AN ANALYSIS OF THE PHYSICAL SCIENCE RESULTS IN THE PROVINCE OF KWAZULU-NATAL IN THE 2008 NATIONAL SENIOR CERTIFICATE (NSC) EXAMINATION

By

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This research is submitted in partial fulfillment of the requirements for the Master of Education Degree, University of KwaZulu-Natal,

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RESEARCH PROPOSAL: ANALYSIS OF THE PHYSICAL SCIENCE RESULTS PRODUCED IN THE
2008 NATIONAL SENIOR CERTIFICATE (NSC) EXAMINATION: A MIXED METHOD APPROACH

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2. Departmental officials should not be identifiable in any way from the results of the investigation.

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6. Should you wish to extend the period of your survey please contact Mr Sibusiso Alwar at the contact numbers above.

7. A copy of this letter is submitted to the District manager where the intended research is to be conducted.

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9. A brief summary of the content, findings and recommendations is provided to the Director: Resource Planning.

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We wish you success in your research.

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DECLARATION

I, Ramesh Gareeb (Student Number: 8117067) do hereby declare that this dissertation, which is submitted to the University of KwaZulu-Natal for the degree of Master of Education, has not been previously submitted by me for a degree at any other university, and that all sources I have used or quoted have been indicated and acknowledged by means of a complete reference.

_____
Ramesh Gareeb
Researcher

_____
Professor R. Sookrajh

DEDICATION

I dedicate this research to my loving wife Anusha Gareeb and son Yastil Gareeb for your encouragement, support and most of all for your understanding and sacrifices.

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List of Abbreviations

1	NSC	National senior certificate
2	KZN	KwaZulu-Natal
3	KZNDOE	KwaZulu-Natal Department of Education
4	DOE	Department of Education
5	GDP	Gross domestic product
6	SACMEQ	Southern African Consortium for Monitoring Education Quality
7	TIMMS	Trends in International Mathematics and Science Study
8	OBE	Outcomes based education
9	C2005	Curriculum 2005
10	HG	Higher grade
11	SG	Standard grade
12	NCS	National curriculum statement
13	HSRC	Human sciences research council
14	NISE	National Institute for Science education
15	NAEP	National Assessment of Educational Progress
16	NELS	National Education Longitudinal Study
17	SAT	Scholastic Aptitude Test
18	ACT	American College Test
19	AP	College Board's Advanced Placement
20	SES	socio-economic status
21	US	United States (of America)
22	df.	Differential
23	p	Significance
24	S	Difference is significant
25	N	Difference is not significant
26	CASS	Continuous assessment
27	SME	Science, math, and English
28	NSLA	National Strategy for Learner Attainment

TABLES AND GRAPHS

ABSTRACT

This study examined the performance of the first cohort of learners writing Physical Science in the National Senior Certificate examinations. The critical question that the researcher addressed was: How can the results produced in Physical Science in the province of KwaZulu-Natal in the 2008 NSC examination be used to give an understanding of the academic performance of learners? Using the mixed method approach, two data cohorts, namely the results produced by learners in Physical Science and the interview data, were subjected to analysis through the lens of phenomenology and semiotics. Findings of the study reveal that the education system still carries with it the inequalities of the past, with quality Physical Science to a few learners who were fortunate enough to attend privileged schools, identified by their high quintile ranking (5), in the predominately urban areas. The results of learners in poor, predominately rural schools, ranked quintile 1 and quintile 2, reveal that the "cycle of mediocrity" (Khan, 1995, p.128) still prevails

CHAPTER 1

Introduction to the study

1.1. Introduction

Performance in the National Senior certificate (NSC) examination, as acknowledged by UMALUSI[1], represents a high point of learning in South Africa, as it is still by far the most popular determinant of access to higher education and to the world of work (UMALUSI, Investigation Into The Senior Certificate Examination, 2004).

The performance of learners in the gateway subjects such as Mathematics and Physical Science, taken at the NSC level, attracts both local and international interest (UMALUSI, Investigation Into The Senior Certificate Examination, 2004). Learner performance in these subjects is interpreted as a public measure of how well the education system is doing (UMALUSI, Investigation Into The Senior Certificate Examination, 2004) .

In June 2001, the National Department of Education (NDOE) initiated its strategy for the improvement of Mathematics, Science and Technology. This initiative saw the launch of the Dinaledi (or "102 schools") programme in September 2001 (KZNDOE, Annual performance plan, 2008). The KwaZulu-Natal Department of Education (KZNDOE) supports 84 schools in the province. The support was in the form of vacation classes for learners, where learners received tuition as well as curriculum support material. Mathematics, science and biology educators from 23 underperforming[2] Dinaledi schools were assisted with skills for effective teaching, and using more effective teaching methods. In 2008, the KZN DoE adopted special interventions in an attempt to improve the performance[3] of many of the schools in the province. These included specific subject interventions and general curriculum support programmes targeted at the critical[4] subjects. Schools were provided with teaching and learning support materials as well as additional

[1] The quality assurance body for all institutions registered under the South African Schools' Act.

[2] Schools that obtain less than 50 % pass rate in the National Senior Certificate examinations.

[3] Measured by the percentage pass of the school in the national senior certificate examinations.

[4] Subjects studied by large number of learners especially in the formerly disadvantaged schools. These subjects include mathematics, agricultural science, biology, physical science, accounting, economics, history and travel and tourism.

support materials such as past question papers and memoranda, learning and assessment guides and video lessons in order to improve on learner performance (KZNDOE, Annual performance plan, 2008). The second intervention was the National Strategy for Learner Attainment (NSLA)[5] that monitored and supported schools across the board that obtained below 60 % pass in the preceding years National Senior Certificate examination (KZNDOE, Annual performance plan, 2008).

According to the Southern African Consortium for Monitoring Education Quality (SACMEQ), South Africa is relatively well resourced; public spending on education constitutes approximately six per cent (6%) of the Gross domestic product (GDP) yet the performance of South African students on international tests is far lower than the performance of students in France, Hong Kong, Singapore and South Korea, where the respective governments spend far less on schooling than the South African Government (Crouch & Fasih, Patterns of educational attainment: implications for further efficiency analysis, 2004). In the regional context, South Africa had participated, until 2003, in the international study, known as the Trends in International Mathematics and Science Study (TIMSS) which compares Mathematics and Science in countries worldwide. The TIMSS (1999) ranks South Africa last in the proficiency levels. According to the TIMSS report, about 69 percent (69 %) of South African learners who took part in the study did not achieve the lower quarter benchmark (Crouch & Fasih, Patterns of educational attainment: implications for further efficiency analysis, 2004).

1.2. Focus and Purpose of the Study

The focus of this study is on the results produced by learners in Physical Science in the 2008 NSC examination. The rationale for the study derives from three important considerations:

Firstly, a personal context: the researcher has taught Physical Science at grade 12 level for the past 24 years. Prior to 2008, the curriculum used was the NATED 550. The year 2008 saw, for the first time, the introduction of the National Curriculum Statements with the outcomes–based approach to education through to grade 12 level, hence an interest in

[5] The NSLA is a nationally-driven programme and the strategy will continue until the Minister has dealt with all areas of non-performance.

gaining greater insights into learner performance in Physical Science in the new Outcomes Based Education (OBE) system served as a motivation for the study.

Secondly, the conceptual and policy changes that took place in the South African education system necessitate the study. Prior to 2008, learners followed a content–driven curriculum and assessment was norm-referenced. With a change in the curriculum, came a change in the assessment and the fundamental shift in the new assessment is a focus on learning outcomes and assessment standards. The departmental analyses of results in senior certificate examinations, prior to 2008, show high failure rates both at higher grade (HG) and standard grade (SG) levels (Khan, 2004). The introduction of Curriculum 2005 (C2005) resulted in the scrapping of HG and SG, and the offering of subjects on one level. Successful curriculum implementation is based on a gradual process of building, review and improvement.

Thirdly, many large-scale examination systems include measures to ensure consistency of learners' performance over periods of time. UMALUSI manages a statistical moderation process whereby results obtained in final examinations by schools are adjusted to maintain reasonably consistent standards over time. Prior to 2008, this moderation included adjusting raw scores on the basis of norms calculated from learner performance over three- or five-year periods; pairs analysis in which the average results for a particular subject are compared to the average results of all other subjects, for the same group of learners; and giving consideration to reports made by internal and external moderators. The candidates in the 2008 National Senior Certificate (NSC) were the first cohort of learners following the new curriculum for the NSC qualification. The first national exams for this new system took place at the end of 2008. There was no historical norm for the associated examination results; therefore, the 2008 National Senior Certificate results provide the baseline data against which subsequent examination performances can be compared.

1.3. Why Physical science?

The Constitution of the Republic of South Africa (Act 108 of 1996) provided the basis for curriculum transformation and development in South Africa. The National Curriculum Statement Grades 10-12 (General) forms the basis for the attainment of these goals through the Learning Outcomes and Assessment Standards. Section 2 of the Learning Programme

Guidelines suggests how teaching the particular subject may be informed by the principles which underpin the National Curriculum Statement. The key principles and values are:

- **Social transformation**

  Physical Sciences assist in the development of scientifically-literate citizens who are responsible and can critically debate scientific issues and participate in an informed way in democratic decision-making processes.

- **Outcomes-Based Education**

  The activity-based approach to teaching, learning and assessment in Physical Science encourages learners to develop inquiry and problem-solving skills.

- **High knowledge and high skills**

  Physical Science places particular emphasis on creating opportunities for all learners to realise their full potential as thinking and doing beings who will contribute to an improved quality of life for themselves and others in society.

- **Integration and applied competence**

  Integration and applied competence applies across subjects.

- **Progression**

  This is where learners move from the beginning to the end of a grade and from grade to grade.

- **Articulation and portability**

  This allows mobility and portability across and within Grades 10-12 as well as access to the Higher Education and Training Band.

- **Human rights, Inclusivity, Environment and Socio-Economic Justice**

  This involves the promotion of a culture of human rights, inclusivity and socio-economic justice.

- **Valuing Indigenous Knowledge systems**

  This in the South African context, refers to the body of knowledge embedded in African philosophical thinking and social practices that have evolved over thousands of years

- **Credibility, Quality and Efficiency**

  According to the NCS the credibility and quality of the Physical Science curriculum is evident in that its focus areas (matter and materials; chemical systems; chemical change; mechanics; waves, sound and light; electricity and magnetism) are internationally recognised as relevant areas for the learning, teaching and assessment of Physical Sciences.

A realization of these principals is essential for nation building.

The purpose of this study is to analyze the results produced in Physical Science in the 2008 NSC examination in KwaZulu-Natal, by focussing on how the secondary data set, namely the Physical Science results of learners, and the primary data gathered from the semi-structured interviews with physical science subject advisors from the KwaZulu-Natal Department of Education (KZNDOE), can be used to give a deeper understanding of the academic performance of learners, through the use of mixed method methodology.

1.4. Critical question

What is the relationship between student performance in physical science in the province of KwaZulu-Natal in the 2008 NSC examination and the quintile ranking of the school?

1.5. Limitations of the study

The main objective of this study was to understand the performance of learners in Physical Science in the 2008 National Senior Certificate examination in the province of KwaZulu-Natal by stratifying schools in terms of provincial districts and quintiles. Firstly, according to Van der Berg (2005), a schools socio-economic status (SES), family backgrounds of learners, school quality and facilities, resources, language barrier and teacher quality

impact on the performance of learners. The quintile[6] ranking of the schools has been broadly used as an indication of these factors since the quintile score is calculated based on national census data that is the income level, unemployment rate and the level of education (literacy rate); hence causality is inferred by the stratification and analysis of the data in terms of the quintile ranking of the school. The Human sciences research council (HSRC) report, (2009), however, does indicate that the quintile system is effective in identifying schools at the extremes, that is, Quintile 1 and quintile 5. Schools in the middle are often incorrectly identified.

Secondly, the individual learner scores were not available from the Department. Frequency scores were provided by the Department of Education for each school in the province.

Thirdly, the scope of the study did not allow for the analysis of the subject with respect of the content and challenges associated with pursuing Physical Science as a subject; hence no attempt was made in analysing the final examination scores to determine specific areas where learners performed better or worse. This, however, is an important aspect for understanding performance as well as making informed decisions in terms of putting in place interventions to improve achievement levels of learners.

Fourthly, the review of the literature in chapter two shows that studies conducted in South Africa were conducted in different contexts and using different measurement instruments to those used in this study. The purpose of reviewing these studies was to emphasise the relationship (or lack thereof) between learner performance (output) and the context, input and process. No comparable data exists to make trend analyses of the findings possible.

1.6. The structure of the dissertation

The chapters of the thesis and the contents of the main chapters are described below:

The first chapter provides an introduction to the study, outlining the rationale for the study. It sketches the transformation in the education system with the introduction of the National

[6] Quintiles are used to rate schools in terms of the poorest to the least poor. quintile 1 = poorest & quintile 5 = least poor.

Curriculum Statements against the backdrop of transformation in the country. It goes further to illustrate why this study was necessary, and presents the critical research question. The limitations of the study are also described in this chapter.

The second chapter reviews related literature in the field of study. It sketches a background to the National Curriculum Statements with its outcomes-based methodology. Since performance of learners is also influenced by political commitment by the state and, in particular, the Department of Education, the views and commentaries by academics, educationists and researchers are also presented. The conceptual frameworks of phenomenology and semiotics are also discussed in this chapter.

The third chapter outlines the research design and methodology. It describes how both the qualitative and the quantitative data was gathered and used in the study to answer the research question. The statistical methodology that was used in this study is also described in this chapter. It provides an analysis of the two data cohorts. The ethical considerations of the study are then discussed

Chapter four describes the statistical methodology and the analytical tool, namely the SPSS version 15, and graphically and descriptively presents the results. An analysis of the results is made which forms the basis for the qualitative data collection. An analysis of both the quantitative and qualitative is then presented. In this chapter, the statistical results of the first cohort of data are presented in the form of tables and graphs. Explanations of the representations are also provided. A number of themes were generated from the results. These include:

- The number and percentages of learners that wrote the physical science examinations from each of the 12 districts of KwaZulu-Natal.
- The number of learners who wrote in each quintile in the province.
- The proportion of learners in each category of pass between districts.
- The proportion of learners in each category of pass between quintiles and
- The proportion of learners in each category of pass between districts for each of the quintiles (quintiles 1 – 5).

A summary of the results together with the overall averages was then tabulated and show whether the differences in each of the categories of pass for each of the districts were significant or not significant.

The qualitative cohort was then subjected to analysis and the following five themes were generated: curriculum change and its contribution to learner performance, quality and standard of the examination papers and its contribution to learner performance, contribution of the school-based assessment on learner performance, differentials in the category of passes in the province and differentials in the category of passes between quintiles 1 to quintile 5. The data was then clustered into units of meaning to form themes and presented in this chapter.

In the next chapter, namely chapter 5, the data is drawn upon to draw conclusions. The conclusions are graphically represented using Burchfield's (1992) education evaluation model that was adapted by the researcher for the purposes of this study.

CHAPTER 2

Literature Review and theoretical framework

2.1. Introduction

Considering that the critical question deals with the relationship between learner performance in Physical Science in the 2008 NSC examination and the quintile ranking of the schools, the researcher firstly sketches a background of C2005 and its implementation challenges. This is done because the NSC was introduced for the first time at grade 12 level in 2008. This chapter focuses on the new national curriculum and assessment, and presents some of the findings of researchers and educationists that have undertaken analyses of the senior certificate examinations for the years prior to 2008, that is, in the NATED 550 curriculum. The use of Phenomenology as a theoretical frameworks and Burchfield's education framework are then discussed.

2.2. Review of related literature

2.2.1. Background to the study

As stated in the NCS (2008), Curriculum 2005 (C2005), with its methodology, the outcomes-based education (OBE) forms the foundation for the curriculum in South Africa. It strives to enable all learners to reach their maximum learning potential by setting the Learning Outcomes to be achieved by the end of the education process. The National Curriculum Statement builds its Learning Outcomes for Grades 10–12 on the Critical and Developmental Outcomes that were inspired by the Constitution and developed through a democratic process. The NCS (2008) further states:

"*The Constitution of the Republic of South Africa forms the basis for social transformation in our post-apartheid society. The imperative to transform South African society by making use of various transformative tools stems from a need to address the legacy of apartheid in all areas of human activity and in education in particular. Social transformation in education is aimed at ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of our population. If*

social transformation is to be achieved, all South Africans have to be educationally affirmed through the recognition of their potential and the removal of artificial barriers to the attainment of qualifications".

Educationalists and scholars have proposed various reasons showing why C2005 will fail. Jonathan Jansen (2000) argues, with evidence for the theory of political symbolism, as an explanation for the non-implementation of South African Reform after apartheid. Chisholm and Fuller (1996) further this argument by acknowledging that the effectiveness of local schools will not magically increase if the policy agenda remains centered on symbols of opportunity (Chisholm and Fuller, 1996). Hess (1997) argues that reforms tend to be symbolically attractive but tend not to impose the costs required by significant change, and the result is that policy-makers have worked more diligently on appearing to improve schooling than on actually doing so (Hess 1997). Vinjevold (1999) argues that teachers are typically trained to deliver curriculum, not write it, and many have neither the skills, the time nor the inclination to create their own curriculum content. This problem was especially acute amongst educators in African residential areas who typically had modest training themselves and were already coping with inadequate infrastructure, large classes and a lack of basic teaching materials such as textbooks and exercise books. 'A lack of specified content was a terrible mistake because it undermined the overall goal of promoting equity within the school system' (Vinjevold, 1999). Taylor and Vinjevold, (1999) also found fundamental flaws in the design of the curriculum. Specifically, the curriculum's emphasis on teaching from 'everyday life' rather than on formal school content was having the opposite effect of what was intended (Taylor and Vinjevold (1999).

Educationalists and scholars have argued that C2005 and OBE are destined for failure. It is the intention of the researcher to examine the results produced by the learners in the 2008 NSC examination and find the relationship between learner performance and the quintile ranking of the school (which is based on the socio-economic status of the school), hence giving further insight into the implementation challenges of C2005.

2.2.2. Statistical studies of learner performance in the senior certificate examinations

Kivilu (2006) provides an overview of some of the methods used in comparing standards across examining bodies. Using statistical analysis, Kivilu (2006) maps performance and

trends in the senior certificate results. He found that the senior certificate (SC) results in 2003 showed an upward trend, a trend that began in 2000. The pass rate achieved in 2000 was 58 % (Shindler, 2004). In 2003 the pass rate was 73 %, an increase of 15 %. However, the improvement in the pass rates was viewed by the public as a result of a drop in standards.

UMALUSI, the quality assurance body for all institutions registered under the South African Schools' Act, contradicted this view in its 2004 report where it contends that the higher pass rates are not a sign of the examinations becoming easier. It attributes the higher pass rates, especially from 2002 to 2003, to a greater number of learners taking subjects on the standard grade. The report acknowledges that the decrease in the number of candidates for the Higher Grade is a matter for national concern. UMALUSI states that finer-grained data on the changing enrolment trends and pass rates by subject and province are needed to be able to say with any greater specificity what is happening (UMALUSI, 2004).

The analyses, however, of educational statistics for 1997 and the matriculation results for 1999 and 2000, by Van der Berg (2004) showed that there are large inequalities in the results of the different provinces and massive differentials between the different categories of schools. Illustrated are some of the findings in table 1 below.

Table 1

	Poorest Schools (measured by school fee)	Richest Schools	Predominately African	Predominately White
Pass Rates	44 %	97 %	43 %	97 %

Interesting comparisons can be made between the above statistics and the analysis produced by Michael Khan (1993) on the performance of learners in Mathematics and Physical Science in the 1991 senior certificate (SC) examinations. Summarised results are reflected in table 2.

	MATHEMATICS Higher Grade				PHYSICAL SCIENCE Higher Grade			
	African	Coloured	Indian	White	African	Coloured	Indian	White
Candidates	10 519	1 127	3 436	15 399	10 640	1 308	3952	15 642
Pass	1 052	715	2731	13 543	1 698	1 033	3 277	12 769
Percentage Pass	10	63	80	89	16	79	83	82

Table 2

A similar study conducted by the Tertiary Education Linkages Project (TELP) also showed that about 90 percent (90 %) of the students failed in mathematics knowledge, scoring less than 50 percent (50 %).

South Africa had participated, until 2003, in the international study, known as the Trends in International Mathematics and Science Study (TIMSS) which compares Mathematics and Science in countries worldwide. The TIMSS (1999) ranks South Africa last in the proficiency levels. According to the TIMSS report, about 69 percent (69 %) of South African learners who took part in the study did not achieve the lower quarter benchmark. In attempting to gain a deeper insight and understanding of learner performance, it is imperative to understand the factors and conditions that impact on learner performance. The study by SACMEQ (2007) found that the South African schooling system fares dismally in promoting social equity, which implies that students of a low socio-economic status (SES) are at a greater disadvantage. According to Woessmann (2003) cross-country resource differentials do not explain cross-country student performance differentials very well, given the varying ability of schooling systems to transform inputs into student performance. Other factors identified in the SACMEQ study were:

- **The impact of family background on learner performance**

Burns (2001), Lam (1999) and Louw, Van der Berg and Yu (2006) identify two channels of family background, namely, parents' education and private household resources which together indicate the students' socio-economic status (SES). Access to more resources implies potentially greater household support for learning in the form of funding school fees, transport to school, school uniforms, investment in child health, educational materials and supplementary private tuition.

- **The impact of school quality on student performance**

Eric Hanushek (1986; 2004) points out that schools and classrooms with access to superior resources do not necessarily provide the best quality education. At the heart of this problem lies an issue of efficiency: schools translate inputs into outputs with varying degrees of efficiency

Taylor (2006) ascribes the poor performance of the school system to the large number of schools that are largely dysfunctional where greatly varying levels of learning within the same classroom has become the norm, making the task of teaching even more difficult. This view is supported by Moloi (2005) from the Department of Education who found that the effect of dysfunctional schools may completely swamp the possible positive effects of teacher or student efforts. The research also found that the majority of learners attended schools that were dysfunctional and inefficient and that individual measures to improve school quality were unlikely to improve learner performance. There is, however, a relatively steep positive relationship between SES and student performance for the two most affluent student quintiles (quintile 4 and quintile 5) suggesting that school quality may matter greatly for these children (SACMEQ, 2007).

2.2.3. South African. African and international studies on students' academic achievement in science

In the following section, the researcher reviewed some national studies in science by focusing on trends in student achievement in science by socio-economic status and gender. Thereafter the researcher reviewed studies about science education in Africa. Finally, the researcher ends by providing a summary of some international trends.

According to the National Institute for Science education (NISE), data from a variety of sources, such as the National Assessment of Educational Progress (NAEP) and the National Education Longitudinal Study (NELS) reports were used to provide a meta-analysis of current trends in student achievement in science by socioeconomic status and gender within ethnic groups. (Rodriguez, 1997). In addition, trends in student achievement from NAEP and NELS were contrasted with trends from college-entrance exams, such as the Scholastic Aptitude Test (SAT) and the American College Test (ACT) and these

observed trends in achievement were further contrasted with those emerging from the College Board's Advanced Placement (AP) Exams scores in science (Rodriguez, 1997). The results of this analysis indicated showed there has been some improvement in student achievement and participation in science. However, it was alarming that the observed pattern of achievement by socio-economic status (SES) and gender within ethnic groups was consistent and congruent over time and across national studies and reports regardless of age and grade level, that is, it was observed that U.S. Asian and Anglo-European students consistently outperformed underserved students (Rodriguez, 1997).

According to Laguarda (1994), America had gone through social reforms, similar to those that South Africa is currently undergoing and further states that the deep disparities of the past both in South Africa and America required rigorous programmes and reform policies to bring about equity. He goes further to argue that while educational research points out equity as an instrumental process to substantially effect change in today's schools, we have politicians and some interest groups increasing their attacks on affirmative action and other social programs (Laguarda, 1994). While national reform efforts such as the National Science Foundation's State-wide Systemic Initiatives (Laguarda, 1994), Project 2061: Science for All Americans (American Association for the Advancement of Science, 1989), and the National Science Education Standards (NRC, 1996b), all make equity one of the primary driving engines of their recommendations for reform, we are not quite certain how to assess equity and/or how to tell when an educational system (at the state, district, or local level) has achieved a state of functioning equity, that is, the process by which an institution's equity policies deliver in practice what it promises in paper. Therefore, in light of the increasing pressures for educational reform at all levels, such as the extensive science education reform efforts spearheaded by the National Science Foundation's Statewide, Urban and Rural Systemic Initiatives[1] (Shields, Corcoran, and Zucker, 1994), there is a need for greater clarity on the present state of student achievement in science. Moreover, in regard to equity, there is a need to better understand how the achievement of traditionally underserved students has changed in the last few years (Shields, Corcoran, and Zucker, 1994).

2.2.3.1. National Studies on Student Academic Achievement in Science

According to Rodriguez (1997), government agencies were mandated by law to monitor students' educational progress, including the Office of Educational Research and Improvement in the Department of Education. Since 1969, this agency has sponsored the National Assessment of Educational Progress (NAEP). Every two years, NAEP evaluates the academic achievement of a nationally representative sample of elementary (Grade 4) and secondary (Grades 8 and 12) students. Rodriguez (1997) maintains that the NAEP assessment tool, it is the most comprehensive tool for assessing students' cognitive achievement in science at critical grade levels (Mullis, Dossey, Campbell, Gentile, O'Sullivan, & Latham, 1994). The Office of Educational Research and Improvement sponsors another important educational attainment project, the National Education Longitudinal Study (NELS; Horn, Hafner, & Owings, 1992; Owings & Peng, 1992; Rock & Pollack, 1995). The goal of this study was to measure cognitive growth in science over time. Furthermore, the NELS aimed to investigate the impact of school policies, family participation, and teacher practice on educational outcomes as the students developed and made challenging transitions from middle school, to high school, to college.

NAEP Trends show that compared to 1970 scores, the average science achievement for all students who participated in the 1992 NAEP (Mullis et al., 1994), was slightly higher for 9-yearolds, practically the same for 13-year-olds, and lower for 17-year-olds and the overall science performance for all three age groups has actually been increasing since 1982 (Mullis, Dossey, Campbell, Gentile, O'Sullivan, and Latham, 1994).

In the last twenty years, according to NAEP revealed that the gap in science performance scores of students of African, Latino/a, and Anglo-European descent[2] closed modestly from 1977 to 1986. From 1986 to 1992, however, the achievement gains of underserved students seem to have stalled (see Figures 2 and 3). Furthermore, in spite of the improvement in the last ten years, the differences in performance among ethnic groups are still quite large for all three age groups considered (Mullis et al., 1994). The gaps in proficiency scores are less wide between U.S. Latinos and African students. However, the difference in performance between these two ethnic groups seems to be increasing in favour of 13- and 17-year-old Latinos (Mullis et al., 1994).

2.2.3.2. Science education in the developing world: Science in Africa

According to Ogunniyi (1996), "realising the importance of science to development, Africa has been eager to develop its scientific human power to attain a measure of self-reliance in the production of goods and services, by expanding its educational facilities, and setting up curriculum development and research centres, as well as developing policies on science education" Ogunniyi 1996: 268). Ogunniyi (1996), goes further to argue that beyond the rhetoric and interesting interventions, science education appears to be experiencing problems that could lead to a crisis. In Africa, the Dakar Declaration indicates large socio-economical obstacles against efforts towards human power development in the field of science and a poor state of science education (Ogunniyi, 1996). In SA these obstacles are widely articulated for example by MacDonald and Rogan (1988: 234), who found that in the Eastern Cape Province impoverished communities that could not contribute towards curriculum development, poor school resources and inadequate teacher training (Ogunniyi, 1996).

Ogunniyi, (1996) recognises that the problems in science education as reflected by the performance of learners are numerous. The researcher highlights some of the problems that impact on learner performance and the quality of science education.

2.2.3.3. Teachers' misconception of their problems

Teachers often claim that lack of science equipment and laboratories prevent them from teaching science practically. However, there is evidence that teachers who have equipment do not use it. It appears therefore that, apart from work overloads, the main reason why teachers do not use practical approaches is that they are deficient in practical skills and do not understand the science concepts they are supposed to teach. This claim is demonstrated in schools that have science equipment. For example, schools that participate in the ZENNEX project have Somerset Micro Science kits, and all of the high schools sampled in Butterworth had some science teaching equipment. In the 21 schools visited, Ogunniyi, (1996) found that only five seemed to have attempted to use the science teaching equipment. The equipment was found to be gathering dust or neatly stored in boxes that had never been opened in 16 of those schools. Similarly, visits to three Masifunde Project schools in the Free State Province during 2000, and at a school where the author taught,

revealed an assortment of unused science teaching equipment. All schools had some expired chemicals and broken or poorly maintained physics equipment some of which teachers' could not Identify.

During a school visit, Ogunniyi, (1996) reported that the teachers' lack of knowledge of chemicals in their schools was demonstrated at a school where a teacher requested for some of the chemicals used in a demonstration. The chemicals used in fact obtained from that school. The problem here was that the teacher was unable to identify those chemicals Ogunniyi, (1996)

2.2.3.4. Problems in the science classrooms

Ogunniyi (1996), identified managerial problems such as late coming, schools opening late in the year, and starting end-of-year examination by the middle of October reduce tuition time which for science might lead to ignoring practical exercises as teachers rush to complete the syllabus. Other problems relate with the quality of teachers, namely inadequate knowledge and skills to deliver the curriculum (Ogunniyi, 1996)

- **A poor quality of teachers**

Ogunniyi (1996: 278) notes that no education system is higher than the level of the teacher. Thus, standards in science classrooms may fall because of the shortage of properly trained science teachers. Deficiencies in practical skills and conceptual understanding are passed on from teacher to learner who then becomes a teacher - from one generation to the next. This cycle perpetuates incompetence and can lead to a deterioration of standards over time.

2.2.3.5. Practicals do not have clear objectives

According to White (1996: 761), there ought to be clear goals of laboratory teaching. Unfortunately, school textbooks in SA do not outline the objectives of a practical exercise or the science processes which the practical ought to enhance. This degenerates practical work to routine exercises that produce data mainly for calculations or for verifying

textbook information, and nothing else. White (1996) argues that experiments hardly relate with the learner's environment and real life, and do not tease the learner intellectually and practically. Teachers seem to believe that data has to conform to that in the textbook, or else the experiment has to be repeated (Muwanga-Zake, 1998). Overall, practical work may enhance interest in science and increase manipulative skills, as well as memory of content. However, the scientific value of practical work in South African classrooms is questionable (Muwanga-Zake, 1998). Roychoudhury (1996: 423) made similar observations that typically, laboratory work is seen as an exercise with a primary focus on the verification of established laws and principles, or on the discovery of objectively knowable facts.

2.2.3.6. Belief in objectively knowable facts

Roychoudhury (1996) observed that the belief in 'knowable facts', particularly in textbooks, was highly entrenched. Whether a practical is done or not, lessons are often statements of 'facts' or absolute truths from textbooks such that they cannot be challenged. Of course a school laboratory rarely has the resources to challenge such laws - i.e. the learner is forced to believe and memorise.

2.2.3.7. School environments

MacDonald and Rogan (1988) argue that some school environments demotivate learning. School environments that could be demotivating include poor physical structures such as dilapidated buildings, environments devoid of examples of 'school' science, and lack of facilities such as science equipment, laboratories and libraries, particularly in rural schools. For example, plane flights commonly used when teaching vectors can be appropriate to an urban learner may occasionally be exposed to planes; a rural learner has to do with imagination. The science in the streams and in the bush around the rural learner is rarely a part of the syllabus MacDonald and Rogan (1988).

2.2.3.8. Change to Curriculum 2005

Science education is also likely to suffer from changes in the curriculum and syllabi, which have changed almost every two years. A shift to Curriculum 2005 (C2005) has not been

accompanied by a change in resources (including textbooks, which normally simply change covers) MacDonald and Rogan (1988). As the OBE did not evolve from within the South African cultural systems, teachers could be lacking its philosophical background and practical know-how. Hence, according MacDonald and Rogan (1988) to the South African OBE is still modernist, involving the usual information transmission model, where knowledge is selected, organised into a lesson, and transmitted in a one-way flow to mainly passive recipients. Structured approaches are often devoid of constructivism and may inhibit new discoveries in science since, according to Laing (1991: 10), many science discoveries were made accidentally. Structured approaches also discourage divergence, and so may not cater for African cultural belief systems in a science largely Western (often wrongly said to be 'global') such that a cultural - science divide may develop. Among the important factors of the divide is language Laing (199).

2.2.3.9. Cultural barriers

The effects of culture, in particular of language, on science teaching or learning has been explored widely, by among others, Fish (in Lincoln & Denzin, 1994: 579), Solomon (1994: 5), Moje (1995), Atwater (1996), Ogunniyi (1996) and Henderson & Wellington (1998). All agree that science is not culture neutral. Atwater (1996: 828) states that traditional science teachers view science as being independent of mind or social context. This could be one of the reasons why language has not been considered important until lately. According to Henderson & Wellington (1998: 35) for many learners, the greatest barrier to learning science is language. The problem is that like many other African countries, SA has developed science curricula and content upon Western trends and teaches science mainly in English or Afrikaans.

2.2.4. Some international comparisons

According Forgione (1998) measuring students' academic performance has been the purpose of the National Assessment of Educational Progress (NAEP) since its inception in 1969. Students in both public and non-public schools have been assessed in various subject areas on a regular basis. In addition, NAEP collects information about relevant background variables to provide an important context for interpreting the assessment results and to document the extent to which education reform has been implemented. NAEP studies

showed trends in academic achievement in core curriculum areas over an extended period of time.

Trends in average performance over these time periods dealt with students at ages 9, 13, and 17 for science, mathematics, and reading. In general, the NAEP long term trends in science and mathematics show a pattern of early declines or relative stability followed by improved performance; in reading, minimal changes have occurred over the assessment period Forgione (1998). The overall pattern of performance in science for 9-, 13-, and 17-year-olds is one of early declines followed by a period of improvement (For 9-year-olds, the overall trend shows improvement; in 1996, the average score for these students was higher than in 1970. The overall trend for 13-year-olds was also positive, but there was no significant difference between the average science scores in 1970 and those in 1996. The average science score of 17-year-olds in 1996 was lower than the average score in 1969. Science scores have been increasing upward for all ages tested since 1982.

The NAEP 1996 science assessment, which gathered information about the science knowledge of the nation's fourth, eighth, and twelfth-grade students, provides baseline information about science achievement in this country. The NAEP 1996 science results are important not only because they provide this baseline information, but also because their release coincides with release of the science achievement results for the United States on the Third International Mathematics and Science Study (TIMSS). The results from these two major surveys provide valuable data on how science is taught and learned in U.S. schools Forgione (1998).

Based on the review of South African, African and international literature on learner performance, the researcher developed a conceptual framework for this study.

2.3. Theoretical framework of the study

The objective of this study was to gain a deeper insight and understanding of the academic performance of learners in Physical Science in the 2008 NSC examination in KZN and determine the relationship between learner performance and the quintile ranking using a mixed method approach. This required both a quantitative study of the data produced by

the results and a qualitative study, from interviews, the researcher, therefore chose to use phenomenology as the theoretical framework for the study.

2.3.1. Phenomenology as a theoretical point of view

Cohen, Manion, Morrison (2007) argue that phenomenology is a theoretical point of view that advocates the study of direct experiences; and one which sees behaviour as determined by the phenomena of experience rather than by external, objective and physically-described reality. According to Cohen, Manion, Morrison (2007) there are two strands of development in phenomenology: transcendental and existential phenomenology. The transcendental phenomenology is concerned with looking beyond the details of everyday life to the essences underlying them. Cohen, Manion, Morrison (2007) argue that to do this we need to free ourselves from the usual ways of perceiving the world. "The aim of this method of epoche' is the dismembering of the constitution of objects in such a way as to free us from all perceptions about the world" (Cohen, Manion, Morrison, 2007, p23). Schultz (1962) (cited in Cohen, Manion, Morrison, 2007) argues that existential phenomenology is concerned with the understanding of the 'meaning structure' of the world of everyday life.

Husserl (2001), "the fountainhead of phenomenology in the twentieth century" rejected the belief that objects in the external world exist independently and that the information about objects is reliable and argued that people can be certain about how things appear in, or present themselves to, their consciousness (Eagleton, 1983; Fouche, 1993). To arrive at certainty, anything outside immediate experience must be ignored, and in this way the external world is reduced to the contents of personal consciousness. Realities are thus treated as pure 'phenomena' and the only absolute data from where to begin. Husserl named his philosophical method 'phenomenology', the science of pure 'phenomena' (Eagleton, 1983, p.55). The aim of phenomenology is the return to the concrete, captured by the slogan 'Back to the things themselves!' (Eagleton, 1983, p. 56; Kruger, 1988, p. 28; Moustakas, 1994, p. 26). For Giorgi (as cited in Stones, 1988), the operative word in phenomenological research is 'describe'. The aim of this study was to gain an understanding of the results produced in Physical Science in the 2008 NSC examination and to describe as accurately as possible the phenomenon, refraining from any pre-given framework, but remaining true to the facts. According to Welman and Kruger (1999, p.

189), "the phenomenologists are concerned with understanding social and psychological phenomena from the perspectives of people involved". Husserl's philosophical phenomenology provided a point of departure for Alfred Schultz who termed it "toward the ways in which ordinary members of society attend to their everyday lives" (Gubrium and Holstein, 2000, pp. 488-489). A researcher applying phenomenology is concerned with the lived experiences of the people involved, or who were involved; with the issue that is being researched (Maypole and Davies, 2001). Cohen, Manion, Morrison (2008) argue that meaning can be implied retrospectively by turning back and looking at what has been happening.

The choice of phenomenology as the theoretical point of view for this research study was informed by an epistemological position. A researcher's epistemology according to Holloway (1997) is literally his/her theory of knowledge, which serves to decide how the social phenomena will be studied. The researcher's epistemological position regarding the study (seeking how the results produced in physical science in the province of KwaZulu-Natal in the 2008 NSC examination can be used to give a deeper insight and understanding of the academic performance of learners) can be formulated as follows:

i. Data are contained within the perspectives of people that are involved with examinations.
ii. The researcher cannot be detached from his/her own presuppositions.
iii. Learners are social beings and their performance is influenced by their social reality.

The researcher, in applying phenomenology is concerned with the lived experiences of the people involved, or who were involved; with the issue that is being researched, that is the relationship between learner performances in Physical Science in the 2008 NSC examination, uses Burchfield's educational framework as a theoretical framework in the methodology and analysis in this study. Using Burchfield's educational framework, the researcher implies meaning retrospectively to the data, which is the results produced by learners in Physical Science in the 2008 NSC examination.

2.3.2. Burchfield's Education framework

According to Burchfield (1992), the education system of a country can be represented as a framework describing the different phases as indicated in Figure 2.3.2.1. Each of these phases will have an influence on the final outcome of the education system and all frameworks show some broad commonalities that can be described as indicators of context, input, process and output Burchfield (1992).

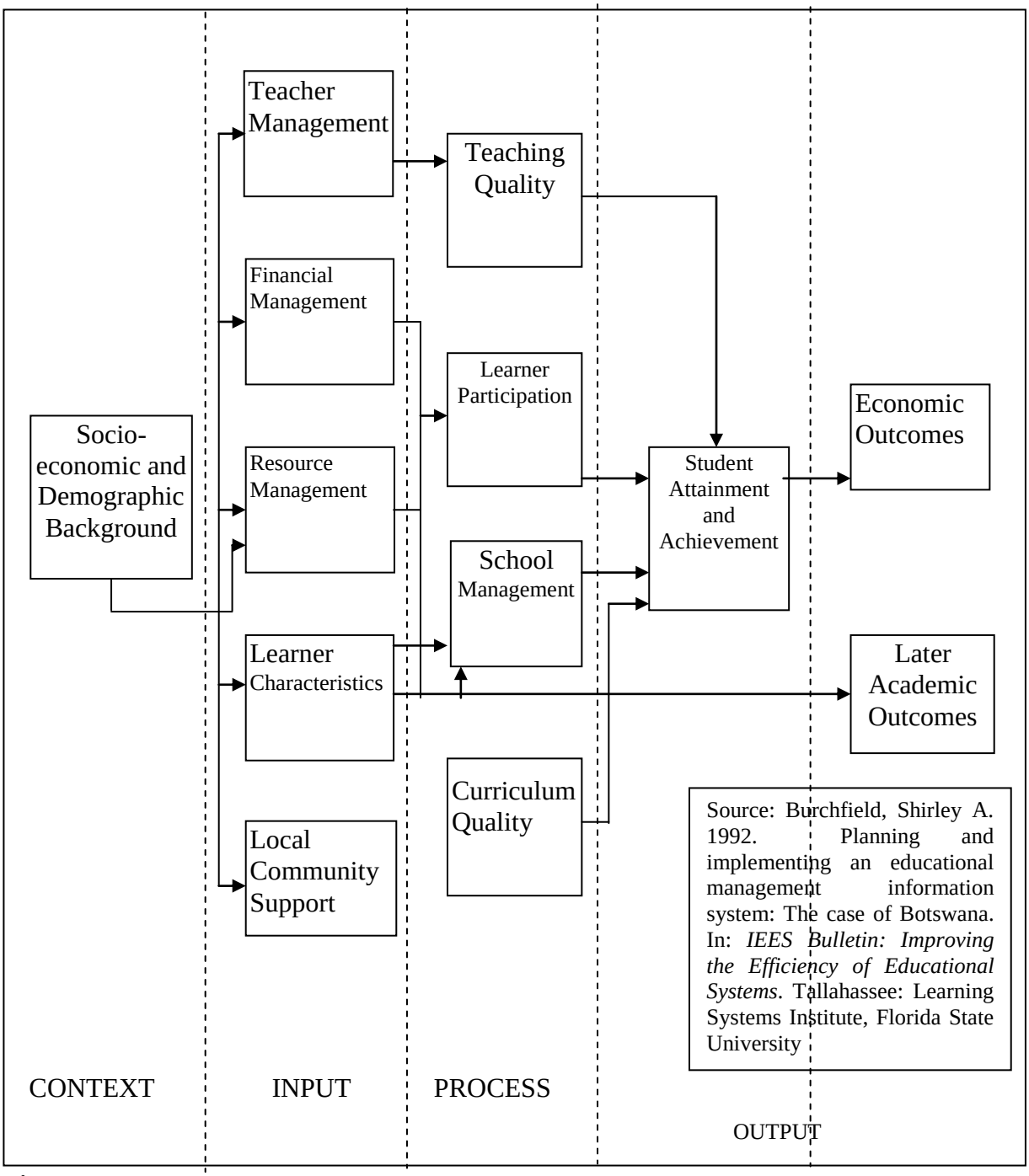


Figure 2.3.2.1.

Different dimensions or aspects exist within the different phases:

Context information describes the current conditions, issues, opportunities and constraints in the environment of the learners. The context in which education takes place is reflected in the socio-economic milieu and the demographic background in which the learners grow up and live during their school career (Burchfield, 1992).

Inputs into education can be seen as the provision that is made before education can take place. The government plays an important role in supplying human, financial and physical resources (Burchfield, 1992).

According to Burchfield (1992), the process in education attempts to describe the activities taking place in the teaching and learning situation and all the stakeholders in education, namely the parents, learners, teachers and principals, play an important role

The output phase of the education system describes the immediate effects of the education process and includes the achievements that were attained in the assessment (Burchfield, 1992).

The outcomes phase describes the less-immediate and less-direct results. This aspect can only be measured over a period of time. Outcomes cover a wider range of individuals than just the school leavers (Burchfield, 1992).

The researcher analysed learner performance in Physical Science in the 2008 NSC examination, by stratifying the schools according to districts and their quintile ranking. According to the model, learner performance lies in the output phase. This framework is used in evaluating an education system by examining the influence of the socio-economic factors (the context of teaching and learning) on the input, process, output and ultimately the outcomes of the system. The quintile rankings, being the indicator of the socio-economic status of the schools, were used as an indicator for the context of learning.

In chapter 4, the researcher describes how the model was adapted by using the output that is the results of learners in the different quintiles, to understand the relationship between learner performance and the quintile ranking of the schools.

The next chapter describes the methodology used in this study, which is based on the explanatory mixed method research model. This, according to Cresswell (2006), is a procedure for collecting and then "mixing" of both quantitative and qualitative research methods into a single study to analyse and understand the research problem.

CHAPTER 3

Research design and methodology

3.1. Introduction

In this chapter, the researcher explains the methodological design of the study which was the explanatory mixed method design. In this design, both quantitative and qualitative data was used. This chapter explains how the two data cohorts, namely the results produced in physical in the 2008 NSC examination and the interviews with subject advisors were used to answer the research question: What is the relationship between student performance in physical science in the province of KwaZulu-Natal in the 2008 NSC examination and the quintile ranking of the school?

This chapter begins with the description of the research design and methodology. It then describes the two data cohorts and the sampling techniques that were used. The theoretical framework is then mapped and located in the interpretative, mixed method paradigm. The methods of data analysis are then discussed. The chapter ends with the ethical considerations in the study.

3.2. Research design and methodology

The methodology used in this study is based on the explanatory mixed method research model which, according to Cresswell and Plano Clark (2007), is a procedure for collecting and then "mixing" of both quantitative and qualitative research methods into a single study to analyse and understand the research problem (Cresswell 2006). The basic assumption is that the use of both quantitative and qualitative methods, in combination, provides a better understanding of the research problem and questions than either method by itself (Cresswell, 2006).

The quantitative data in the study, being the results of learners in Physical Science in the 2008 National Senior Certificate examination, yield specific numbers that can be statistically analysed to provide results to understand the frequency and magnitude of trends, and provide useful information needed to describe and analyse the performance of learners.

The qualitative data, namely the data from the semi-structured interviews, provide the actual words of people in the study and offer many different perspectives on the study topic. This consequently produces a complex picture of the situation. Miles and Huberman, (1994) claim that when one combines quantitative and qualitative designs, a very powerful mix is created (Miles & Huberman, 1994).

In this study, an explanatory mixed method framework is used. This framework allows the researcher to follow up the quantitative study with a qualitative one to obtain more detailed and specific information than that which can be gained from the results of statistical tests.

The explanatory mixed method model consists of first collecting quantitative data and then collecting qualitative data to help explore and elaborate on the quantitative results. The rationale for this approach is that the quantitative data and results of analysis provide a general picture of the research problem; more analysis, specifically through qualitative data collection, is needed to refine, extend and explain the general picture (Cresswell C. W., 2006).

3.3. Sources of data

Two cohorts of data were gathered. These data were:

3.3.1. Statistical data, namely the proportion of learners in each category of pass for each of the schools in the province of KwaZulu-Natal were gathered. Individual scores of the learners were unavailable from the Department of Education; hence the frequency scores being subjected to statistical analysis to elicit the results.

3.3.2. The second data cohort was the interviews with participants identified by the researcher. These included the chief marker for the Physical Science paper as well as subject advisors that served as moderators in each of the two papers written in Physical Science.

3.4. Sampling

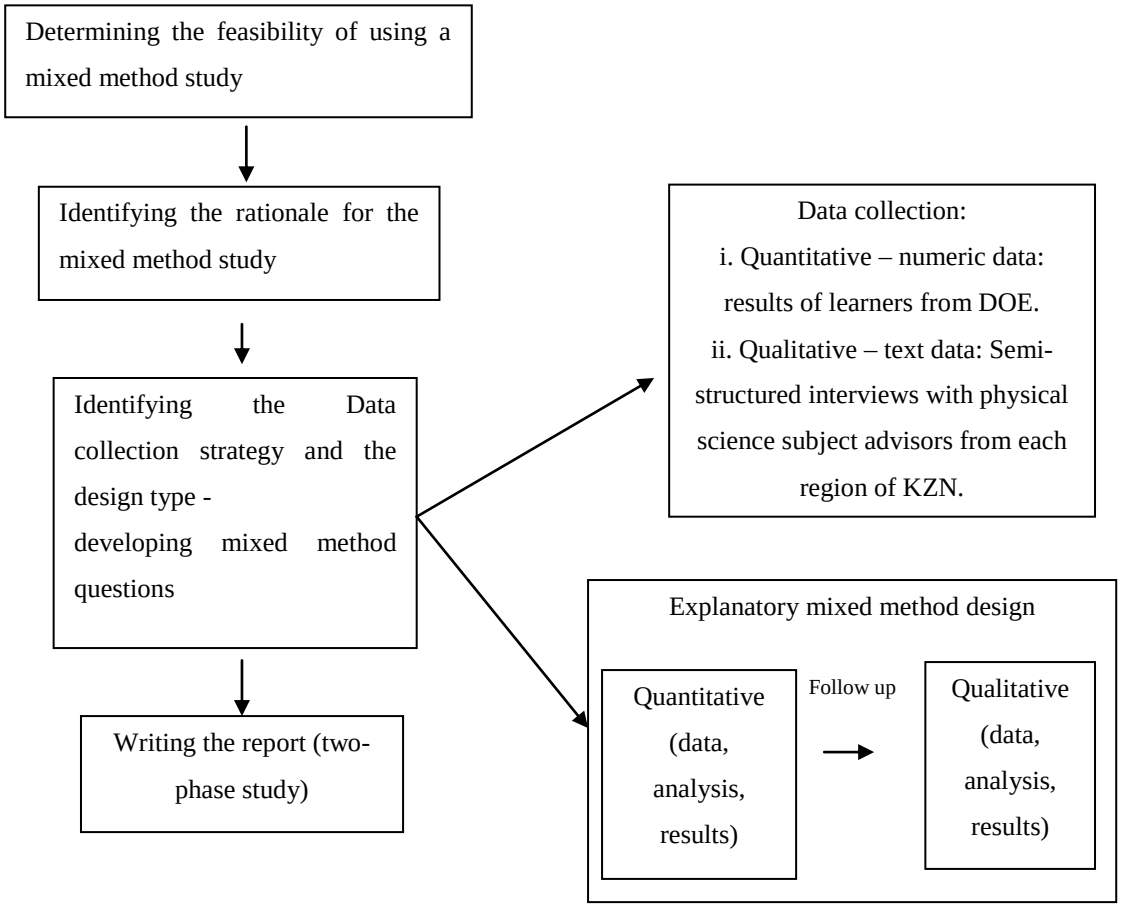
The purpose of the study was to investigate how the results produced in Physical Science in the province of KwaZulu-Natal in the 2008 NSC examination are used to give a deeper insight and understanding of the academic performance of learners through the use of a mixed method approach. Since the study sought to gain a deeper insight and understanding of the provincial results, the purposive sampling technique was used to identify participants that were responsible for marking, moderation and reporting of provincial examination papers.

Map of KwaZulu-Natal showing the new education region and district and local boundaries as well as regional and district offices.

Creswell (2008) states that purposive sampling involves the researcher intentionally selecting individuals on the basis of the researcher's judgement of the individual's typicality. Cohen, Manion, Morrison (2007) support this view and argue that this sampling technique is best suited when the intention is to collect data about a central phenomenon,

which in the case of this study involved the results produced by learners in physical science in the 2008 NSC examinations.

3.5. Mapping the conceptual framework for the study



According to Cohen, Manion and Morrison (2008), the mixed method researcher:

i. Places a priority on quantitative data collection.

ii. Collects quantitative data first in sequence. This is followed by the qualitative data collection.

iii. Uses the qualitative data to refine the results from the quantitative data. This refinement results in exploring a few typical cases, probing a key result in more detail and following up with outlier and extreme cases.

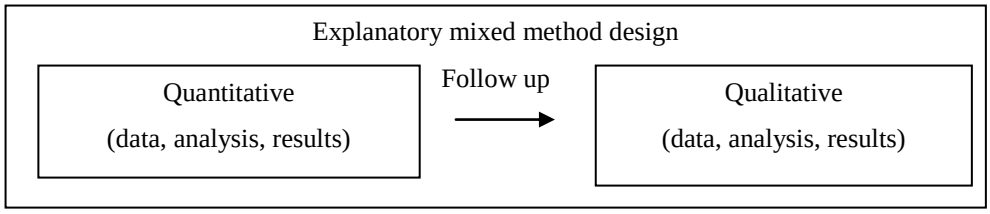
3.6. Locating the study: The issue of paradigms

The use of mixed method methodology raises debates on the research paradigm or worldview (Cresswell, 2006). According to Reichardt and Cook (1979), as cited in

Cresswell (2006), the issue about worldviews is whether a researcher who used certain methods, also needed to use a specific worldview – the "compatibility" (Tashakkori and Teddlie, (1998) as cited in Cresswell (2006) between worldviews and methods. According to Cresswell (2006), those who argued for "incompatibility" said that quantitative methods (an attempt to measure objectively) belonged to the quantitative worldview whereas qualitative methods (attempt to assess reality subjectively) apply only to the qualitative worldview (Cresswell, 2006).

The results of learners have an "objective", statistical reality but results and statistics don't speak for themselves. They also have a "subjective" reality, therefore, in this interpretative mixed method study. The researcher adopted Tashakkori and Teddlie's (1998) philosophy, as cited in Cresswell (2006), and that is that a pragmatist worldview is necessary in mixed method research. The pragmatists believe philosophically in using procedures that "work" for a particular research problem and that the researcher should use many methods when understanding a research problem (Tashakkori and Teddlie's, 1998 as cited in Cresswell (2006)).

This study, as stated, uses the explanatory mixed method design. Both quantitative and qualitative data is used in this research to answer the research question. In this section, the researcher describe the specific mixed method design, namely the explanatory mixed method design, outlines the rationale for the choice of the design and describes the methods used in the collection and analysis of the data.



The explanatory mixed method model is a two-phase model, adapted in this research to give priority to the quantitative data, (the results of learners in physical science in the 2008 NSC examinations). The first data cohort, which is the results of the learners, was then analyzed statistically using a statistical data analysis programme, namely the SPSS version 15. The data was used to determine the proportion of learners by category of pass.

The National Curriculum describes category of pass according to the following table:

ACHIEVEMENT LEVEL	ACHIEVEMENT DESCRIPTION	% : CATEGORY OF PASS
7	Outstanding achievement	80 - 100 %
6	Meritorious achievement	70 - 79 %
5	Substantial achievement	60 - 69 %
4	Adequate achievement	50 - 59 %
3	Moderate achievement	40 - 49 %
2	Elementary achievement	30 - 39 %
1	Not Achieved	0 - 29 %

The data was subjected to statistical analysis using a computer programme, namely the SPSS version 15, to determine the proportion of learners in each category of pass by taking the number of passes in each category over the total number who wrote.

The results of a normality test, namely the Kolmogorov-Smirnov test that was done, reflected that the data do not follow a normal distribution. Hence, non-parametric testing was used, that is, the one-sample chi-square was computed to compare the proportions separately for each category of pass between districts and between quintiles within districts. Chi-square results could not be computed where the data was insufficient.

The chi-square statistic is a method of determining whether the differences between the observed and theoretical frequencies are significant. The null hypothesis is that no differences exist between the observed and theoretical frequencies.

If the level of significance (p), read of the table is greater than 0.05 or 5%, then the hypothesis is accepted. This means that 95% of the time when observed data is this close to expected data; this deviation is due to random chance.

If the level of significance (p), read of the table is less than 0.05 or 5%, then the hypothesis is rejected. This means that 95% of the time there is a significant difference between the observed and theoretical frequencies. In terms of the proportion of learners in each category of pass, this would mean that the differences were not due to random chance. It

could therefore be reasonably assumed that the variable, quintile ranking, contributed to the difference.

3.7. Analysis of the first data cohort: The statistical results

Three themes were generated from the data and these were:

3.6.1. Comparison of the proportion of learners in each category of pass for the Province.
3.6.2. Comparison of the proportion of learners in each category of pass between quintiles in the Province.
3.6.3. Comparison of the proportion of learners in each category of pass between quintiles within districts

Finally, a tabulated summary is presented showing whether the proportion of pass in each category for each of the districts was significant or not significant.

The results were then analyzed using the analytical framework that was developed using the Burchfield's (1992) Education Framework as its basis.

The second data cohort, namely the interviews, was then subjected to explicitation.

3.8. Explicitation of the second data cohort: the interviews

Hycner (1999) cautions that 'analysis' has dangerous connotations for phenomenology. The term 'analysis' usually means a 'breaking into parts' and therefore often means a loss of the whole phenomenon. 'Explicitation' implies investigation of the constituents of a phenomenon while keeping the context of the 'whole'. Coffey and Atkinson (1996, p. 9) regard analysis as the "systematic procedures to identify essential features and relationships". It is a way of transforming the data through interpretation. Hence the researcher uses the term 'explicitation'.

This explicitation process has five ‘steps’ or phases, which are:

3.8.1. Bracketing and phenomenological reduction.

Phenomenological reduction is a deliberate and purposeful opening by the researcher to the phenomenon “in its own right with its own meaning” (Lauer, 1958, p. 50). The researcher relied entirely on the data provided by the participants as they were selected on the basis of their roles in the NSC Physical Science examinations. Comments on issues outside the examination itself, especially with respect to theme 3, (that is the transformation) would have been within the experience of subject advisors as they interact with many schools within districts.

3.8.2. Delineating units of meaning.

This is a critical phase of explicating the data, in that those statements that are seen to illuminate the researched phenomenon are extracted or ‘isolated’ (Creswell, 1998; Holloway, 1997; Hycner, 1999). The researcher is required to make a substantial amount of judgement calls while consciously bracketing her/his own presuppositions in order to avoid inappropriate subjective judgements. Meaning was derived by the researcher comparing responses from the various participants.

3.8.3. Clustering of units of meaning to form themes.

With the list of non-redundant units of meaning in hand the researcher must again bracket her or his presuppositions in order to remain true to the phenomenon. By rigorously examining the list of units of meaning the researcher tries to elicit the essence of meaning of units within the holistic context (Hycner, 1999). Units of meaning was clustered into themes. The researcher generated four themes. These were: curriculum change and its contribution to learner performance, quality and standard of the examination papers and its contribution to learner performance, contribution of school-based assessment on learner performance, and differentials in the category of passes in the province and between quintiles.

3.8.4. Summarising each interview

A summary that incorporates all the themes elicited from the data gives a holistic context (Hycner, 1999), captures it as follows:

"Whatever the method used for a phenomenological analysis the aim of the investigator is the reconstruction of the inner world of experience of the subject. Each individual has his own way of experiencing temporality, spatiality, materiality, but each of these coordinates must be understood in relation to the others and to the total inner 'world'. (Hycner, 1999, pp. 153-154).

3.8.5. Composite summary

General and unique themes for all the interviews formed a composite summary. Once the process outlined in points 1 - 4 has been done for all the interviews, the researcher looks "for the themes common to most or all of the interviews as well as the individual variations" (Hycner, 1999, p. 154).

Four themes were generated from this data. These were:

- Curriculum change and its contribution to learner performance.
- Quality and standard of the examination papers and its contribution to learner performance.
- Contribution of the school based assessment on learner performance.
- Differentials in the category of passes in the province and between quintiles.

3.9. Ethical considerations

In order to ensure ethical research, the researcher firstly obtained the ethical clearance from the university's ethics committee. The researcher then sought permission from KZN Department of Education, research. This was duly granted (refer to appendix B)

Informed consent also involves competence, voluntarism, full information and comprehension (Cohen et al., 2007). In order to ensure ethical research, the researcher made use of informed consent. Based on Bailey's (1996, p. 11) recommended items, a

specific informed consent agreement was developed, in order to gain the informed consent from participants, namely:

- That they were participating in the research
- The purpose of the research
- The procedures of the research
- The risk and benefits of the research
- The voluntary nature of research participation
- The subject's (informant's) right to stop the research at any time.
- The procedures used to protect confidentiality.

All participants were in agreement with its content and signed (see appendix A).

In the following chapter, the results of the two cohorts of data, namely the quantitative study and the qualitative study are analyzed using Burchfield's Education Evaluation Framework.

CHAPTER 4

Analysis

4.1. Introduction

In this chapter, the statistical results of the first cohort of data are presented in the form of tables and graphs. Explanations of the representations are also provided. A number of themes were generated from the results. These include:

- The number and percentages of learners that wrote the physical science examinations from each of the 12 districts of KwaZulu-Natal.
- The number of learners who wrote in each quintile in the province.
- The proportion of learners in each category of pass between districts.
- The proportion of learners in each category of pass between quintiles and
- The proportion of learners in each category of pass between districts for each of the quintiles (quintiles 1 – 5).

A summary of the results together with the overall averages was then tabulated showing whether the differences in each of the categories of pass for each of the districts were significant of not significant.

The qualitative cohort was then subjected to analysis and the following five themes were generated: curriculum change and its contribution to learner performance, quality and standard of the examination papers and its contribution to learner performance, contribution of the school-based assessment on learner performance, differentials in the category of passes in the province and differentials in the category of passes between quintiles 1 to quintile 5.

The results of the two sets of data cohorts, namely the quantitative and the qualitative data cohorts, were then subjected to further analysis using the analytical framework developed by the researcher, based on Burchfield's (1992) Education Evaluation Framework.

4.2. Results

The data was analysed using the SPSS version 15.0 (SPSS Inc., Chicago, Illinois, USA). A p value <0.05 was considered statistically significant. The following 4 records were omitted from the analysis since the numbers reflected in the categories of passes did not correspond to the number who wrote:
Sizabonke Secondary (10), Phumanyova High (33), Mziwamandla High (42) And Khethokuhle Secondary (16).

Schools without a quintile score were labelled 'No Quintile'. Descriptive statistics in the form of frequency and percentage were computed.

The proportion of learners in each category of pass was computed by taking the number of passes in each category over the total number who wrote. One-sample chi-square was computed to compare the proportions between districts. This was computed separately for each category of pass. Values of p less than 0.05 indicate a significant difference at the 95% level. Chi-square results could not be computed where the data was insufficient. The results of the normality test, namely the Kolmogorov-Smirnov test, reflected that the data do not follow a normal distribution. Hence, non-parametric testing was used.

4.2.1. The number of learners who wrote in each of the 12 districts of KZN

Table 4.2.1 : Number of learners who wrote in each district

District name	Number Entered	Number Wrote	% Wrote
Amajuba	3019	2918	96.6
Empangeni	7675	7315	94.7
Ilembe	2657	2559	95.5
Obonjeni	4968	4788	96.3
Othukela	3600	3519	96.8
Pinetown	6113	5917	96.7
Sisonke	2633	2540	95.6
Ugu	4159	4080	97.9
Umgungundlovu	4319	4190	96.9
Umlazi	7961	7744	96.8
Umzinyathi	2402	2307	96.1
Vryheid	6685	6363	94.2
Total	**56191**	**54240**	**96.1**

The results in Table 4.2.1 reflect that on average 96.1% of the learners who registered for the exams, wrote the exams. The number of learners writing exams ranged from a minimum of 2307 (Umzinyathi) to a maximum of 7744 (Umlazi). Empangeni produced the second largest group of learners (7315). The data is graphically presented in Figure 1.

4.2.2. The number of learners who wrote the exams in each quintile in the province of KZN

In the analysis that follows the term quintile, in the tables, includes quintiles 1,2,3,4,5 and the "No Quintile schools"[7].

Table 4.2.2 : Number of learners who wrote in each quintile

Quintile	Number Entered	Number Wrote	% Wrote
1	11472	10853	94.6
2	10706	10286	95.7
3	14062	13588	96.3
4	9627	9401	97.5
5	8201	8084	98.8
No quintile	2123	2028	95.6
Total	**56191**	**54240**	**96.1**

The data in Table 4.2.2 reflects the number of learners who wrote in each quintile. Quintile 1 produced the largest number of learners (13588) while quintile 5 produced 8084 learners who wrote.

[7] No quintile schools refer to schools for which the quintile ranking was unavailable from the Department. These schools do have a quintile ranking but their database had not been updated with the Department.

4.2.3. Proportion of learners by category of pass in the province of KZN

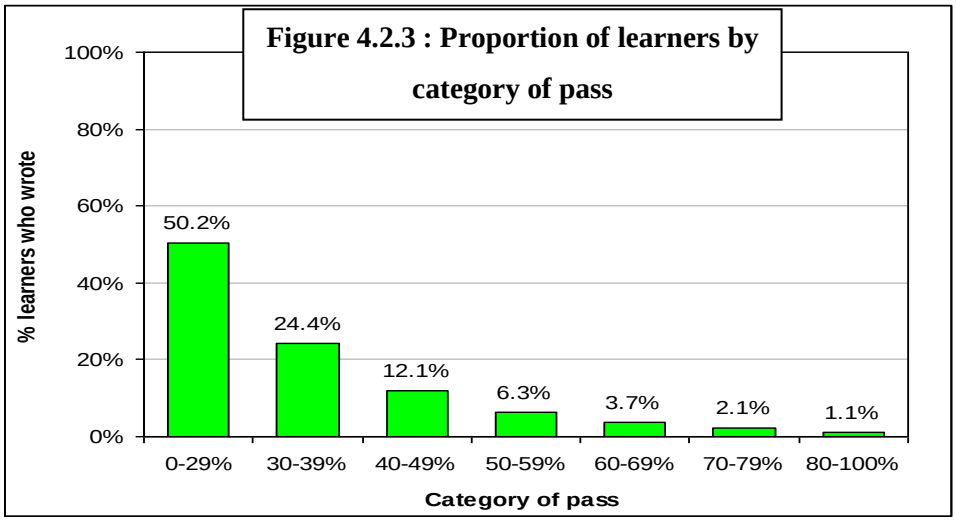


Figure 4.2.3 reflects the overall proportion of learners in each category of pass. An average of 13.2% of learners obtained passes of 50% or higher while the large majority are in the categories below 50%. In particular, 50.2% of learners are in the category of 0-29%.

4.2.4. Comparison of the proportion of learners in each category of pass between districts

Table 4.2.4 : Proportion of learners in each category of pass between districts

	0-29%	**30-39%**	**40-49%**	**50-59%**	**60-69%**	**70-79%**	**80-100%**
Amajuba	51.9%	25.6%	12.2%	5.7%	3.1%	1.3%	0.4%
Empangeni	57.1%	25.2%	10.6%	4.1%	2.0%	0.7%	0.2%
Ilembe	57.0%	25.5%	9.7%	4.3%	2.1%	1.0%	0.4%
Obonjeni	64.1%	23.1%	8.4%	3.1%	1.0%	0.3%	0.0%
Othukela	46.7%	29.4%	13.3%	5.9%	3.0%	1.1%	0.5%
Pinetown	41.8%	22.0%	13.2%	9.2%	6.1%	4.3%	3.4%
Sisonke	66.5%	20.4%	7.3%	4.1%	1.1%	0.5%	0.2%
Ugu	55.0%	23.3%	10.4%	5.1%	3.6%	1.8%	0.8%
Umgungundlovu	45.6%	23.3%	12.4%	7.9%	5.8%	3.5%	1.4%
Umlazi	31.3%	22.6%	17.1%	11.7%	8.4%	5.5%	3.3%
Umzinyathi	55.6%	25.2%	12.4%	4.2%	1.5%	0.8%	0.3%
Vryheid	52.7%	27.8%	12.5%	4.6%	1.9%	0.4%	0.1%
Overall Average	**50.2%**	**24.4%**	**12.1%**	**6.3%**	**3.7%**	**2.1%**	**1.1%**
Chi-Square	36.411	71.647	34.528	48.154	80.783	227.896	39.670
df	11	11	11	11	11	11	10
p	.000	.000	.000	.000	.000	.000	.000

$p<0.05$ significant at the 95% level

The data in Table 4.2.4 shows that a large proportion of the respondents had a pass-rate of 0-29%. The overall average reflects that 50.2% of the learners had a pass-rate between 0-29%, 24.4% were between 30-39% and 12.1% were between 40-49%. Only 6.3% had a pass-rate between 50-59% and 6.9% have a pass-rate over 60%.

There is a significant difference between the districts at the 95% level with regards to the proportion of learners who obtained 80-100% (Chi-square=39.67,$p<0.05$). The Pinetown district had 3.4% of learners in this category, Umlazi had 3.3% and Umgungundlovu had 1.4%. The other districts had 0.5% or below with Obonjeni producing no learners in this category of pass.

There is a significant difference between the districts with regards to the proportion of learners in the 70-79% at the 95% level ($p<0.05$). Umlazi had 5.5% of its learners in this category, followed by 4.3% of the Pinetown learners and 3.5% from Umgungundlovu. The other districts produce 1.3% or fewer learners in this category.

There is a significant difference between the districts with regards to the proportion of learners in the 60-69% at the 95% level ($p<0.05$). Umlazi had 8.5% of its learners in this category, followed by 6.1% of the Pinetown learners and 5.85% from Umgungundlovu. The other districts produce 3.6% or fewer learners in this category.

There is a significant difference between the districts with regards to the proportion of learners in the 50-59% at the 95% level ($p<0.05$). Umlazi had 11.7% of its learners in this category, followed by 9.2% of the Pinetown learners, 7.9% from Umgungundlovu, 5.9% from Othukela and 5.7% from Amajuba. The other districts produce 5.1% or fewer learners in this category.

There is a significant difference between the districts at the 95% level with regards to the proportion of learners who obtained 0-29% (Chi-square=36.411,$p<0.05$). Sisonke had the highest proportion of learners in this category (66.5%) followed by Obonjeni with 64.1%. A total of 6 districts produced between 51% and 57.1% of learners in this category. The Umlazi district had the lowest proportion of learners in this category (31.3%).

4.2.5. Average proportion of learners who achieved below 50% or above 50%

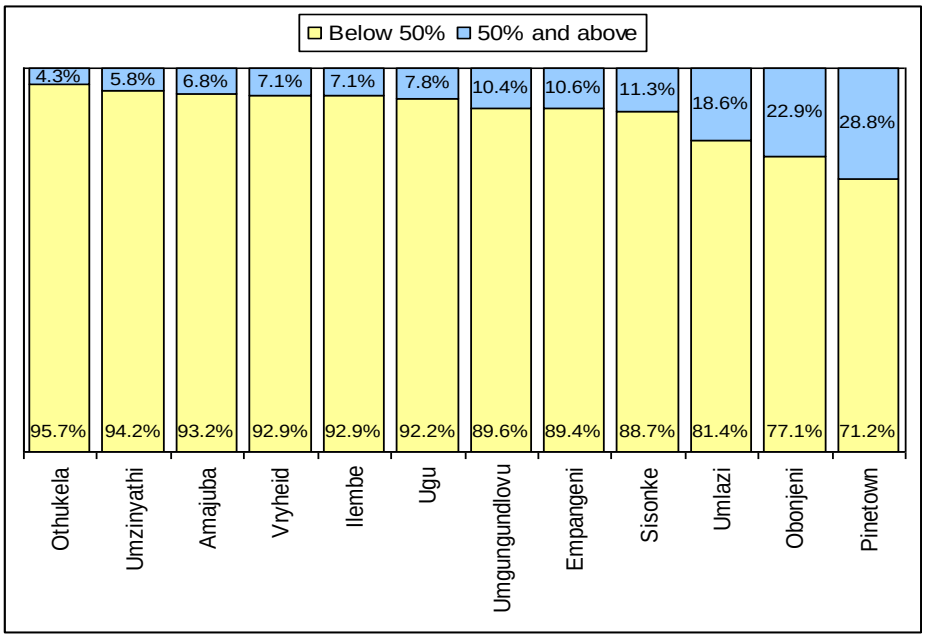


Figure 4.2.5: Average proportion of learners who achieved below 50% or 50%+

Figure 4.2.5 illustrates graphically the average proportion of learners who had under 50% (categories 0-29%, 30-39%, 40-49%) and over 50% (categories 50-59%, 60-69%, 70-79%, 80-100%). A total of 28.8% of the learners in the Pinetown district achieved 50% or higher.

4.2.6. Comparison of the proportion of learners in each category of pass between quintiles

Table 4.2.6 : Proportion of learners in each category of pass between quintiles

Quintile	**0-29%**	**30-39%**	**40-49%**	**50-59%**	**60-69%**	**70-79%**	**80-100%**
1	61.9%	24.1%	9.5%	3.1%	1.0%	0.3%	0.1%
2	61.3%	25.2%	9.1%	3.1%	1.1%	0.3%	0.0%
3	58.8%	24.9%	10.2%	3.8%	1.5%	0.5%	0.3%
4	45.0%	26.6%	14.2%	7.1%	4.3%	1.8%	1.0%
5	15.2%	21.5%	19.9%	16.7%	12.6%	8.8%	5.2%
No Quintile	37.7%	19.3%	13.3%	11.6%	9.4%	5.6%	3.0%
Overall Average	**50.2%**	**24.4%**	**12.1%**	**6.3%**	**3.7%**	**2.1%**	**1.1%**
Chi-Square	573.148	49.135	82.347	273.850	243.901	290.461	115.429
df	5	5	5	5	5	5	4
p	.000	.000	.000	.000	.000	.000	.000

$p<0.05$ significant at the 95% level

The results in Table 4.2.6 show that quintile 1 had 61.9% of learners in the 0-29% category, 24.1% of learners had 30-39% and 9.5% had 40-49%. Only 4.5% of the learners had a pass of 50% or higher. In Quintile 2, 61.3% of learners were in the 0-29% category, 25.2% of learners had 30-39% and 9.1% had 40-49%. Similarly to Quintile 1, 4.5% of the learners had a pass of 50% or higher. Quintile 4 had 58.8% in the 0-29% category, 24.9% in the 30-39% category anf 10.2% in the 40-49% category. A total of 6.1% had a pass of 50% or higher. Amongst the learners in Quintile 4, 45% of the learners were in the 0-29% category, with 26.6% between 30 and 39%, 14,2% between 40 and 49% and 18.2% above 50%. Quintile 5 reflects the lowest proportion of learners in the 0-29% category (15.2%). A total of 21.5% were in the 30-39% category and 19.9% were in the 40-49% category. A total of 17.3% of learners were 50% or higher.

The results of the Pearson chi-square tests show that there is a significant difference in the proportion of learners between the quintiles in each category of pass ($p<0.05$).

Quintile 5 had the lowest proportion of learners in the 0-29% category when compared to all the quintiles, including the private schools. Quintile 5 also had the highest proportion of learners over 50% when compared to quintiles 1,2,3 and 4

4.2.7. Average proportion of learners who achieved below 50% or above 50%

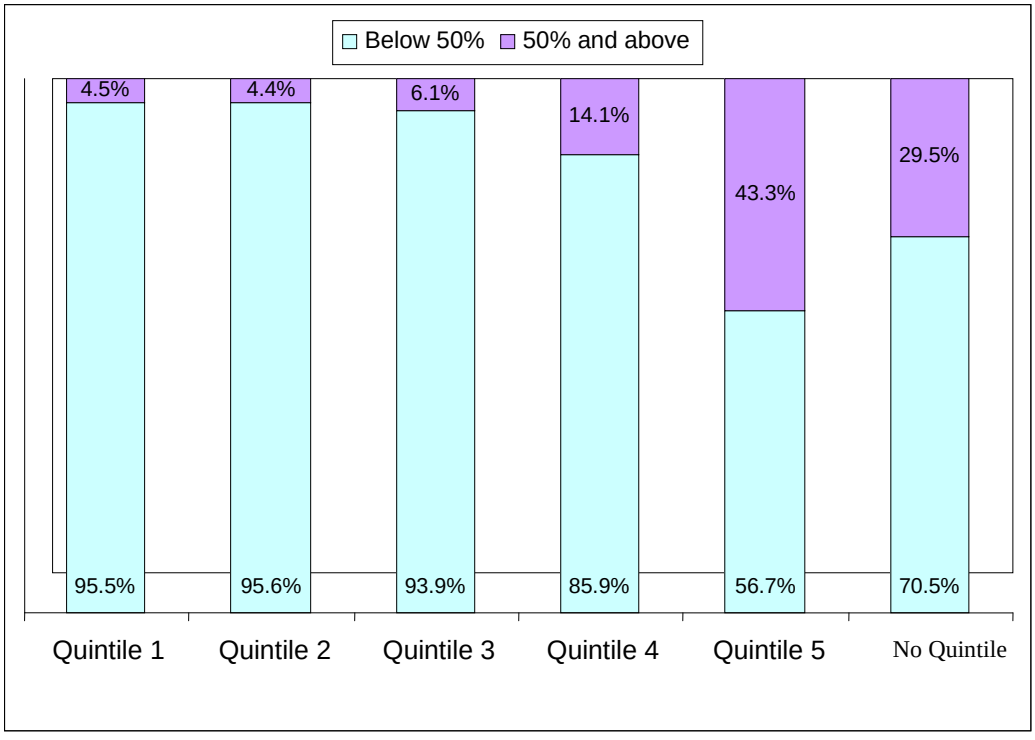


Figure 4.2.7: Average proportion of learners who achieved below 50% or 50% and more

Figure 4.2.7 presents graphically the average proportion of learners who had under 50% (categories 0-29%, 30-39%, 40-49%) and over 50% (categories 50-59%, 60-69%, 70-79%, 80-100%). Quintile 5 is the best performing quintile with 43.3% of learners obtaining a pass above 50%. Quintile 5 has performed better than the private schools.

4.2.8. Comparison of the proportion of learners in each category of pass between districts within Quintile 1

Quintile	1

District Name	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
Amajuba	44.3%	31.6%	14.8%	6.8%	1.3%	0.8%	0.4%
Empangeni	67.3%	21.2%	8.5%	1.8%	0.9%	0.2%	0.0%
Ilembe	62.2%	27.0%	8.3%	2.0%	0.3%	0.3%	0.0%
Obonjeni	66.6%	21.6%	7.9%	2.8%	0.8%	0.3%	0.1%
Othukela	54.9%	31.8%	8.3%	4.4%	0.6%	0.0%	0.0%
Pinetown	28.6%	14.3%	10.9%	16.8%	14.3%	9.2%	5.9%
Sisonke	75.6%	17.8%	5.4%	0.8%	0.2%	0.1%	0.0%
Ugu	61.4%	24.7%	8.6%	3.1%	1.8%	0.3%	0.2%
Umgungundlovu	56.0%	24.7%	11.9%	5.4%	1.1%	0.9%	0.0%
Umzinyathi	60.3%	22.4%	13.8%	2.7%	0.7%	0.1%	0.0%
Vryheid	55.6%	28.0%	11.8%	3.9%	0.7%	0.0%	0.0%
Average	61.9%	24.1%	9.5%	3.1%	1.0%	0.3%	0.1%
Chi-Square	27.226	12.722	8.811	41.961	58.000	11.636	
df	10	10	10	10	8	2	
p	.002	.240	.550	.000	.000	.003	

$p<0.05$ significant at the 95% level

The data in Table 4.2.9 reflects the proportion of learners in each category of pass for all districts in Quintile 1. The Pinetown district had 5.9% of its learners in the 80-100% category while the other districts had less than 0.5% in this category. Pinetown also had the highest proportion of learners passing in the 70-79% while the other districts produced less than 1%. In the 60-69% category, Pinetown fared the best between the districts with 14.3% of learners in this category while the other districts produced 1.3% or lower. Pinetown also produced 16.8% of the learners in the 50-59% category followed by Amajuba with 6.8%.

Pinetown had the lowest proportion of learners in the 0-29%, 30-39% and 40-49% categories while Sisonke produced the largest proportion (75.6%) of its learners in this category.

The results of the Pearson chi-square test shows that there is a significant difference in the proportion of learners between the districts in the 0-29% category ($p<0.05$). The Pearson chi-square test for the 30-39% category reflects no significant difference between the districts. With the exception of Pinetown and Sisonke, the other districts ranged between 21.6% and 31.8%. In the 40-49% category, with the exception of Sisonke, the other districts ranged between 8.3% and 14.8%. All the districts are not statistically different with regards to the proportion of learners in the 40-49% ($p>0.05$).

4.2.9. Comparison of the proportion of learners in each category of pass between districts within quintile 2

Table 4.2.9 : Proportion of learners in each category of pass compared between districts in for quintile 2

Quintile	2						
District Name	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
Amajuba	78.2%	13.7%	5.6%	0.0%	1.6%	0.8%	0.0%
Empangeni	62.5%	24.9%	9.2%	2.3%	0.9%	0.2%	0.0%
Ilembe	62.3%	26.2%	8.2%	2.3%	0.8%	0.2%	0.0%
Obonjeni	59.5%	26.7%	8.9%	3.5%	1.3%	0.2%	0.0%
Othukela	53.2%	31.2%	11.4%	3.2%	1.0%	0.1%	0.0%
Pinetown	85.0%	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sisonke	65.3%	20.5%	7.2%	4.9%	1.5%	0.6%	0.0%
Ugu	64.4%	23.0%	9.2%	2.1%	0.8%	0.3%	0.1%
Umgungundlovu	66.1%	24.5%	7.5%	1.6%	0.2%	0.0%	0.0%
Umlazi	54.2%	31.4%	9.3%	4.2%	0.8%	0.0%	0.0%
Umzinyathi	59.2%	28.2%	7.2%	3.9%	0.7%	0.7%	0.2%
Vryheid	58.8%	25.3%	10.8%	3.6%	1.4%	0.1%	0.0%
Average	61.3%	25.2%	9.1%	3.1%	1.1%	0.3%	0.0%
Chi-Square	14.815	13.559	3.161	3.516	.818	.000	
df	11	11	10	9	9	2	
p	.191	.258	.977	.940	1.000	1.000	

$p<0.05$ significant at the 95% level

The data in Table 4.2.9 reflects the comparison of the districts in Quintile 2. Umzinvathi had 0.2% of its learners in the 80-100% category followed by 0.1% for Ugu. In the 70-79% category, Amajuba had 0.8% of its learners in this category, followed by Umzinvathi with 0.7% and Sisonke with 0.6%. The other districts produced 0.2% or lower. Pinetown produced no learners in the 40-49%, 50-59% or higher categories. The results of the Pearson chi-square test shows that the districts are not significantly different from each other with regards to the proportion of learners within each category ($p>0.05$).

In the 0-29% category, Pinetown produced 85% of its learners in this category, followed by 78.2% for Amajuba. The other districts produced between 54% and 66.1% in this category.

4.2.10. Comparison of the proportion of learners in each category of pass between districts within quintile 3

Table 4.2.10 : Proportion of learners in each category of pass compared between districts in for quintile 3

Quintile	3						
District Name	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
Amajuba	64.6%	22.6%	7.3%	3.0%	2.1%	0.4%	0.0%
Empangeni	61.9%	25.5%	8.4%	3.4%	0.4%	0.3%	0.1%
Ilembe	66.0%	22.3%	7.8%	3.0%	0.9%	0.0%	0.0%
Obonjeni	70.8%	18.7%	7.3%	2.3%	0.5%	0.3%	0.0%
Othukela	51.0%	28.9%	13.6%	4.3%	1.5%	0.6%	0.2%
Pinetown	61.6%	22.1%	8.9%	3.9%	1.9%	0.8%	0.7%
Sisonke	66.5%	21.0%	7.3%	3.8%	0.9%	0.3%	0.3%
Ugu	58.3%	25.4%	10.3%	3.7%	1.6%	0.6%	0.1%
Umgungundlovu	58.0%	27.7%	8.7%	3.7%	1.8%	0.2%	0.0%
Umlazi	53.6%	20.3%	15.0%	5.6%	3.4%	1.4%	0.7%
Umzinyathi	59.2%	26.5%	9.1%	2.5%	2.0%	0.5%	0.2%
Vryheid	49.3%	31.7%	13.2%	4.3%	1.1%	0.2%	0.2%
Average	58.8%	24.9%	10.2%	3.8%	1.5%	0.5%	0.3%
Chi-Square	7.871	7.143	8.966	3.605	2.000	.000	.000
Df	11	11	11	11	9	3	1
P	.725	.787	.625	.980	.991	1.000	1.000

$p<0.05$ significant at the 95% level

In quintile 3, an average of 58.8% of learners was in the 0-29% category. Of the districts, Obonjeni had the highest proportion of its learners in this category (70.8%) while Vryheid had the lowest proportion amongst the districts (49.3%). The proportion of learners in the other districts ranged between 51% and 66%. The proportion of learners in the 0-29% category is not significantly different between the districts ($p>0.05$).

The proportion of learners in the 30-39% category ranged between 18.7% and 31.7% with an average of 24.9% of learners in this category. The districts are not significantly different from each other with regards to proportion of learners ($p>0.05$). In the 40-49% category, the proportion of learners ranged between 7.3% and 13.6% with an average of 10.2% in this category. The districts are not significantly different from each other with regards to proportion of learners ($p>0.05$).

In the 50-59% category, the proportion of learners ranged between 2.3% and 5.6% with an average of 3.8% in this category. The districts are not significantly different from each other with regards to proportion of learners ($p>0.05$).

Umlazi had 3.4% of it s learners in the 60-69% category, followed by Amajuba with 2.1% of learners. The proportion of learners in the 60-69% category is not significantly different between the districts ($p>0.05$).

Umlazi had 1.4% in the 70-79% category and 0.7% in the 80-100% category while Pinetown had 0.8% of its learners in the 70-79% category and 0.7% in the 80-100% category. The other districts had 0.6% or lower in the 70-79% category and lower than 0.3% in the 80-100% category. Ilembe produced 0% of learners in the 70-79% or 80-100% categories while Amajuba had 0% of its learners in the 80-100% category.

4.2.11. Comparison of the proportion of learners in each category of pass between districts within quintile 4

Table 4.2.11 : Proportion of learners in each category of pass compared between districts in for quintile 4

Quintile	4

District Name	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
Amajuba	55.5%	26.4%	11.6%	3.9%	1.6%	0.6%	0.6%
Empangeni	58.8%	23.5%	11.4%	3.5%	1.7%	1.2%	0.0%
Ilembe	44.7%	28.1%	14.4%	6.8%	4.4%	0.8%	0.8%
Obonjeni	36.6%	34.1%	18.3%	7.3%	3.7%	0.0%	0.0%
Othukela	33.2%	31.8%	19.2%	8.7%	5.5%	1.1%	0.5%
Pinetown	44.3%	25.3%	14.2%	8.7%	4.2%	1.8%	1.4%
Sisonke	30.1%	35.7%	16.8%	11.9%	3.5%	2.1%	0.0%
Ugu	48.4%	23.4%	12.0%	7.1%	4.9%	2.9%	1.3%
Umgungundlovu	55.8%	24.7%	11.9%	3.6%	3.1%	0.8%	0.1%
Umlazi	38.7%	27.5%	14.8%	8.4%	5.8%	3.0%	1.8%
Umzinyathi	32.0%	29.2%	20.8%	11.2%	3.4%	2.2%	1.1%
Vryheid	42.9%	26.3%	15.2%	7.4%	5.7%	2.2%	0.3%
Average	45.0%	26.6%	14.2%	7.1%	4.3%	1.8%	1.0%
Chi-Square	23.929	6.958	7.333	11.273	6.000	3.579	.750
df	11	11	11	11	11	10	6
p	.013	.802	.771	.421	.873	.964	.993

$p<0.05$ significant at the 95% level

The data in Table 4.2.11 reflects a comparison between the districts in quintile 4. There is a significant difference between the districts in the 0-29% category ($p<0.05$). Sisonke had the lowest proportion of learners in this category (30.1%) while Empangeni had the largest proportion in this category . The other districts ranged between 33.2% and 55.8% with an average of 45% of the learners in Quintile 4 produced in this category.

In the 30-39% category, the proportion of learners ranged between 23.5% and 34.1% with an average proportion of 26.6% produced in this category. The districts are not significantly different with regards to the proportion of learners in this category ($p>0.05$).

An average of 14.2% of learners in quintile 4 was produced in the 40-49% category. Umzinyathi had 20.8% of its learners in this category, followed by Sisonke with 16.8%. The other districts ranged between 11.4% and 15.2%. The differences between the categories is not statistically significant at the 95% level ($p>0.05$).

In the 50-59% category, quintile 4 produced an average of 7.1% in this category. Sisonke produced 11.9% of its learners in this category followed by 11.2% from Umzinyathi. The other districts ranged between 3.5% and 8.7%. The proportions amongst the districts are not statistically different ($p>0.05$).

An average of 4.3% of learners was in the 60-69% category. Umlazi produced 5.8% in this category followed by 5.7% for Vryheid and 5.5% for Othukela. The other districts had below 5% in this category. The districts are not statistically different ($p>0.05$).

In the 70-79% category, Umlazi had 3.0% in this category while Ugu had 2.9% in this category. The other districts ranged between 0.6% and 2.2%. Obonjeni produced 0% in both the 70-79% and 80-100% categories.

Pinetown had 1.8% in the 70-79% category and 1.4% in the 80-100% category. Umlazi had 1.8% in the 80-100% category followed by Pinetown with 1.4% and Ugu with 1.3%. The other districts produced 1.1% or lower. Empangeni and Obonjeni had no learners in the 80-100%.

4.2.12. Comparison of the proportion of learners in each category of pass between districts within quintile 5

Table 4.2.12 : Proportion of learners in each category of pass compared between districts in for quintile 5

Quintile	5

District Name	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
Amajuba	29.1%	28.4%	19.4%	12.0%	6.9%	3.6%	0.7%
Empangeni	28.7%	31.8%	18.8%	10.3%	6.6%	2.2%	1.6%
Ilembe	34.1%	21.1%	12.1%	14.3%	9.4%	6.3%	2.7%
Othukela	2.2%	1.5%	15.6%	30.4%	24.4%	17.0%	8.9%
Pinetown	9.9%	19.7%	18.2%	16.7%	13.3%	12.1%	10.1%
Sisonke	3.6%	7.1%	28.6%	42.9%	3.6%	3.6%	10.7%
Ugu	6.2%	15.9%	13.8%	22.8%	18.6%	15.9%	6.9%
Umgungundlovu	4.1%	14.8%	20.6%	22.1%	19.1%	13.6%	5.8%
Umlazi	13.2%	20.7%	21.6%	17.4%	13.1%	8.9%	5.1%
Umzinyathi	14.4%	22.7%	25.8%	15.5%	10.3%	8.2%	3.1%
Vryheid	9.7%	18.1%	26.4%	18.1%	20.8%	5.6%	1.4%
Average	15.2%	21.5%	19.9%	16.7%	12.6%	8.8%	5.2%
Chi-Square	91.613	41.634	13.856	44.244	32.712	29.735	24.690
df	10	10	10	10	10	10	10
p	.000	.000	.180	.000	.000	.001	.006

$p<0.05$ significant at the 95% level

Table 4.2.12 reflects the comparison of the districts in Quintile 5. There is a significant difference in the proportion of learners in the 0-29% category between the districts ($p<0.05$). The proportion of learners in this category ranged from 2.2% (Othukela) to 34.1% for Ilembe.

There is a significant difference in the proportion of learners in the 30-39% category between the districts. Othukela had the lowest proportion of its learners in this category followed by 7.1% for Sisonke. The other districts ranged between 14.8% and 31.8%. The differences between districts is statistically significant ($p<0.05$).

In the 40-49% category, the proportion of learners between the districts is not significantly different ($p>0.05$).

In the 50-59% category, Sisonke produced the majority of its learners in this category (42.9%) followed by Othukela with 30.4%. The other districts ranged between 10.3% and 18.1%. There is a significant difference between the districts with regards to the proportion of learners in the 50-59% category ($p<0.05$).

In the 60-69% category, a total of 24.4% were from Othukela followed by 20.8% from Vryheid, 19.1% from Umgungundlovu and 18.6% from Ugu. The rest of the districts had 13.3% or fewer learners in this category. The proportions between the districts is significantly different ($p<0.05$)

In the 70-79% category, there were 12.1% learners from Pinetown, 13.6% from Umgungundlovu, 15.9% from Ugu and 17% from Othukela. The other districts had lower than 9% . The differences in proportions between the districts is significantly different ($p<0.05$).

In the 80-100% category, Pinetown and Sisonke had 10.1% and 10.7% learners respectively, followed by Othukela with 8.9%. The other districts produced lower than 9%.

4.2.13 Comparison of the proportion of learners in each category of pass between quintiles in the Amajuba district

Table 4.2.13 : Proportion of learners in each category of pass compared between quintiles

District Name	Amajuba						
Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	44.3%	31.6%	14.8%	6.8%	1.3%	0.8%	0.4%
2	78.2%	13.7%	5.6%	0.0%	1.6%	0.8%	0.0%
3	64.6%	22.6%	7.3%	3.0%	2.1%	0.4%	0.0%
4	55.5%	26.4%	11.6%	3.9%	1.6%	0.6%	0.6%
5	29.1%	28.4%	19.4%	12.0%	6.9%	3.6%	0.7%
Average	51.9%	25.6%	12.2%	5.7%	3.1%	1.3%	0.4%
Chi-Square	26.251	7.447	10.068	7.538	8.143	3.857	.000
df	4	4	4	3	4	3	1
p	.000	.114	.039	.057	.086	.277	1.000

$p<0.05$ significant at the 95% level

The results in Table 4.2.13 show that there is a significant difference between the quintiles in the Amajuba district with regards to the proportion of learners in the 0-29% category ($p<0.05$). In particular, quintile 5 had the lowest proportion of learners (29.1%) of all the districts while quintile 2 had the largest proportion of learners (78.2%) in this category.

The proportion of learners in the 30-39% category is not significantly different between the learners in the different quintiles ($p>0.05$).

The proportion of learners in the 40-49% category is significantly different between the quintiles in the Amajuba district ($p<0.05$)

In the 50-59% category, the differences between quintiles is not statistically significant at the 95% level ($p>0.05$). Quintile 5 had 12% of learners in this category while quintile 2 had no learners in this category.

In the 60-69% category, quintile 5 had 6.9% of learners in this category while quintiles 1-4 produced 2.1% of learners or below. The differences are not significant at the 95% level ($p>0.05$).

In the 70-79% category, quintile 5 had 3.6% of its learners in this category while quintiles 1-4 had less than 1% of learners. The differences are not statistically significant ($p>0.05$).

In the 80-100% category, quintile 5 had 0.7% of its learners in this category, followed by 0.6% for quintile 4 and 0.4% for quintile 1. Quintiles 2 and 3 had not learners in this category. The differences between the quintiles in this category are not statistically significant ($p>0.05$).

4.2.14. Comparison of the proportion of learners in each category of pass between quintiles in the Empangeni district

Table 4.2.14: Proportion of learners in each category of pass compared between quintiles

District Name	Empangeni

Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	67.3%	21.2%	8.5%	1.8%	0.9%	0.2%	0.0%
2	62.5%	24.9%	9.2%	2.3%	0.9%	0.2%	0.0%
3	61.9%	25.5%	8.4%	3.4%	0.4%	0.3%	0.1%
4	58.8%	23.5%	11.4%	3.5%	1.7%	1.2%	0.0%
5	28.7%	31.8%	18.8%	10.3%	6.6%	2.2%	1.6%
No Quintile	17.4%	27.4%	16.8%	18.4%	14.7%	4.7%	0.5%
Average	57.1%	25.2%	10.6%	4.1%	2.0%	0.7%	0.2%
Chi-Square	44.297	2.779	8.945	33.053	27.846	3.250	.333
df	5	5	5	5	4	2	1
p	.000	.734	.111	.000	.000	.197	.564

$p<0.05$ significant at the 95% level

The results in Table 4.2.14 reflect the comparison between the quintiles in each category for Empangeni. There is a significant difference between the quintiles in the 0-29% category ($p<0.05$). The private schools had 17.4% of learners in this category. Of the quintiles, quintile 5 had 28.7% of learners while quintile 1 had the highest proportion of learners in this category (67.3%).

There is no difference in the proportion of learners in the 30-39% category between the quintiles ($p>0.05$).

There is no difference in the proportion of learners in the 40-49% category between the quintiles ($p>0.05$).

In the 50-59% category, 18.4% were from private schools. Of the quintiles, quintile 5 had the highest proportion of learners in this category (10.3%) while quintiles 1-4 had 3.5% or lower. The differences between the quintiles is statistically significant ($p<0.05$).

There is a significant difference between the quintiles in category 60-69% ($p<0.05$). The private schools had 14.7% in this category. Quintile 5 had 6.6% of its learners in this category while quintiles 1-4 had 1.7% or lower.

In the 80-100% category, Quintile 5 had 1.6% of its learners in this category. Quintile 3 had 0.1% of its learners in this category. Quintiles 1, 2 and 4 had no learners in this category. The differences between quintiles are not significant ($p>0.05$).

4.2.15. Comparison of the proportion of learners in each category of pass between quintiles in the Ilembe district

Table 4.2.15 : Proportion of learners in each category of pass compared between quintiles

District Name	Ilembe

Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	62.2%	27.0%	8.3%	2.0%	0.3%	0.3%	0.0%
2	62.3%	26.2%	8.2%	2.3%	0.8%	0.2%	0.0%
3	66.0%	22.3%	7.8%	3.0%	0.9%	0.0%	0.0%
4	44.7%	28.1%	14.4%	6.8%	4.4%	0.8%	0.8%
5	34.1%	21.1%	12.1%	14.3%	9.4%	6.3%	2.7%
No Quintile	0.0%	14.3%	0.0%	14.3%	0.0%	71.4%	0.0%
Average	57.0%	25.5%	9.7%	4.3%	2.1%	1.0%	0.4%
Chi-Square	13.993	5.913	3.200	23.429	11.400	117.308	1.000
df	4	5	4	5	3	2	1
p	.007	.315	.525	.000	.010	.000	.317

$p<0.05$ significant at the 95% level

The data in Table 4.2.15 show that there is a significant difference between the quintiles with regards to the proportion of learners in the 0-29% category ($p<0.05$). The private schools had 0% in this category. Quintile 5 had 34.1% of its learners in this category while Quintile 3 had 66% of its learners in this category.

There are no differences between the quintiles with regards to the proportion of learners in the 30-39% category($p>0.05$).

There are no differences between the quintiles with regards to the proportion of learners in the 40-49% category (p>0.05). There are significant differences between the quintiles with regards to the proportion of learners in the 50-59% category (p>0.05). Both quintile 5 and the missing quintile schools had 14.3% of their learners in this category while quintiles 1-4 produced fewer than 7% of their learners in this category.

There are significant differences between the quintiles with regards to the proportion of learners in the 60-69% category (p>0.05). The private schools had 0% of its learners in this category while quintile 5 had 9.4% of its learners in this category. Quintiles 1-4 had under 5% of learners in this category. In the 70-79% category, quintile 5 had 6.3% of its learners in this category while quintiles 1,2 and 4 had less than 1% of their learners in this category. The differences between quintiles is significant (p<0.05). Quintile 3 had no learners in the 70-79% category.

In the 80-100% category, 2.7% of learners from quintile 5 and 0.8% learners from Quintile 4 were in this category. Quintile 1, 2 and 3 and the private schools had no learners in this category.

4.2.16. Comparison of the proportion of learners in each category of pass between quintiles in the Obonjeni district

Table 4.2.16 : Proportion of learners in each category of pass compared between quintiles

District Name	Obonjeni

Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	66.6%	21.6%	7.9%	2.8%	0.8%	0.3%	0.1%
2	59.5%	26.7%	8.9%	3.5%	1.3%	0.2%	0.0%
3	70.8%	18.7%	7.3%	2.3%	0.5%	0.3%	0.0%
4	36.6%	34.1%	18.3%	7.3%	3.7%	0.0%	0.0%
No Quintile	62.1%	16.1%	12.6%	4.6%	3.4%	1.1%	0.0%
Average	64.1%	23.1%	8.4%	3.1%	1.0%	0.3%	0.0%
Chi-Square	11.838	8.525	7.455	4.000	3.000		
df	4	4	4	4	3		
p	.019	.074	.114	.406	.392		

p<0.05 significant at the 95% level

The data in Table 4.2.16 reflects a comparison between quintiles across categories of pass within the Obonjeni district. There is a significant difference between quintiles ($p<0.05$). Quintile 3 had the highest proportion of learners in this category (70.8%) while quintile 4 had 36.6%. The differences between quintiles in the 30-39% category is not statistically significant at the 95% level ($p>0.05$). It should, however, be noted that quintile 4 had 34.1% of its learners in this category.

There is no significant difference between the quintiles in the 40-49%, 50-59% and 60-69% categories ($p>0.05$). In the 70-79% category, quintiles 1,2 and 3 had under 0.5% of their learners in this category.

Quintile 1 had 0.1% of its learners in the 80-100% category while none of the other quintiles had learners with 80% and above.

4.2.17. Comparison of the proportion of learners in each category of pass between quintiles in the Othukela district

Table 4.2.17 : Proportion of learners in each category of pass compared between quintiles

District Name	Othukela

Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	54.9%	31.8%	8.3%	4.4%	0.6%	0.0%	0.0%
2	53.2%	31.2%	11.4%	3.2%	1.0%	0.1%	0.0%
3	51.0%	28.9%	13.6%	4.3%	1.5%	0.6%	0.2%
4	33.2%	31.8%	19.2%	8.7%	5.5%	1.1%	0.5%
5	2.2%	1.5%	15.6%	30.4%	24.4%	17.0%	8.9%
No quintile	21.2%	30.3%	22.2%	11.1%	12.1%	2.0%	1.0%
Average	46.7%	29.4%	13.3%	5.9%	3.0%	1.1%	0.5%
Chi-Square	63.205	28.910	8.800	51.426	53.391	35.190	11.636
df	5	5	5	5	5	3	2
p	.000	.000	.117	.000	.000	.000	.003

$p<0.05$ significant at the 95% level

The data in Table 4.2.17 reflects a comparison between quintiles across categories of pass within the Othukela district.

There is a significant difference in the proportion of learners in the 0-29% category between quintiles ($p<0.05$). Quintile 5 had only 2.2% of its learners in this category, followed by the no quintile schools with 21.2% and quintile 4 with 33.2%. Quintile 1 had 54.9% of its learners in this category.

There is a significant difference in the proportion of learners in the 30-39% category between Quintiles ($p<0.05$). Quintile 5 had 1.5% in this category-the lowest proportion between the quintiles. The proportion of learners in the other quintiles ranged between 28.9% and 31.8%.

The differences between quintiles in the 40-49% category is not statistically significant ($p>0.05$) .

In the 50-59% category, quintile 5 had 30.4% of its learners in this category followed by 11.1% from the private schools and 8.7% from quintile 4. Quintiles 1,2 and 3 had 4.4% or lower in this category. The differences between quintiles is statistically significant ($p<0.05$).

In the 60-69% category, quintile 5 had 24.4% of its learners in this category followed by 12.1% from the private schools and 5.5% from quintile 4. Quintiles 1,2 and 3 had 1.5% or lower in this category. The differences between quintiles is statistically significant ($p<0.05$).

In the 70-79% category, quintile 5 had 17% of its learners in this category as compared to the other quintiles with 2.0% or under. The differences between quintiles is statistically significant ($p<0.05$).

4.2.18. Comparison of the proportion of learners in each category of pass between quintiles in the Pinetown district

Table 4.2.18 : Proportion of learners in each category of pass compared between quintiles

District Name	Pinetown

Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	28.6%	14.3%	10.9%	16.8%	14.3%	9.2%	5.9%
2	85.0%	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	61.6%	22.1%	8.9%	3.9%	1.9%	0.8%	0.7%
4	44.3%	25.3%	14.2%	8.7%	4.2%	1.8%	1.4%
5	9.9%	19.7%	18.2%	16.7%	13.3%	12.1%	10.1%
No Quintile	28.9%	14.7%	18.7%	15.1%	13.8%	6.7%	2.2%
Average	41.8%	22.0%	13.2%	9.2%	6.1%	4.3%	3.4%
Chi-Square	83.556	5.486	5.268	10.581	14.809	14.000	15.500
df	5	5	4	4	4	4	4
p	.000	.359	.261	.032	.005	.007	.004

$p<0.05$ significant at the 95% level

The data in Table 4.2.18 reflects a comparison between quintiles across categories of pass within the Pinetown district.

Within the 0-29% category, there is a significant difference in the proportion of learners between the quintiles ($p<0.05$). Quintile 5 produced the lowest proportion of learners in this category (9.9%) while Quintile 2 produced the highest proportion of learners in this category (85%).

Quintile 2 produced no learners in the 40-49%, 50-59% , 60-69%, 70-79% or 80-100% categories. There are no significant differences between quintiles within the 30-39% and 40-49% categories of pass ($p>0.05$).

Within the 50-59% category, quintile 3 produced 3.9% of its learners in this category while for quintiles 1 and 5 schools produced over 15% of their learners in this category. The differences between quintiles is statistically significant ($p<0.05$).

Within the 60-69% category, Quintile 1, 4 and 5 produced between 13.3% and 14.3% of learners in this category. The differences between quintiles is statistically significant ($p<0.05$). Within the 70-79% and 80-100% categories, Quintile 5 had a higher proportion of learners than other quintiles. The differences between quintiles is statistically significant ($p<0.05$) for both categories of passes.

4.2.19. Comparison of the proportion of learners in each category of pass between quintiles in the Sisonke district

Table 4.2.19 : Proportion of learners in each category of pass compared between quintiles

District Name	Sisonke

Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	75.6%	17.8%	5.4%	0.8%	0.2%	0.1%	0.0%
2	65.3%	20.5%	7.2%	4.9%	1.5%	0.6%	0.0%
3	66.5%	21.0%	7.3%	3.8%	0.9%	0.3%	0.3%
4	30.1%	35.7%	16.8%	11.9%	3.5%	2.1%	0.0%
5	3.6%	7.1%	28.6%	42.9%	3.6%	3.6%	10.7%
No Quintile	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Average	66.5%	20.4%	7.3%	4.1%	1.1%	0.5%	0.2%
Chi-Square	75.867	169.584	31.385	91.538	3.000	2.000	
df	4	5	4	4	3	2	
p	.000	.000	.000	.000	.392	.368	

$p<0.05$ significant at the 95% level

The data in Table 17 reflects a comparison between quintiles across categories of pass within the Sisonke district.

Amongst the quintiles, quintile 5 had the lowest proportion of learners in the 0-29% category. Quintile 1 had 75.6% of its learners in this category. The differences between quintiles is statistically significant ($p<0.05$).

There is a significant difference in the proportion of learners within the 30-39% category between quintiles ($p<0.05$). Quintile 1 produced 7.1% of its learners in this category. The proportion of learners in quintiles 1 to 4 ranged from 17.8% and 35.7%. The differences between quintiles is statistically significant ($p<0.05$).

There is a significant difference in the proportion of learners within the 40-49% category between quintiles ($p<0.05$). Quintile 1 produced 28.6% of its learners in this category followed by quintile 4 with 16.8% . Quintile 1 to 3 produced 7.3% or lower in this category. Quintile 5 produced 42.9% of its learners in the 50-59% category of pass. The proportion of learners in quintiles 1 to 4 ranged from 0.8% to 11.9%. The differences between the quintiles is statistically significant ($p<0.05$).

Within the 60-69% category, Quintile 5 produced 3.6% of its learners followed by Quintile 4 with 3.5% of learners. Quintiles 1 to 3 produced less than 2% of their learners in this category. The differences between quintiles is not statistically significant ($p>0.05$).

Quintile 5 produced 3.6% of its learners in the 70-79% category which is the highest proportion amongst the quintiles. The differences between quintiles, however, is not statistically significant ($p>0.05$). Quintile 5 produced 10.7% of its learners in the 80-100% category followed by 0.5% from quintile 3. There were no learners from the other quintiles.

4.2.20. Comparison of the proportion of learners in each category of pass between quintiles in the Ugu district

Table 4.2.20 : Proportion of learners in each category of pass compared between quintiles

District Name	Ugu						
Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	61.4%	24.7%	8.6%	3.1%	1.8%	0.3%	0.2%
2	64.4%	23.0%	9.2%	2.1%	0.8%	0.3%	0.1%
3	58.3%	25.4%	10.3%	3.7%	1.6%	0.6%	0.1%
4	48.4%	23.4%	12.0%	7.1%	4.9%	2.9%	1.3%
5	6.2%	15.9%	13.8%	22.8%	18.6%	15.9%	6.9%
No Quintile	27.5%	18.5%	16.5%	14.2%	13.7%	6.4%	3.2%
Average	55.0%	23.3%	10.4%	5.1%	3.6%	1.8%	0.8%
Chi-Square	59.864	2.969	3.543	37.906	39.465	20.462	5.091
df	5	5	5	5	5	3	2
p	.000	.705	.617	.000	.000	.000	.078

$p<0.05$ significant at the 95% level

The data in Table 4.2.20 reflects a comparison between quintiles across categories of pass within the Ugu district.

Within the 0-29% category, quintile 5 produced 6.2% of their learners in this category followed by 27.5% for the private schools. Quintiles 1 and 2 produced over 60% of their learners in this category. The differences between quintiles is statistically significant ($p<0.05$).

There is no difference between quintiles within the 30-39% and 40-49% categories ($p>0.05$).

Quintile 5 produced the highest proportion of its learners in categories 50-59% and higher when compared to the other quintiles. The differences between quintiles is statistically significant within the 50-59%, 60-69% and 70-79% categories ($p<0.05$). Within the 80-100% category, Quintile 5 produced 6.9% of its learners as compared to 3.2% for the no quintile schools and 1.3% or lower for quintiles 1 to 4. The differences between quintiles is not statistically significant ($p>0.05$).

4.2.21. Comparison of the proportion of learners in each category of pass between quintiles in the Umgungundlovu district

Table 4.2.21: Proportion of learners in each category of pass compared between quintiles

District Name	Umgungundlovu

Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	56.0%	24.7%	11.9%	5.4%	1.1%	0.9%	0.0%
2	66.1%	24.5%	7.5%	1.6%	0.2%	0.0%	0.0%
3	58.0%	27.7%	8.7%	3.7%	1.8%	0.2%	0.0%
4	55.8%	24.7%	11.9%	3.6%	3.1%	0.8%	0.1%
5	4.1%	14.8%	20.6%	22.1%	19.1%	13.6%	5.8%
No Quintile	35.1%	23.2%	11.4%	11.4%	8.1%	7.0%	3.8%
Average	45.6%	23.3%	12.4%	7.9%	5.8%	3.5%	1.4%
Chi-Square	57.356	4.234	9.667	35.250	33.515	19.957	.400
df	5	5	5	5	4	3	1
p	.000	.516	.085	.000	.000	.000	.527

$p<0.05$ significant at the 95% level

The data in Table 4.2.21 reflects a comparison between quintiles across categories of pass within the Umgungundlovu district. Within the 0-29% category, quintile 5 produced 4.1% of its learners in this category followed by 35.1% for the no quintile schools. Quintile 2 produced 66.1% of its learners in this category. The differences between quintiles is statistically significant ($p<0.05$).

There is no difference between quintiles within the 30-39% and 40-49% categories ($p>0.05$). Quintile 5 produced the highest proportion of its learners in categories 50-59% and higher when compared to the other quintiles. The differences between quintiles is statistically significant within the 50-59%, 60-69% and 70-79% categories ($p<0.05$).

Within the 80-100% category, quintile 5 produced 5.8% of its learners in this category. The differences between quintiles is not statistically significant ($p>0.05$).

4.2.22. Comparison of the proportion of learners in each category of pass between quintiles in the Umlazi district

Table 4.2.22 : Proportion of learners in each category of pass compared between quintiles

District Name	Umlazi

Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
2	54.2%	31.4%	9.3%	4.2%	0.8%	0.0%	0.0%
3	53.6%	20.3%	15.0%	5.6%	3.4%	1.4%	0.7%
4	38.7%	27.5%	14.8%	8.4%	5.8%	3.0%	1.8%
5	13.2%	20.7%	21.6%	17.4%	13.1%	8.9%	5.1%
No Quintile	49.5%	16.5%	8.2%	8.8%	5.8%	6.3%	5.0%
Average	31.3%	22.6%	17.1%	11.7%	8.4%	5.5%	3.3%
Chi-Square	28.619	5.552	9.188	11.227	14.276	7.737	3.923
df	4	4	4	4	4	3	3
p	.000	.235	.057	.024	.006	.052	.270

$p<0.05$ significant at the 95% level

The data in Table 4.2.22 reflects a comparison between quintiles across categories of pass within the Obonjeni district. There is a significant difference between quintiles with regards to the proportion of learners in the 0-29% category ($p<0.05$). Quintile 5 produced the lowest proportion of learners in this category.
The differences between quintiles is not statistically significant for the 30-29% and 40-49% category of pass ($p>0.05$).

Within the 50-59% and 60-69% categories, quintile 5 produced 17.4% learners and 13.1% learners respectively. This is twice the proportion of learners from quintile 4. Quintiles 2 and 3 produced less than 6% of learners.

Within the 70-79% category, quintile 5 produced 8.9% of learners as compared to 6.3% for the private schools. The differences between quintiles is not statistically significant ($p>0.05$).

In the 80-100% category, quintile 5 and the Private schools produced 5.1% and 5% of their learners in this category. The differences between quintiles is not statistically significant ($p>0.05$)

4.2.23. Comparison of the proportion of learners in each category of pass between quintiles in the Umzinvathi district

Table 4.2.23 : Proportion of learners in each category of pass between quintiles

District Name	Umzinyathi						
Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	60.3%	22.4%	13.8%	2.7%	0.7%	0.1%	0.0%
2	59.2%	28.2%	7.2%	3.9%	0.7%	0.7%	0.2%
3	59.2%	26.5%	9.1%	2.5%	2.0%	0.5%	0.2%
4	32.0%	29.2%	20.8%	11.2%	3.4%	2.2%	1.1%
5	14.4%	22.7%	25.8%	15.5%	10.3%	8.2%	3.1%
No Quintile	0.0%	75.0%	25.0%	0.0%	0.0%	0.0%	0.0%
Average	55.6%	25.2%	12.4%	4.2%	1.5%	0.8%	0.3%
Chi-Square	38.991	60.471	19.647	18.571	16.824	7.818	1.000
df	4	5	5	4	4	2	1
p	.000	.000	.001	.001	.002	.020	.317

$p<0.05$ significant at the 95% level

The data in Table 4.2.23 reflects a comparison between quintiles across categories of pass within the Umzinvathi district.

Within the 0-29% category of pass, Quintile 1 produced 60.3% of its learners. Quintile 5 produced 14.4% of its learners in this category while the private schools had no learners in this category. The differences between quintiles is statistically significant ($p<0.05$).

Within the 30-39% category, the proportion of learners amongst Quintiles 1 to 5 ranges between 22.7% and 29.2%. The differences between quintiles is statistically significant ($p<0.05$).

Within the 40-49% category, the proportion of learners from quintiles 4 and 5 ranged between 20.8% and 25.8% while quintiles 1 to 2 ranged between 7.2% and 13.8%. The differences between quintiles is statistically significantly ($p<0.05$).

Within the 50-59%, 60-69% 70-79% and 80-100% categories, quintile 5 produced a higher proportion of learners than quintiles 1 to 4 or the private schools.

4.2.24. Comparison of the proportion of learners in each category of pass between quintiles in the Vryheid district

Table 4.2.24 : Proportion of learners in each category of pass between quintiles

District Name	Vryheid						
Quintile	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
1	55.6%	28.0%	11.8%	3.9%	0.7%	0.0%	0.0%
2	58.8%	25.3%	10.8%	3.6%	1.4%	0.1%	0.0%
3	49.3%	31.7%	13.2%	4.3%	1.1%	0.2%	0.2%
4	42.9%	26.3%	15.2%	7.4%	5.7%	2.2%	0.3%
5	9.7%	18.1%	26.4%	18.1%	20.8%	5.6%	1.4%
No Quintile	58.1%	17.4%	10.8%	7.8%	3.6%	1.2%	1.2%
Average	52.7%	27.8%	12.5%	4.6%	1.9%	0.4%	0.1%
Chi-Square	37.676	6.959	11.273	19.667	53.529	4.667	.000
df	5	5	5	5	5	2	1
p	.000	.224	.046	.001	.000	.097	1.000

$p<0.05$ significant at the 95% level

The data in Table 4.2.24 reflects a comparison between quintiles across categories of pass within the Vryheid district.
Within the 0-29% category, quintile 5 produced the lowest proportion of learners while the highest proportion of learners was from the quintile 2 with 58.1% and 58.8% respectively. The differences between quintiles is statistically significant ($p<0.05$).

There are no differences between the quintiles in the 30-39% category of pass ($p>0.05$).
The proportion of learners in the 50-59% and 60-69% categories is highest for Quintile 5. The differences between quintiles is statistically significant ($p<0.05$).

Within the 70-79% category, the differences between quintiles is not statistically significant ($p>0.05$). It must he noted, however, that quintile 5 produced 5.6% of its learners in this category.

Within the 80-100% category, quintile 5 produced 1.4% of its learners while the Private schools produced 1.2% of its learners.

4.3. Summary of the Results

Table 4.4.1 summarises the results generated in tables 4.2.3 – 4.2.22, showing whether the differences in each category of pass is significant or not significant between quintiles 1 - 5. The overall averages for each category of pass are also included.

4.3.1.1. Although an average of 95% of learners who registered for the examinations in the province wrote the examinations, the percentage of learners that did not write the examination translates to 1 951. The greatest proportion of these learners came from the quintile 1 schools.

4.3.1.2. According to the NCS, the 0-29% category of achievement translates to a failure in the subject. In KZN, 50,2% failed the subject and 24,4% passed at the elementary level. Only 1,1% of learners achieved outstanding results.

4.3.1.3. There were extreme differences in performance between the poorest (quintile 1) schools and the least poor (quintile 5) schools.

4.4. Table 4.4.1 shows whether the differences for each category of pass between the quintiles within each districts were significant or not significant.

Table 4.4.1 : Table showing significance for each category of pass between the quintiles within each district

Key: S = Difference is significant N = Difference is NOT significant

X = Chi-square results could not be computed - the data was insufficient.

District Name	Categories of Pass						
	0-29%	**30-39%**	**40-49%**	**50-59%**	**60-69%**	**70-79%**	**80-100%**
Amajuba	S	**N**	S	**N**	**N**	**N**	**N**
Empangeni	S	**N**	**N**	S	S	**N**	**N**
Ilembe	S	**N**	**N**	S	S	S	**N**
Obonjeni	N	S	S	S	S	X	X
Othukela	S	S	**N**	S	S	S	S
Pinetown	S	**N**	**N**	S	S	S	S
Sisonke	S	S	S	S	**N**	**N**	X
Ugu	S	**N**	**N**	S	S	S	**N**
Umgungundlovu	S	**N**	**N**	S	S	S	**N**
Umlazi	S	**N**	**N**	S	N	**N**	**N**
Umzinyathi	S	S	S	S	S	S	**N**
Vryheid	S	**N**	S	S	S	**N**	**N**
Overall Average	**50.2%**	**24.4%**	**12.1%**	**6.3%**	**3.7%**	**2.1%**	**1.1%**

The table. 4.4.1 shows that significant differences exist between each category of pass in the districts. This indicates that the poorer schools have a high failure rate. The differences in the category 80 – 100% is an interesting result since most of the differences are not significant, meaning that a similar proportion of learners in each of the quintiles in each district perform at the outstanding level. This, however, could be misleading when subjected to analysis. The non significant results must be seen in relation to the overall average proportion that indicates that a very small proportion of learners attain at the outstanding level.

The results of Obonjeni and Sisonke could not be computed. There was insufficient data. Deeper inspection reveals other interesting facts. In the Sisonke District, the richest schools had 10,7% of the learners achieving outstanding results followed by quintile 3

schools with 0,3% achieving outstanding results. All other quintiles (quintiles 1,2 and 4) showed a 0% proportion with outstanding results.

In the Obonjeni District, only the Quintile 1 schools, that is the poorest schools in the district, produced 0, 1% of learners with outstanding results. All other quintiles, including quintile 5 schools, showed a 0% proportion with outstanding results.

Another result showed that at the richest schools in the Pinetown district a proportion of 10,1% of learners achieved at the outstanding level, but more interestingly, this was followed by the poorest schools having 5,9% of learners achieving at the outstanding level, with 0% in quintile 2.

In the Othekela District 0% of learners achieved passes at the outstanding level.

These anomalies could be a result of the incorrect classification of schools in terms of its quintile ranking. This is in agreement with the Human Sciences research Council's Report (2009) that states that the quintile ranking system is effective in identifying schools in the extreme, that is, in quintiles 1 and 2; schools in the middle are often incorrectly identified. However, for the purposes of this study, the quintile ranking of schools, as identified by the Department, are used as an indication of the socio-economic and demographic status using data based on national census with respect to income, unemployment rate and level of education (that is the literacy rate). Quintile 1 schools were the poorest schools and quintile 5, the least poor.

4.5. Explicitation of the data in the qualitative study

This explicitation process had been done according to the following steps:

4.5.1. Bracketing and phenomenological reduction.

Having decided on the use of purposive sampling as the technique in this study, the researcher relied entirely on the data provided by the participants as they were selected on the basis of their roles in the NSC Physical Science examinations. Comments on issues outside the examination itself, especially with respect to theme 3, (that is the

transformation) would have been within the experience of subject advisors as they interact with many schools within districts.

4.5.2. Delineating units of meaning.

4.5.2.1. Respondents differed on the impact of the curriculum change on learner performance. The chief marker stated that there was no impact on the performance. One subject advisor indicated that results had deteriorated, while the other indicated that some schools performed very well but "township/rural' schools performed worse than they did in the NATED 550 curriculum.

4.5.2.2. All respondents used the term "acceptable" for the quality of the examination paper. The chief marker felt that the type of questions was familiar to the learners since the examination was similar to the exemplar papers. The subject advisor differed with this view, saying that the papers were of an extremely high standard, requiring application of knowledge and not mere "rote" learning. They, however, still maintained that the standard and quality was "acceptable".

4.5.2.3. Regarding learner responses: The respondents agreed that the learners were unable to answer qualitative, "wordy" questions. Many learners provided "stock" answers. Both subject advisors agreed that this was an indication that the "teaching and learning" at schools were inadequate. The majority of the learners were underprepared.

4.5.2.4. The chief marker was unaware of the impact of CASS on the learner performance. The advisors, however, indicated that although CASS tasks may have been of a good standard, the assessment and control thereof created a false sense of achievement. This may have undermined preparation for the final examination. Where the difference between CASS and the final mark was high, CASS was ignored. This impacts negatively on learner performance. Unfortunately this seems to be the case in most schools as educators feel that by giving learners a high CASS mark they will actually be "helping them", this in reality is just not the case.

4.5.1.5. In terms of the adjustments of marks, all respondents were reluctant to comment. One advisor stated that the standardisation committee dealt with adjustments.

4.5.2.6. All respondents concurred with the view that teaching in many schools, especially the "township/rural" schools was "sub-standard". Learners were not ready for Physical Science. Gaps existed in the General Education and Training (GET) phase. Subject advisors cited the "lack of support, teacher development, resources etc...." as the major cause for the great differentials in learner results. One respondent also stated "not all learners have the same level of intelligence. Some can take physical science as a subject, others cannot".

4.5.2.7. The chief marker was of the view that learners just didn't have the ability. They were not adequately prepared. Resources also played a role in poor performance. The advisors agreed with the view on resources but further stated that too many learners are "streamed" into Physical Science, knowing well that they could not cope. They also indicated that there was a breakdown of the schooling system in many areas.

4.5.2.8. All respondents indicated that there was no conscious focus on the key principals of Physical Science. One respondent stated, "These principles have been overlooked; they are expected to happen by accident". All held the notion that poor communities would continue to be poor hence these learners would be denied access to science-related studies, leading them to getting semi-skilled or low-paying work opportunities. If they performed poorly in the exams, it implied that their understanding of the basic concepts was poor, and they would not be science-literate. Their participation in a science-based society would be ineffective. Hence these communities now become vulnerable to the exploits of people in power and big businesses. The quality of life for these communities sets them even further on the back-foot.

4.5.3. Clustering of units of meaning to form themes.

Four themes were generated from this data. These were:

4.5.3.1. Curriculum change and its contribution to learner performance.

Respondents differed widely on the impact of the curriculum change on the performance of learners. One believed that there was no impact while the others believed that the "township/rural" schools were greatly disadvantaged.

4.5.3.2. Quality and standard of the examination papers and its contribution to learner performance.

It was interesting to note that all the respondents were in agreement that the quality and standard of the papers were "acceptable". The subject advisors, however, contradicted themselves by further stating that the papers were of a very high standard, implying too high for the learners to be able to answer adequately. It was not clear whether the notion of "acceptable" applied to the comparison with national and/or international norms.

4.5.3.3. Contribution of school-based assessment on learner performance.

The advisors agreed that the school based assessment (CASS) impacted negatively on the results of learners in the following ways:

4.5.3.3.1. If the difference between the CASS marks and the marks obtained by learners in the examination paper was too great, then the CASS component is ignored. This disadvantages the learners.

4.5.3.3.2. The high CASS marks, that the learners are given create a false sense of preparedness for learners.

4.5.3.4. Differentials in the category of passes in the province and between quintiles.

Respondents were unanimous that resources were the major contributory factor in the poor performance of learners. They cited that the lower quintile ranking schools were mainly found in the township/rural areas. They also agreed that in many schools learners were merely "streamed" into taking physical science as a subject without any assessment of their aptitudes. No guidance is provided for the learners.

CHAPTER 5

Conclusions and recommendations

5.1. Introduction

In the following chapter, conclusions from the findings were made and represented graphically in a flow diagram. Recommendations, based on the findings were then suggested.

5.2. Conclusions

In their report on the provincial statistics in respect of the 2008 National Senior Certificate examinations results for 2008, the Department of Education-KwaZulu-Natal claims that "even though fewer numbers wrote in 2008, the quality of passes is recommendable" Contrary to the claim made by the Department of Education, this study raises great concern about the quality of graduates from the provincial schooling system.

The provincial education still carries with it the great inequalities of the apartheid era. During the apartheid era, schools were divided along racial lines. According to Khan (1995), quality Science, Maths and English (SME) was available for only a few who were fortunate to attend the former white House of Assembly schools. "For the rest of the learners who attended schools in the much larger education periphery there was little chance of acquiring quality SME – the system design and resource allocation saw to that" (Khan, 1995, p. 127).

This study confirms that the inequalities of the apartheid era still prevail. This assertion is confirmed in the data represented in tables 11-23, that show great differentials in the proportion of learners obtaining passes in each quintile. The researcher's assertion is also based on the criteria for ranking schools in particular quintiles. Schools with the least resources, in communities with the highest rate of unemployment, which are the former Black schools, are ranked as quintile 1. Furthermore, the results show that the performance of schools in the urban districts of Pinetown and Umlazi are better than the rural districts.

What was termed a "cycle of mediocrity" (Khan, 1995, p.128) prevailed in which poorly prepared teachers were unable themselves to develop the latent talent of their learners. According to Khan (1995), senior certificate completers with mediocre science and mathematics grades then took up teaching careers. "For black people this was one of the few avenues of advancement available under apartheid" (Khan, 1995, p.128). The researcher concludes that this cycle of mediocrity still prevails in the post-apartheid era. This is evidenced by both data cohorts in this study. Firstly, results from the statistical data reveal that over 60% of learners in quintiles 1 and 2 fail Physical Science that is they obtain below 30% in the examination. Secondly, all respondents confirmed that teaching in the rural schools was sub-standard. Stretching the argument further, one could say the potential of the cycle of mediocrity still exists considering the claim by the Department of Education that "even though fewer numbers wrote in 2008 the quality of passes is recommendable". Here quality of passes refers to passes in the NSC examination and not in Physical Science.

A study by Van der Berg and Louw (2006) shows that the effect of individual socio-economic status on student performance revealed that there was no clear relationship between test scores and individual socio-economic status (SES) for the poorest 60 per cent of South African students (of whom the vast majority are black). This suggests that the majority of students who attend schools that are so dysfunctional and inefficient that individual measures of school quality are unlikely to improve student performance. By contrast, there is a relatively steep positive relationship between SES and student performance for the two most affluent student quintiles, suggesting that school quality may matter greatly – potentially in measurable ways – for these children.

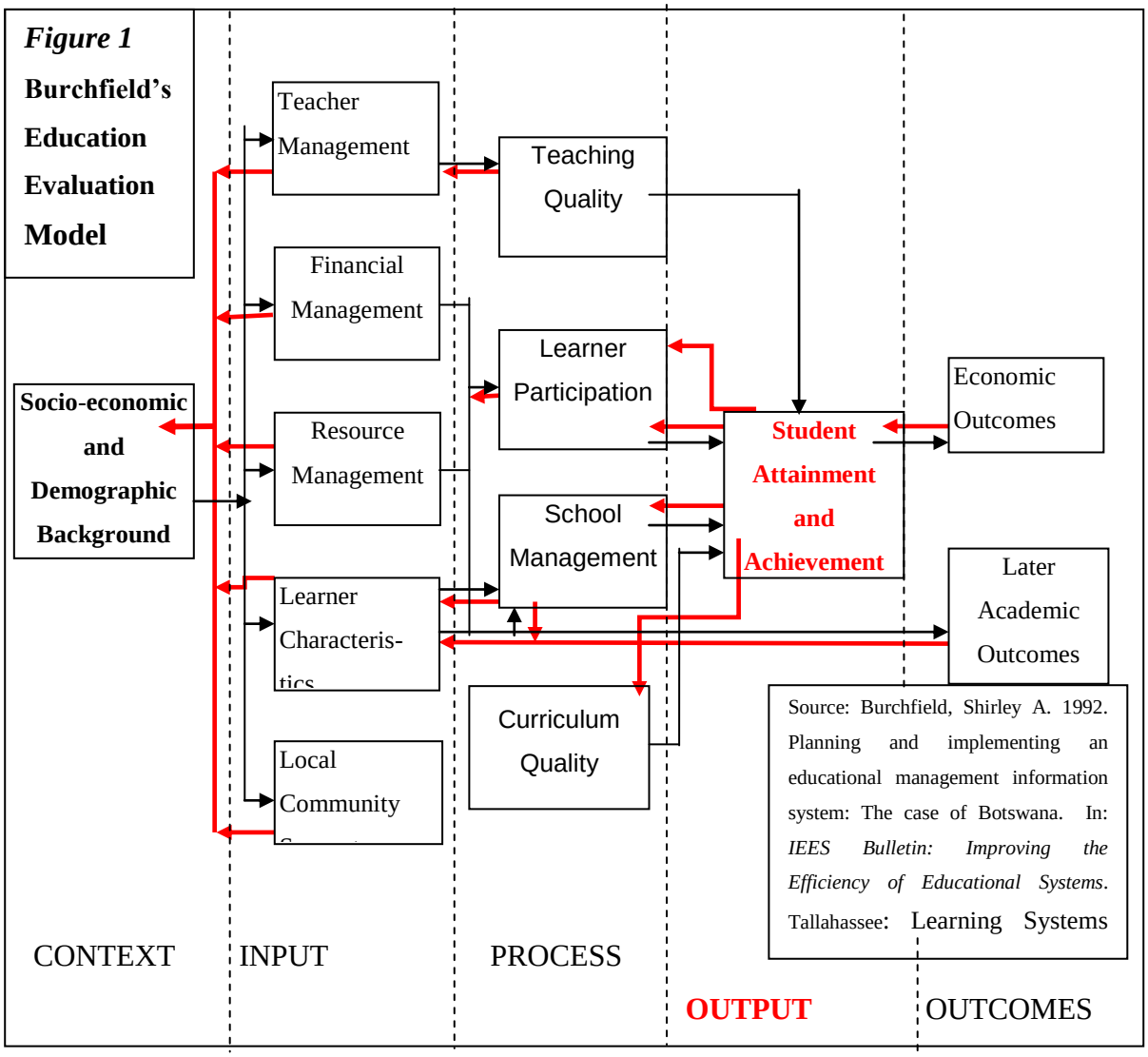
This study concurs with the findings of the study by Van der Berg and Louw (2006). This study has shown that despite the KZN Department of Education's interventions, which included subject interventions and general curriculum support programmes, the National Strategy for Learner Attainment (NSLA) which provides support to schools with a pass-rate of below 60%, school development plans which included resource management, subject advisory support to educators teaching grade 12, radio lessons and the Dinaledi schools project, schools in the poorest-ranked quintiles (namely quintile 1 and quintile 2) performed dismally with a failure rate of over 60%. Taylor (2006) confirms this when he argues that the poor performance of many schools can be ascribed to the large number of

schools being dysfunctional and the effect of dysfunctional schools may completely swamp the possible positive effects of teacher or student efforts(Taylor 2006).

5.3. Graphical representation of finding

In answering the critical question which was to explore the results produced in Physical Science in the province of KwaZulu-Natal in the 2008 NSC examination, the research could be used to give a deeper insight and understanding of the academic performance of learners through the use of a mixed method approach. The researcher concludes that learner performance is largely a result of the process, input and context of learning. To illustrate this graphically, the researcher adapted Burchfield's (1992) educational framework. The education system of a country can be represented as a framework describing the different phases as indicated in Figure 1 (Burchfield, 1992). According to Burchfield (1992), each of these phases will have an influence on the final outcome of the education system. The statistical data gathered, namely the results produced by learners in the 2008 NSC examinations in physical science in the province of KwaZulu-Natal, represent the output, which Burchfield (1992) refers to as the student attainment and achievement (shown in the figure 1). It is the researcher's view that if the context, that is the socio-economic and demographic background, determines the input and processes of an education system, and ultimately the learner performance, that is, the student attainment and achievement in Burchfield' model, then learner performance could be used to make inferences on the process, inputs, and ultimately, the socio-economic and demographic background (that is the context of education).

The bold arrows (red) in figure 1 that run in reverse to those in Burchfield's original model, demonstrate how the researcher used the results of both the quantitative and qualitative to understand the performance of the learners.



This research focuses on the results produced by learners in Physical Science in the 2008 NSC examination, which according to Burchfield (1992), lies in the output phase, and specifically, in the student attainment and achievement phase. Each of these phases will have an influence on the final outcome of the education system. All frameworks show some broad commonalities that can be described as indicators of context, input, process and output. Different dimensions or aspects exist within the different phases.

On analyzing the student attainment and achievement, through the results produced by learners in Physical Science in the 2008 NSC examination, inferences are made of the process, input and context phases.

The main area of focus of the researcher was the context phase since the data revealed great differentials between results produced by schools in the five different quintile

rankings. The quintile ranking of the schools has been broadly used as an indication of the socio-economic factor since the quintile score is calculated based on national census data (that is the income level), unemployment rate and the level of education (literacy rate). According to Burchfield (1992), context information describes the current conditions, issues, opportunities and constraints in the environment of the learners. The context in which education takes place is reflected in the socio-economic milieu and the demographic background in which the learners grow up and live during their school career (Burchfield, 1992). Inputs into education can be seen as the provision that is made before education can take place. The government plays an important role in supplying human, financial and physical resources (Burchfield, 1992). The process in education attempts to describe the activities taking place in the teaching and learning situation. All the stakeholders in education, namely the parents, learners, teachers and principals, play an important role.

5.4. Recommendations

Using the two cohorts of data, this study has gone a step beyond that what had hitherto been possible in explaining learner performance in Physical Science in the 2008 NSC examinations. The quantitative and qualitative analysis, together with reference to other studies, showed that better performance in richer, that is, the higher quintile schools, was associated with a number of variables. These include teacher and learner quality; school management; curriculum quality; teacher, financial and resource management; learner characteristics and community support. The findings were not surprising; however, they have enormous policy implications.

- Recommendation 1: At the level of process

In 2008, the KZN DoE adopted special interventions in an attempt to improve the performance of many of the schools in the province. These included specific subject interventions and general curriculum support programmes targeted at the critical subjects. Schools were provided with teaching and learning support materials as well as additional support materials such as past question papers and memoranda, learning and assessment guides and video lessons in order to improve on learner performance. The second intervention was the National Strategy for Learner Attainment (NSLA) that monitored and supported schools across the board that obtained below 60 % pass in the preceding years in

the National Senior Certificate examination. It is a recommendation of this study that this learner support be extended to all schools in the province.

- Recommendation 2: At the level of input

This study has shown that performance of learners in less resourced, poorer schools are far below those learners in richer schools. Eric Hanushek (2004) points out that schools and classrooms with access to superior resources do not necessarily provide the best quality education and argues that at the heart of this problem lies an issue of efficiency: schools translate inputs into outputs with varying degrees of efficiency. It is a recommendation of this study that greater monitoring and support with respect to teacher management, financial management as well as resource management be provided to all schools in the province.

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UNIVERSITY OF
KWAZULU-NATAL

07 Auousr 2009

Faculty Research Committee
Faculty of Education
Edgewood Campus
University of KwaZulu-Natal

Dear Prof R Sookrajh,

Consideration of Ethical Clearance for student:

Gareeb, Ramesh - 8117067

Your student's ethical clearance application has met with approval in terms of the internal review process of the Faculty of Education.

Approval has been obtained from the Faculty Research Committee, and the application will be forwarded for ratification (MEd) or recommended in the case of PhD and Staff applications, to the Ethics Sub-Committee of the University of KwaZulu-Natal. All Masters applications approved by Faculty Research Committe may commence with research.

Both you and the student will be advised as to whether ethical clearance has been granted for the research thesis (PhD), once the Ethics Sub-Committee has reviewed the application. An ethical clearance certificate will be issued which you should retain with your records. The student should include the ethical clearance certificate in the final dissertation (appendixes).

Should you have any queries please contact the Faculty Research Officer on (031) 2603440 or on the email govender3@ukzn.ac.za

Yours faithfully

UNIVERSITY OF KWAZULU-NATAL
EDUCATION
2009 -08- 07
FACULTY RESEARCH OFFICE

Professor D. Bhana
Deputy Dean Postgraduate Studies and Research

Appendix A

R. Gareeb
Student No. 81 17067
University of KwaZulu-Natal
Edgewood Campus
Private Bag x03
Ashwood
3605

15 July 2009

The Physical Science Subject Advisor/ Moderator

For Attention : _____

KZN Department of Education _____ Region

CONSENT TO PARTICIPATE IN RESEARCH: INTERVIEW

Project Title

AN ANALYSIS OF THE PHYSICAL SCIENCE RESULTS PRODUCED IN THE 2008 NATIONAL SENIOR CERTIFICATE (NSC) EXAMINATION: A MIXED METHOD APPROACH

I am currently pursuing a master's degree at the University of KwaZulu-Natal. My details are as follows:

1.1. Full Name & Surname	Ramesh Gareeb	
1.2. Title	Mr.	
1.3. Student Number	81 17067	
1.4. Discipline	Curriculum	
1.5. School	Education & Development	
1.6. Faculty	Education	
1.7. Campus	Edgewood	
1.8. Existing Qualification	B. Ed. (Educational Technology)	
1.9. Proposed Qualification for Project	M.Ed.	
2. CONTACT DETAILS		
2.1. Home Telephone Number	031 409 8488	
2.2. Cell Number.	072 3915 389	
2.3. e-Mail	rgareeb@hotmail.com	
NAME	**Tel.**	**E-Mail**
3.1. Prof. Reshma Sookrajh	0784517764	sookrajhre@ukzn.ac.za

The purpose of my study is to analyze the results in physical science in the 2008 NSC examination, by focusing on how the secondary data set, namely the physical science results of learners, and the primary data gathered from the semi-structured interviews with physical science subject advisors from each of the four regions of Kwazulu Natal, can be used to give a deeper insight and understanding of the academic performance of learners, through the use of mixed method methodology.

Since the NCS was introduced for the first time at grade 12 level, the analysis of the 2008 National Senior Certificate results provide the baseline data against which subsequent examination performances can be compared.

This study uses the explanatory mixed method design. Both quantitative and qualitative data is used in this research to answer the research question.

The explanatory mixed method model is a two phase model, adapted in this research to give priority to the quantitative data, being the results of learners in physical science in the 2008 NSC examinations. The data is then analyzed statistically.

The results are then presented to physical science subject advisors from each of the four regions of Kwazulu Natal (KZN) for comment. Qualitative data is gathered from semi-structured interviews conducted separately with each of the subject advisors from the four regions of KZN. The interviews seek only to obtain a greater understanding of the initial statistical results. The names and identity of the interviewees, the subject advisors from the four regions will not appear in the final publication.

The data will be stored in a secure place during data collection and upon submission of the thesis will be stored in the School of Education, UKZN for a period of five years after which it will be disposed of.

The confidentiality of the participants will be guaranteed and respected. A copy of the findings will be lodged with the Regional Senior manager on completion of my studies. No individual will be forced to participate and all ethical considerations governing research will be strictly adhered to by the researcher and the respondents.

Thanking you in anticipation of a favorable response.

Yours faithfully

_____ _____

Researcher: R. Gareeb Date

DECLARATION

AN ANALYSIS OF THE PHYSICAL SCIENCE RESULTS PRODUCED IN THE 2008 NATIONAL SENIOR CERTIFICATE (NSC) EXAMINATION: A MIXED METHOD APPROACH

I, _____ (*full name of participant*)

Hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

_____ _____

Signature of participant Date

Appendix B

R. Gareeb
Student No. 81 17067
University of KwaZulu-Natal
Edgewood Campus
Private Bag x03
Ashwood
3605

15 July 2009

The Research Officer
KZN Department of Education
RESEARCH, STRATEGY, POLICY DEVELOPMENT AND ECMIS DIRECTORATE
Metropolitan Building, PIETERMARITZBURG, 3200

REQUEST FOR PERMISSION TO CONDUCT RESEARCH: KWAZULU-NATAL

Project Title

AN ANALYSIS OF THE PHYSICAL SCIENCE RESULTS PRODUCED IN THE 2008 NATIONAL SENIOR CERTIFICATE (NSC) EXAMINATION: A MIXED METHOD APPROACH

I am currently pursuing a masters degree at the University of KwaZulu-Natal. My details are as follows:

1.1. Full Name & Surname	Ramesh Gareeb	
1.2. Title	Mr.	
1.3. Student Number	81 17067	
1.4. Discipline	Curriculum	
1.5. School	Education & Development	
1.6. Faculty	Education	
1.7. Campus	Edgewood	
1.8. Existing Qualification	B. Ed. (Educational Technology)	
1.9. Proposed Qualification for Project	M.Ed.	
2. CONTACT DETAILS		
2.1. Home Telephone Number	031 409 8488	
2.2. Cell Number.	072 3915 389	
2.3. e-Mail	rgareeb@hotmail.com	
NAME	**Tel.**	**E-Mail**
3.1. Prof. Reshma Sookrajh	0784517764	sookrajhre@ukzn.ac.za

The purpose of my study is to analyze the results in physical science in the 2008 NSC examination, by focusing on how the secondary data set, namely the physical science results of learners, and the primary data gathered from the semi-structured interviews with physical science subject advisors from each of the four regions of Kwazulu Natal, can be used to give a deeper insight and understanding of the academic performance of learners, through the use of mixed method methodology.

Since the NCS was introduced for the first time at grade 12 level, the analysis of the 2008 National Senior Certificate results provide the baseline data against which subsequent examination performances can be compared.

This study uses the explanatory mixed method design. Both quantitative and qualitative data is used in this research to answer the research question.

The explanatory mixed method model is a two phase model, adapted in this research to give priority to the quantitative data, being the results of learners in physical science in the 2008 NSC examinations. The data is then analyzed statistically.

The results are then presented to physical science subject advisors from each of the four regions of Kwazulu Natal (KZN) for comment. Qualitative data is gathered from semi-structured interviews conducted separately with each of the subject advisors from the four regions of KZN. The interviews seek only to obtain a greater understanding of the initial statistical results. The names and identity of the interviewees, the subject advisors from the four regions will not appear in the final publication.

The data will be stored in a secure place during data collection and upon submission of the thesis will be stored in the School of Education, UKZN for a period of five years after which it will be disposed of.

The confidentiality of the participants will be guaranteed and respected. A copy of the findings will be lodged with the Regional Senior manager on completion of my studies. No individual will be forced to participate and all ethical considerations governing research will be strictly adhered to by the researcher and the respondents.

I hereby apply for permission to conduct the research.

I thank you in anticipation of a favorable response.

Yours faithfully

_____ _____

Researcher: R. Gareeb Date

Interview Schedule

Firstly, I would like to thank you for your written consent to participate in this study. As you have read in appendix A: Consent To Participate In Research: Interview that the purpose of my study is to analyze the results in physical science in the 2008 NSC examination, by focusing on how the secondary data set, namely the physical science results of learners, and the primary data gathered from the semi-structured interviews, can be used to give a deeper insight and understanding of the academic performance of learners, through the use of mixed method methodology.

I would like to emphasize that you are at liberty to withdraw from the project at any time, should I so desire.

1. This has been the first year of implementation of the NCS at grade 12 level. How would describe the impact of the new curriculum on learner performance.

2. You have been involved in the marking and moderation process:

2.1. Please describe to what extent the quality and standard of the examination paper impact on the results of this first cohort of grade 12 learners.

2.2. What were some of the key findings on learner responses to the questions? Please comment on the positives and negatives.

3. In terms of policy, final learner results comprise 25% school-based assessment (SBA), commonly known as continuous assessment (CASS) and 75% examination mark. From your knowledge of learner performance in the examination, please comment on the impact that the CASS would have had on the learner results.

4. Kindly explain if any adjustments were made to the marks obtained by learners in their examination paper. (Note 1. On recommendation of chief marker/moderator & 2. Adjustments in terms of any norms set by the department)

5. Figure 1 shows the proportion of learners by category of pass

The results show that 50.2% learners obtain scores below 30%

A total of 74.6% learners obtain scores below 40%

Only 1,1% of learners obtained distinctions.

5.1. What are some of the key reasons for such wide differentials in the categories of pass.

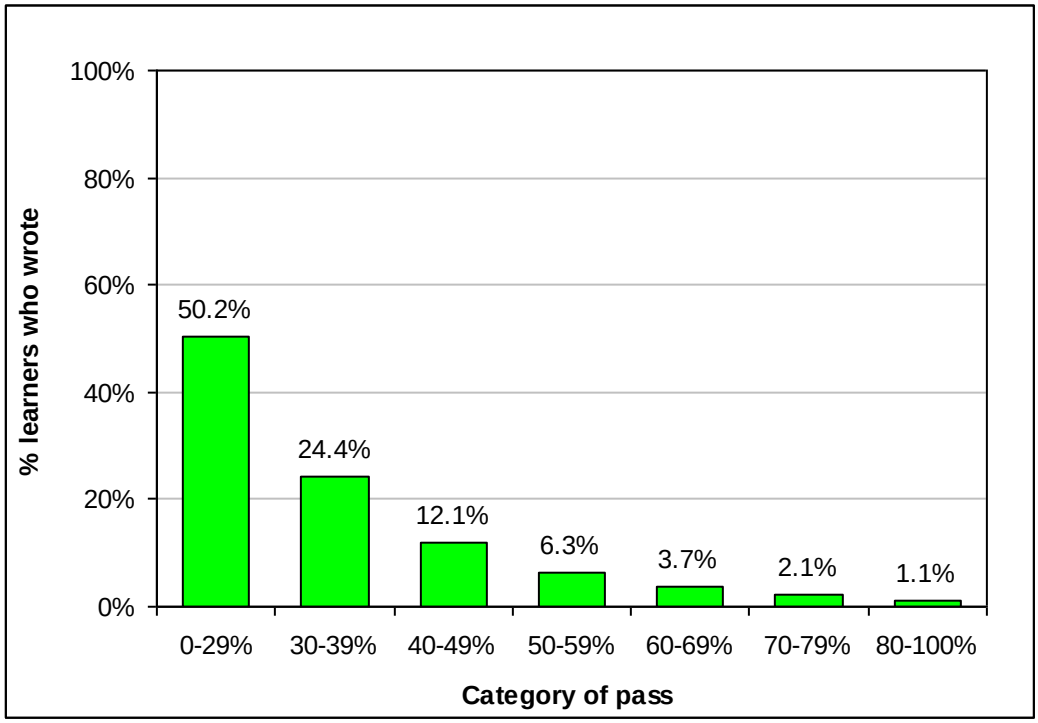

Figure 1 Proportion of learners by category of pass

6. Figure 2: Average proportion of learners who achieved below 50% or 50%+

In the category >50%, Pinetown, Obonjeni and Umlazi districts have 28,8%, 22,9% & 18,6%.

The other districts range from 4,3% to 11,3%.

6.1. What conclusions could be drawn from these differences in the learner performance?

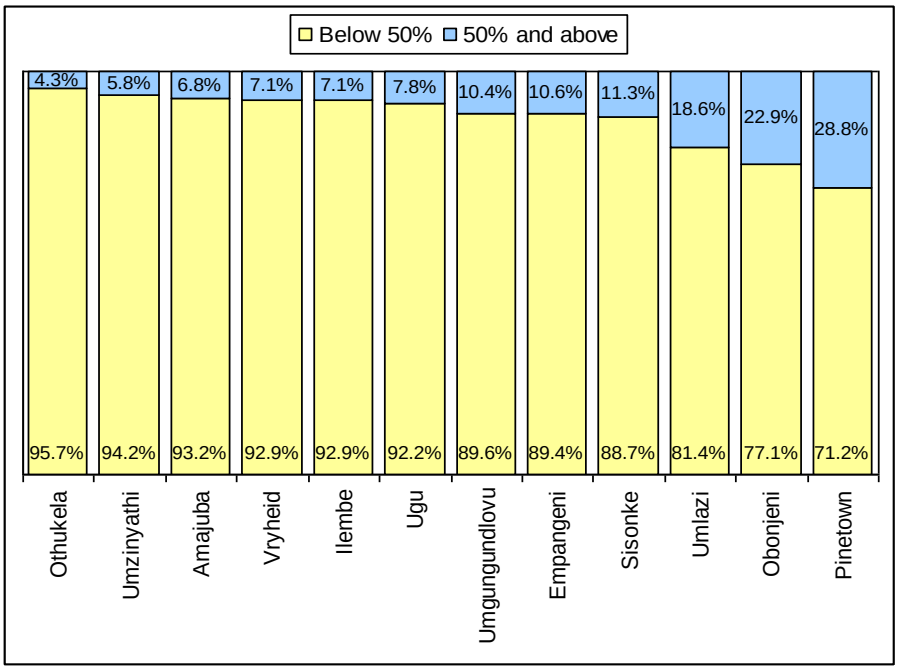

Figure 2: Average proportion of learners who achieved below 50% or 50%+

7. Table 3 shows the proportion of learners in each category of pass compared between quintiles.

Quintiles 1 & 2 have over 61% of learners achieving in the 0 – 29 % category. Quintile 1 had only 0,1% distinctions with 0% for Quintile 2.

Quintile 5 schools performed the best compared to the other quintiles. The overall performance is however very poor 50,2 % achieving below 30 5 and only 1.1% distinctions.

Quintile	**0-29%**	**30-39%**	**40-49%**	**50-59%**	**60-69%**	**70-79%**	**80-100%**
1	61.9%	24.1%	9.5%	3.1%	1.0%	0.3%	0.1%
2	61.3%	25.2%	9.1%	3.1%	1.1%	0.3%	0.0%
3	58.8%	24.9%	10.2%	3.8%	1.5%	0.5%	0.3%
4	45.0%	26.6%	14.2%	7.1%	4.3%	1.8%	1.0%
5	15.2%	21.5%	19.9%	16.7%	12.6%	8.8%	5.2%
Missing Quintiles	37.7%	19.3%	13.3%	11.6%	9.4%	5.6%	3.0%
Overall Average	**50.2%**	**24.4%**	**12.1%**	**6.3%**	**3.7%**	**2.1%**	**1.1%**
Chi-Square	573.148	49.135	82.347	273.850	243.901	290.461	115.429
df	5	5	5	5	5	5	4
p	.000	.000	.000	.000	.000	.000	.000

p<0.05 significant at the 95% level

Table 3 : Proportion of learners in each category of pass compared between quintiles

7.1. Some of the key principles and values that underpin the physical science curriculum are:

i. **Social transformation i.e. the** development of scientifically literate citizens

ii. **Outcomes-Based Education that** encourages learners to develop inquiry and problem solving skills &

iii. **High knowledge and high skills** Physical Sciences places particular emphasis on creating opportunities for all learners to realize their full potential as thinking and doing beings who will contribute to an improved quality of life for themselves and others in society.

To what extent do the results produced by the schools reflect the realization or lack thereof of these principals.

7.2. Lastly, Are there any other comments that you would to make with regards to the results produced by the learners in physical science.

PROVINCE OF KWAZULU-NATAL
ISIFUNDAZWE SAKW AZULU-NAT ALl

DEPARTMENT OF EDUCATION
UMNYANGO WEMFUNDO

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Imibuzo:
Enquiries: Sibusiso Alwar

PIETERMARITZBURG
Reference:
Inkomba: *0063/2009*

HEAD OFFICE
Date:
Usuku: 14 October 2009

MR. R. GAREEB
UNIVERSITY OF KWAZULU NATAL
EDGEWOOD CAMPUS
PRIVATE BAG X 03
ASHWOOD
3605

PERMISSION TO INTERVIEW LEARNERS AND EDUCATORS

The above matter refers.

Permission is hereby granted to interview Departmental Officials of the Province of KwaZulu-
Natal Department of education subject to the following conditions:

1. You make all the arrangements concerning your interviews.
2. Work programmes are not interrupted.
3. Departmental officials are not identifiable in any way from the results of the interviews.
4. Your interviews are limited only to the province of KwaZulu Natal.
5. A brief summary of the interview content, findings and recommendations is provided to my office.
6. A copy of this letter is submitted to District Managers where the intended interviews are to be conducted.

The KZN Department of education fully supports your commitment to research: Analysis of the
physical science results produced in the 2008 national senior certificate (NSC) examination: A mixed method approach
It is hoped that you will find the above in order.
Best Wishes

R Cassius Lubisi,
(PhD)
Superintendent-General