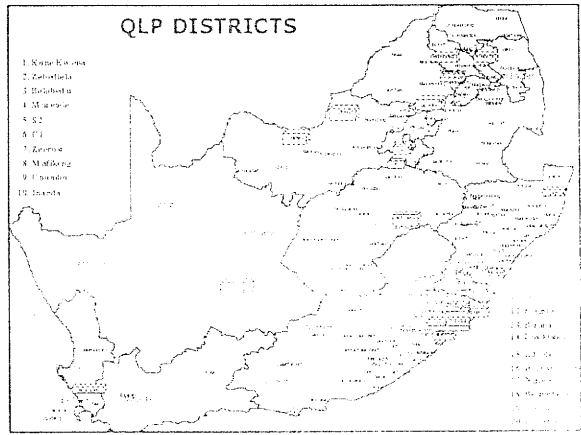
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HSRC RESEARCH OUTPUTS
2005

QUALITY LEARNING PROJECT
Results of the Baseline Study
June 2001
Unit for Assessment Research and Technology
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Format of Presentation
Introduction - Andrew Patterson (5)
Methodology & Design - Anil Kanjee (5)
Results:Learner Performance - Alrika Moore (15)
Conditions of Teaching and Learning
Cass Prinsloo (15)
Factors influencing Learner Performance
Mbithi wa Kivilu (20)
Discussion - Comments & Questions (60)

OVERVIEW OF
EVALUATION
COMPONENT
Programme 3



Paper presented at the Quality Learning project Inolaba 3,
27 June 2001, Misty Hills Country Hotel, Muldersdrift.

The Quality Learning Project

1. 5 Year school improvement project in >500 schools in 17 districts
2. Aims to facilitate change by working with district officials, school management teams and educators



Key outcomes of the QLP

- Improved learning outcomes in Maths and LoL
- Improved teaching of LoL and Maths
- Improved governance and management of schools
- Improved management of District offices
- Improved support to schools



Programmes of the QLP

- One: District Development
- Two: School Development
- Three: Learning outcomes and Assessment practices
- Four: Educator development and Curriculum implementation
- Five: Monitoring and evaluation



The HSRC's Evaluation Plan

- Design and conduct "Learner Achievement Tests" in a sample of QLP schools
- Design and conduct a "Survey" focusing on conditions in a sample of schools and in all districts
- Track changes in Learner Achievement and in School and District Conditions
- Identify and analyse the possible associations between learner achievement scores, QLP interventions, and changes in school and district conditions



Function of the HSRC's Evaluation Plan

- Inform the planning of the interventions at classroom, school and district levels
- Monitoring of progress towards the stated goals of the QLP
- Apply analytic techniques to extract value in terms of 'lessons learned' about district and school development that are transferable and sustainable



Overview of the multi-year Evaluation Plan



Limitations

- The HSRC depended to some extent on information and data gathered by non-HSRC staff (eg: for sampling and for the survey) and could not control these processes
- Limitations imposed by a (20%) sample of the population of schools participating in the QLP



Limitations cont

- Not all learners in target grades were selected for assessment creating anxiety in learners
- The fluid shape of districts will affect the future cross time comparison thus affecting comparability
- Between provinces, the profile of district functions differs thus affecting comparability



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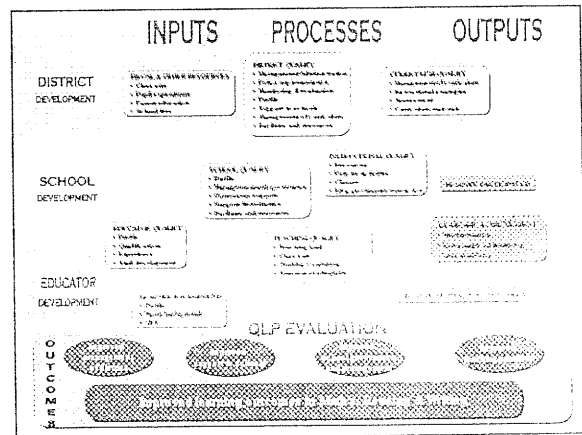


Limitations cont

- Levels of non-disclosure producing null values for respondents (eg: educators)
- Need to improve levels of trust among respondents at all levels so that self report data more closely reflects the actual conditions



METHODOLOGY AND DESIGN



Methodology: Sampling Schools

Relationship between samples in the study

QLP - 500 Schools

Learner assessment and survey - 20% sample
Proportional representation per district
Criteria - Matric results and school size

Site Visits
2 schools per district



Baseline sample realised

Target group	Sample
Learners	8453
Educators	445
School Principal	102
Circuit Managers	70
District managers	18
Mathematics L A S	11
Language L A S	19



Methodology: Instrument Development

Consultations DoE & JET
Develop frameworks
Researchers & educators developed items
Distribute for comment
Developed drafts
Distribute instruments for comment
Pre-testing & Pilot Study
Prepare for Main study



List of instruments


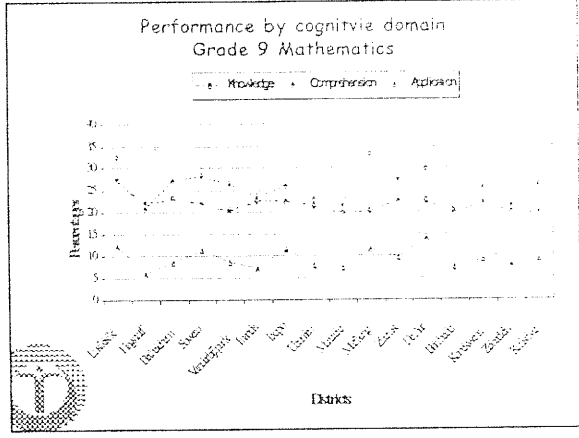
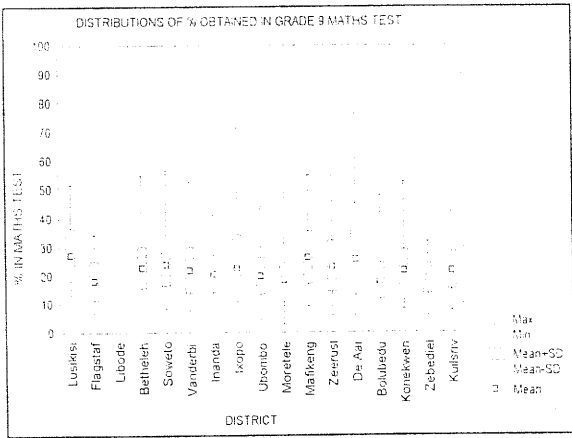
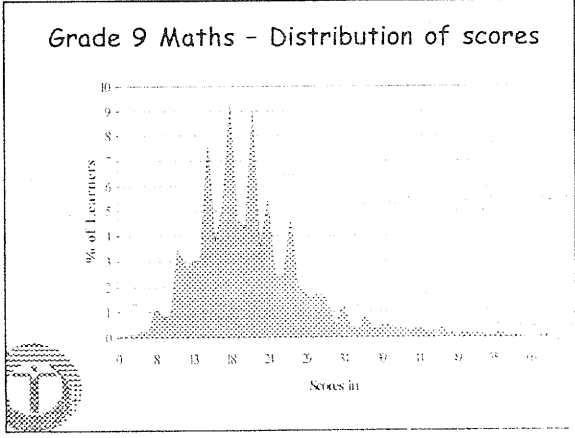
District/ Circuit	Instrument	Target
	Questionnaire	Manager/Director
	Questionnaire	Learning area specialist
	Interview schedule	Manager/Director
	Interview schedule	Learning area specialist
	Field Report Schedule	QLP Project Co-ordinator ¹
School	Questionnaire	Principal
	Interview schedule	Principal
	Interview schedule	Management team
	Interview schedule	Teachers
Class	Questionnaire	All Gd 9 and G11 educators in Mathematics and language
	Observation schedule	Classroom
Learner	Math, Read, Writing Tests	Sample of learners in Grd 9 and G11
	Background	
	Questionnaire	

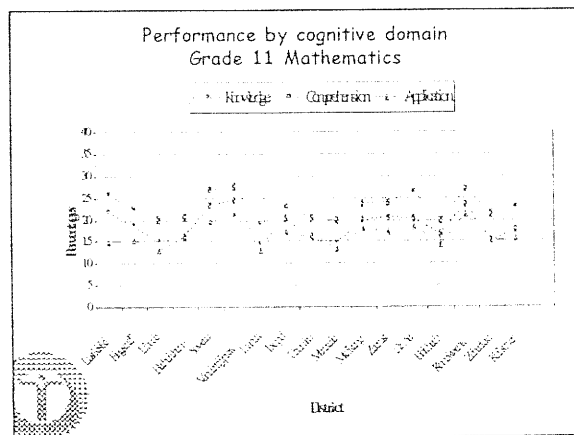
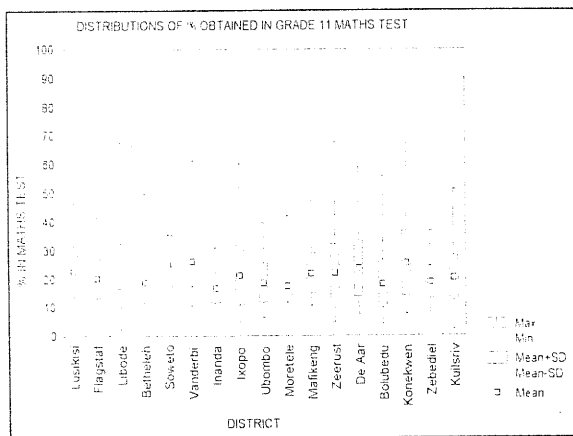
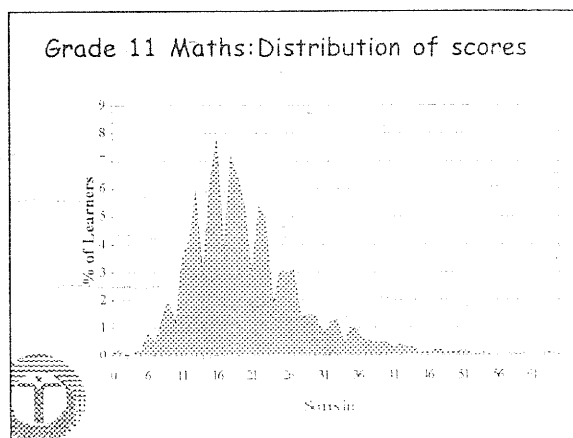
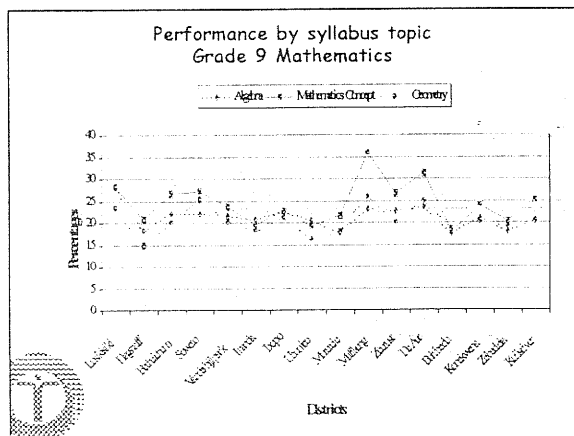
¹ Field Reports recorded years 2 to 5

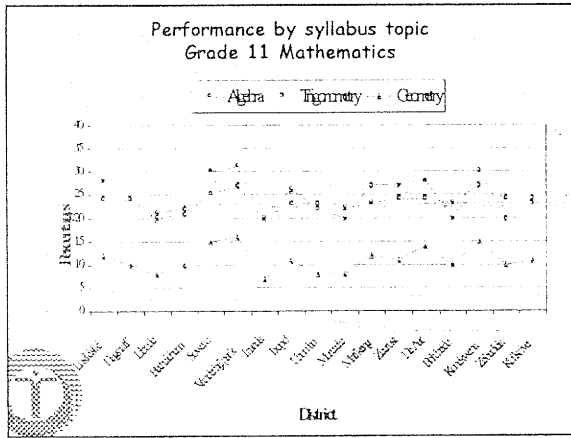


LEARNER PERFORMANCE RESULTS

GRADES 9 & 11 MATHEMATICS AND LANGUAGES

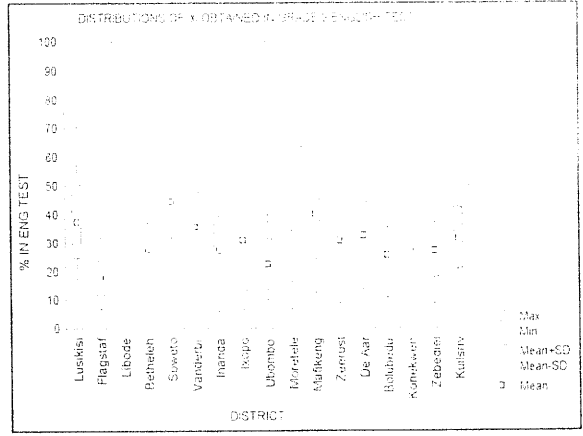
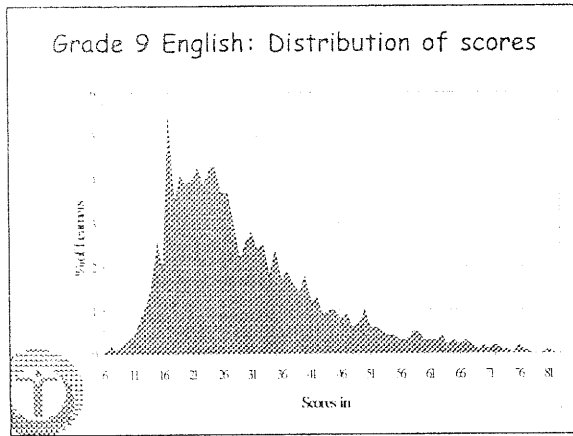


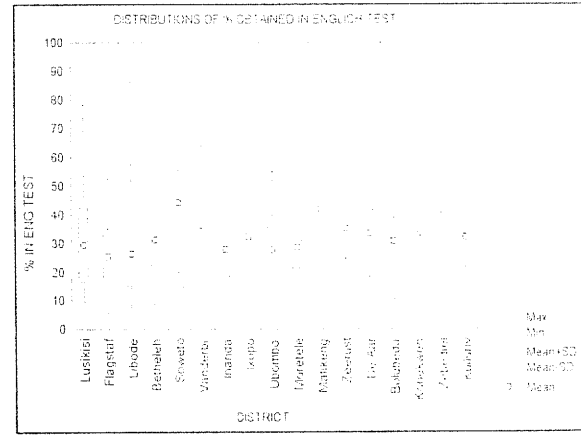
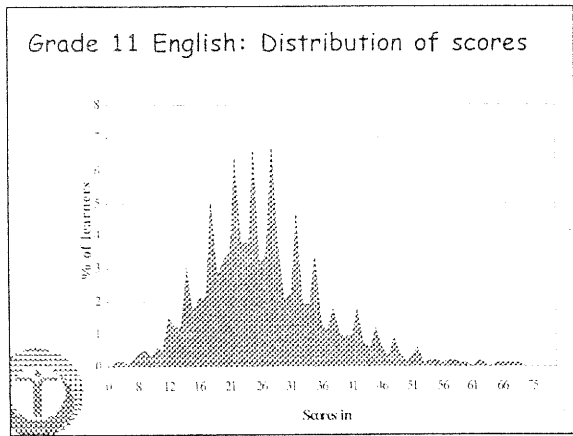
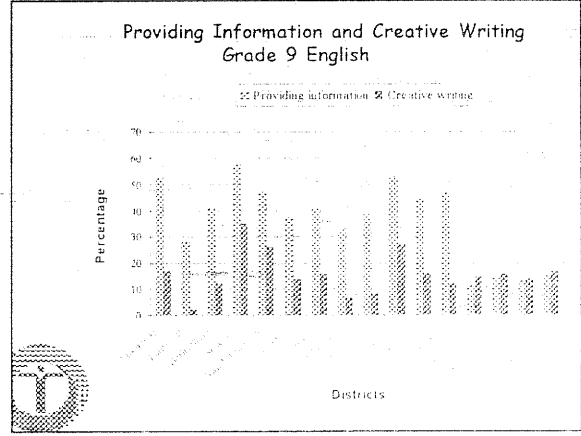
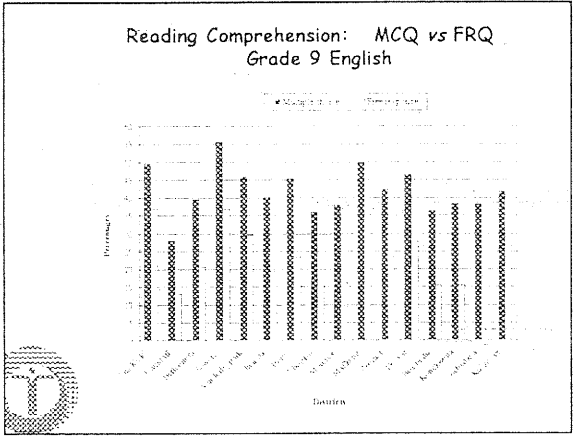


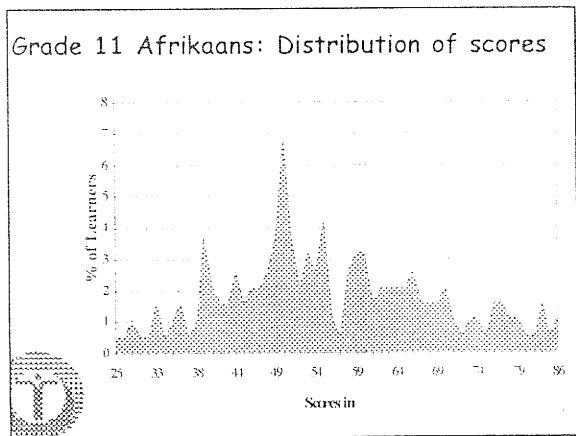
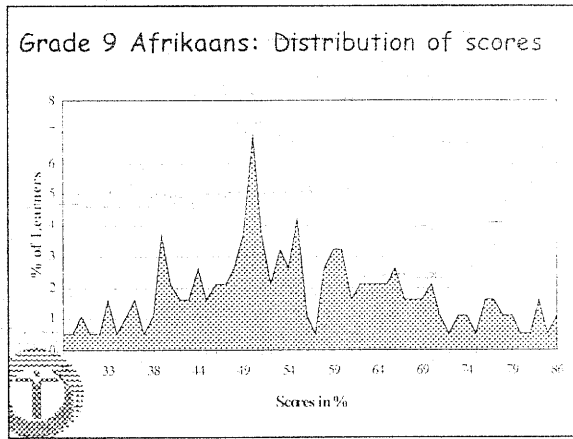
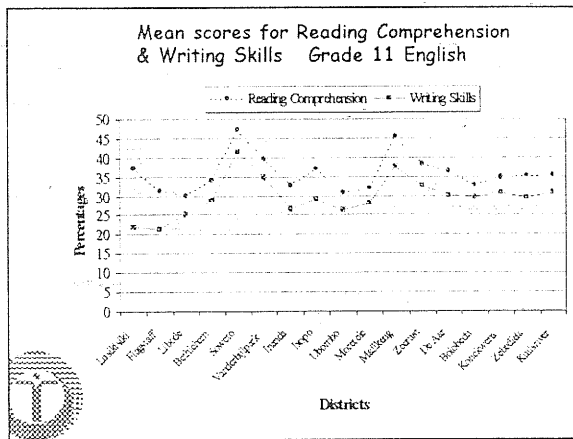
CONCLUSION - Mathematics

- The overall results for both grades 9 and 11 portray a very bleak picture regarding their understanding and knowledge of Mathematics.
- In general, the analysis indicates that learners' understanding of concepts in all topics of the Mathematics syllabus was minimal, especially in Geometry.
- Learners' performance in the knowledge and comprehension domains suggests the presence of serious problems in the knowledge and understanding of mathematical concepts. This also explains the low performance in the application domain.

The poor performance of learners in both the MC and FR items can be attributed to limited skill to structure and produce their own responses correctly.

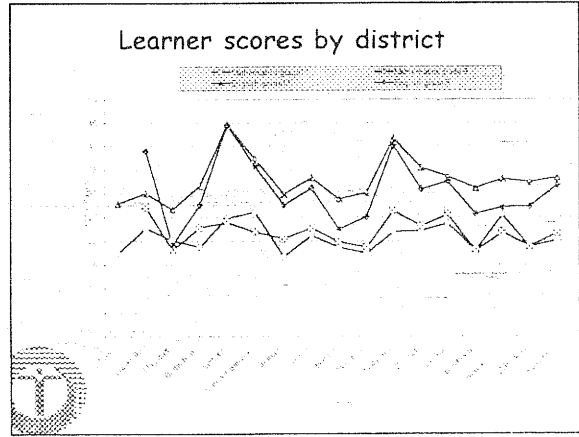
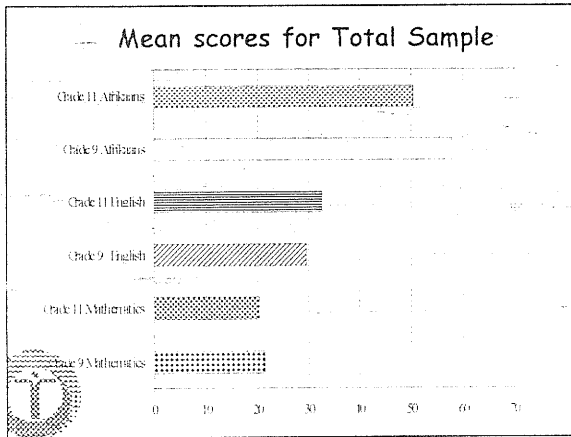






CONCLUSION

- The better performance on the Afrikaans instrument could be ascribed to the fact that Afrikaans is the primary language of the learners assessed.
- The instruments were not designed to diagnose very specific weaknesses and shortcomings – they focused broadly on the learners' ability to access, process and analyse information, and to communicate in writing.
- Learners could, to a certain extent, understand simple texts and straightforward questions but failed to understand texts that were more complicated and in-depth questions on the text.
- They provided simple straightforward information in writing but could not produce longer texts and describe, narrate or argue a point coherently and fluently. Learners seemed to have a limited vocabulary.



CLOSING REMARK

The baseline results for learner performance are well below the targets set for the Quality Learning Project, especially in Mathematics. However, with the successful implementation of the intervention programmes, this situation can only improve, and thus it is expected that the results for the formative evaluation in Year 3 would be significantly higher.

- ### QLP - Baseline study
1. Technical report
 2. Teaching and learning context (conditions) at various levels of the system

Introduction

1. Status of report – draft (comments invited; some errors survived still)
2. Levels: district, school, classroom (M & R&W educators and learners)
3. Focus: policies, structures, management, facilities / resources, activities



Introduction

5. How to read the report – selective (per learning area, district, theme/topic)
6. Methodology, background and sampling (covered in the other parts of the presentation):
 - site visits – observation and interviews (36)
 - survey – self-report questionnaires (102)



Findings – District-level conditions

District Profile

1. Male (management, Maths specialists)
2. Population groups - representative
3. Qualifications – on paper ✓; matched to tasks ✗
4. Facilities – vehicles, e-communication, copying / printing ✗



Main findings – district

1. Boundaries in flux; reach from centre
2. Management & organisation: organograms & job descriptions ↔ DAS, performance appraisal / staff development
3. Education policy formation and implementation ✓ – strategic planning ✗



Main findings - district

4. Administration and finances – year-plans and budgets ✓ / ✗
5. Evaluation and monitoring – regular feedback reports ✓; visits more incidental; EMIS ✗
6. Support to schools – curriculum support (learning progr.s / lesson plans ✗) 50-80% service levels; practical (INSET) ✗

Findings - School-level conditions

School/management profile (SP,SMT,SGB)

1. Size: variation (100 – 2000+)
2. Location: urban / rural
3. Lang. of learning: English (Maths ✗)
4. Qualifications (SPs): 3-yr Col.Ed.Dipl.
5. Staff losses: pregnancy, illness, death
6. Ave. class sizes: 40
7. Ave. educator no.s: M – 3; R&W – 4
8. Access to learning materials: 50%+ ✗

Findings - School-level conditions

School principal profile

1. Gender: 25% = female
2. Age: 45+
3. Population group: representative
4. Years of service: ≤ 5 years

Main findings - school

1. Organisation management & development: < 10% School Development Plans well implemented
2. HR management: reactive; appraisal ↔ redeployment; educator absenteeism (±15% lost ±25 days/year, or ±33% lost ±5 days/year) [Reasons]
3. Curriculum management: ✗

Main findings - school

4. Financial management: 50/50; fees received – in 64% of cases > 80% (R316)
5. Administration: non-computerised; records of attendance and performance ?
6. Governance: SGBs exist for majority; functioning ? - ✗
7. Parental / community involvement: problematic (illiteracy - embarrassing)



Findings - conditions of teaching / learning

In classrooms. Maths / R&W jointly today.

Educator profile

1. Gender: Maths more male; R&W bal.
2. Age: relatively young
3. Population groups: representative
4. Qualifications: ≤ 3-yr Ed. Tr. Certif. (for 50% of them)



Findings - conditions of teaching / learning

Class profile

1. Overcrowding: Maths Lang.(R&W)

Gr 9	48	50
Gr 11	42	47
2. Extra-curricular demands: culture, extra-classes (✓), sport (Maths), administration



Main findings - classroom

1. Two main problems: over-crowded, ill-equipped; sense of professional frustration
2. Resources: only chalkboard & desks ✓
3. Working conditions: facilities / resources, failure rates, learner knowledge base, learner interest and motivation (all ✗)
4. Educator attitude paradox: 50 % would go (alternatives @ calling); most enjoy



Main findings - classroom

5. Curriculum management: fortuitous (year plans, learning programmes, lesson plans); curric coverage (tail-ends & more difficult M / abstract R&W neglected)
6. Educator-learner interaction: whole-class based & mechanistic; very little individual, interactive participation
7. Assessment practices: lack functionality (to improve learning / teaching)

Findings - learner functioning

Learner profile and background

1. Home languages: representative
2. Population groups: representative
3. Opportunity to speak English: little
4. Age: older than appropriate for grades (26,5% were 20 yrs old or older; up to 25)

Main findings - learners

1. Socio-economic status: tapped water ×, electricity ? - ✓, meals (10-20% × -- poverty and distances)
2. Home background:
 - Parent qualifications (30-40% < Gr12)
 - Reading opportunity (30-50% lacking)
 - Books at home (80% have < 10 books)
 - Magazines/newspapers (70% ✓)

Main findings - learners

3. Parental involvement: ±33% ×; 70-80% receive extra Maths / R&W classes ✓
4. Leaving school: pregnancy a huge concern (on average 7 girls per school per year; 44 was highest in 1 school; 2 districts had averages of over 10); next was illness and death
5. Attitudes and aspirations: 25-33% ×

FACTORS INFLUENCING LEARNER PERFORMANCE: A MULTI-LEVEL ANALYSIS

Mbithi wa Kivilu



Factors influencing learner performance: A multi-level Analysis

1. Background to Hierarchical Linear Modelling
2. Application of HLM on QLP data
3. Handling of missing data
4. Results
5. Conclusions



Background to Hierarchical Linear Modelling

- Education systems are hierarchical in structure.
- Learners nested within classrooms which are in turn nested within schools, and schools nested within districts at a higher level.
- This data structure is hierarchical because each learner belongs to one and only one classroom and each classroom belongs to one and only one school.




Assumptions of conventional statistical models

- Observations must be independent for each learner
- Learners must be assigned randomly in schools and classrooms
- Both these assumptions are violated in hierarchical data, because
- Certain educator effects in a given class have a uniform influence on observations made on learners.
- Learners are never assigned randomly in classrooms and in schools. They tend to join a school in the neighbourhood.




Assumptions of conventional statistical models

- Hierarchical linear modeling (HLM) offers a robust statistical technique to the violation of the assumptions.
- School effects and certain learner characteristics are simultaneously explored at the within and between school-levels.



Advantages of the HLM Approach

- Treating data as if they were all at the same unit of analysis leads to misleading conclusions
- Problem of aggregation bias is avoided
- Accurate and reliable estimation of coefficients
- All estimated effects are adjusted for individual, level and group level influence on the outcome variable.




Application of HLM to QLP data

Methodology: Analysis H L M

```

    graph TD
      District --> Level1
      District --> School
      District --> Level2
      School --> Level1
      School --> Level2
      Level1 --> Educator1
      Level1 --> Educator2
  
```




Application of HLM to QLP data

- Handling of missing data
 - Missing data allowed only at level-1 i.e. learner-level
 - Complete data assumed at levels 2 and 3 i.e. school, educator, district levels

Operationalization and identification of variables for use in HLM

Questions were defined in measurable terms (score or rating scale)

New variables were derived and defined



Methods used for selecting Variables for HLM analysis

- Review of literature on school effectiveness
- Factor analysis
- Correlation coefficients among variables at the same level
- Multiple regression technique
- Preliminary HLM output



List of variables identified for the HLM analysis

- | | |
|---|--|
| <input type="checkbox"/> <u>Learner-Level</u> | <input type="checkbox"/> <u>Educator-level</u> |
| <input type="checkbox"/> MATHS | <input type="checkbox"/> MEANMATHS |
| <input type="checkbox"/> MATHSINT | <input type="checkbox"/> MEANLANG |
| <input type="checkbox"/> MATHPERC | <input type="checkbox"/> DAYABSENT |
| <input type="checkbox"/> MTEACHEF | <input type="checkbox"/> ACCESSEQ |
| <input type="checkbox"/> GENDER | <input type="checkbox"/> QUALITEQ |
| <input type="checkbox"/> EXTRAWOR | <input type="checkbox"/> IDISCPIN |
| <input type="checkbox"/> DISCIPL | <input type="checkbox"/> EDINVOLV |
| <input type="checkbox"/> RACE | |
| <input type="checkbox"/> HOMLANG | |
| <input type="checkbox"/> MAUTHORI | |
| <input type="checkbox"/> TIMESPE | |
| <input type="checkbox"/> PARMOTIV | |



List of variables identified for the HLM analysis

- School-level
- MEANMATHS
- MEANLANG
- NLEARNER
- EDUCMATH
- PHYRESOUR



Three-level HLM model with mathematics as outcome variable

<input type="checkbox"/> Fixed Effects	Coeff	SE	DF	T	p
<input type="checkbox"/> School means	21.46	0.64	13	33.62	<.01

<input type="checkbox"/> Random Effects	Variance	df	η^2	p
<input type="checkbox"/> School means	33.25%	74	.315	<.01
<input type="checkbox"/> District	2.17%	13	.187	>.05
<input type="checkbox"/> Learner effect	64.46%			



Reliability Coefficients

- School means 0.94
- District means 0.27
- Much of the variability in mathematics performance is associated with learner factors.
- District factors had insignificant effects on mathematics scores
- Reliability coefficient of 0.94 implies that school sample means were highly reliable indicators of school means in mathematics in the population, but district mean were not.



Exploration of effects of Grade-level on mathematics scores

- Grade 9 Mean score=21.49
 - Grade 11 Mean score=20.69
 - School means (Gr.9&11)=21.05
- | Random | Variance | df | χ^2 | p |
|----------------|-----------|-----|----------|-------|
| Effects | | | | |
| School means | 88.52% 64 | 411 | < .01 | |
| Grade slope | 0.08% | 84 | .388 | > .05 |
| Learner effect | 10.97% | | | |
- Grade of the learner had statistically insignificant influence on the level of performance in maths



Exploration of variability of mathematics scores at school- and learner-levels

- Learner-level $(MATHS)_{ij} = \beta_{0j} + e_{ij}$
- School-level $\beta_{0j} = \alpha_{00} + \tau_{0j}$
- 30% of variance was between schools
- 70% of variance explainable by within school factors- Learner factors.
- Reliability of 0.95- Sample means highly reliable indicators of school means in the population



Exploration of variability of mathematics scores at school- and learner-levels

- Learner level predictors were used with mathematics as outcome variable. No school-level predictor variable was included.
- Only three made significant contribution to variability in maths scores:
- LANG Language of instruction (English or Afrikaans scores)
- GENDER
- MTEACHEF Perceived effectiveness of the maths educator



Exploration of predictors of mathematics scores at learner-level

Random Effects	Variance	df	χ^2	p
School means	11.10	92	924	<.01
LANG	0.014	92	331	<.01
GENDER	1.57	92	140	<.01
MTEACHEF	1.16	92	149	<.01
Learner effect	45.76			
The three predictors	21% of total variance			
School effects	19% of total variance			
Learner effects	60% of total variance			



Exploration of predictors of mathematics scores at school-level

- School level predictors
 - Mean score for language (MEANLANG)
 - Number of learner in the school (NLEARNER)
 - Adequacy of physical resources in the school (PHYRESOUR)
 - Only PHYRESOUR was found to have some influence on mathematics scores
 - Learners in schools with adequate physical resources performed better than those from under-resourced schools
- Similar models were investigated for language of instruction as the outcome variable



Limitations of the study

- Methodological design used for the QLP
- Learner was associate with more than one educator
- High instances of missing data especially at the school and educator level
- Adequate sample of units at all levels should be selected and appropriate links across the levels established.
- The 101 schools used for the study must be maintained in future samples.



Conclusions

- The multi-level structure of data in education require statistical methods that are robust to violation of statistical assumptions.
- Development of HLM models, the research questions and the nature and level of measurement of the variables must be critically examined.
- Correct interpretation of the results is also critical in using the findings to draw valid inferences.



Conclusion

- The number of districts was inadequate. High instances of missing information in the district-level variables also made it impossible to provide empirical evidence of the influence of district-level variables on learner performance in mathematics and language of instruction.



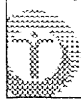
Conclusion

- Inadequate linking of learner data with educator data and high instances of missing information.
- No empirical evidence could be drawn on the influence of educator variables on learner performance in mathematics and language of instruction.
- Grade-level of the learner did not contribute significantly to the overall variation of test scores in mathematics and language of instruction.



Conclusion

- Although much of the variability in performance in mathematics and language of instruction was due to learner factors, there was considerable variability in test scores due to school factors.
- Learners' factors found to have significant influence on performance in mathematics were:
- Language of instruction, gender, and learners' perception of the effectiveness of the mathematics educator.



Conclusion

- Language of instruction was influenced by home language, extra work in language outside class, interest in language and perceived educator control of the class.
- At the school level, adequacy of physical resources were found to have significant influence on both mathematics and language of instruction scores.

