



## 2008 Maintaining Standards Report

- English First Additional Language
- Geography
- Life Sciences
- Mathematics
- Mathematical Literacy
- Physical Science

### Part 1: Overview

UMALUSI



Council for Quality Assurance in  
General and Further Education and Training

# From NATED 550 to the new National Curriculum: maintaining standards in 2008

## **2008 Maintaining Standards Report**

-  *English First Additional Language*
-  *Geography*
-  *Life Sciences*
-  *Mathematics*
-  *Mathematical Literacy*
-  *Physical Science*

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July 2009

PUBLISHED BY



Council for Quality Assurance in  
General and Further Education and Training



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# ACKNOWLEDGEMENTS

This research was designed by Dr Heidi Bolton and Elizabeth Burroughs, with input from Emmanuel Sibanda and Vijayen Naidoo. It was managed by Dr Heidi Bolton, with assistance from Helen Matshoba, Sophie Letsoalo, Frank Chinyamakobvu, and Pauline Masemola. The curriculum evaluation and exam analysis instruments were developed from earlier Umalusi instruments by Dr Heidi Bolton with input from Professor Tim Dunne and Elizabeth Burroughs.

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The Umalusi Assessment and Statistics Committee served as the project reference group.

2008

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# EXECUTIVE SUMMARY

## Introduction

Most large-scale examination systems include measures to ensure consistency of learners' performance over periods of time. Umalusi currently manages a statistical moderation process whereby results obtained in final examinations by schools, colleges, and adult learners are adjusted to maintain reasonably consistent standards over time. Prior to 2008, this moderation included several measures including 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 in each instance are compared to the average results of all other subjects, in turn, for the same group of learners; and reports made by internal and external moderators.

In 2008 Umalusi needed to review its systems in this area – the main reason being that the first cohort of learners following the new curriculum for the *National Senior Certificate* (NSC) qualification had reached matric level. The first national exams for this new system took place at the end of 2008. What had to be addressed immediately was that there were no historical norms for the associated examination results. To ensure the integrity of these results, Umalusi had to have a valid understanding of the quality and levels of cognitive demand of the new curricula relative to those just superseded.

Umalusi's Quality Assurance of Assessment (QAA) and Statistical Information and Research (SIR) units, together with the Statistics and Assessment Committee of the Umalusi Council, put in place a range of different strategies with regard to strengthening Umalusi's quality assurance of assessment in 2008. The overall strategy included the creation of new norms and in-depth research into the levels of difficulty of key curricula and their associated exams. These measures were aimed at NSC gateway subjects but due to budgetary and time considerations it was not possible to conduct research for all of these subjects, and the decision was made to focus the research on selected ones.

The research was specifically designed to provide Umalusi's Assessment and Statistics Committee with succinct information on the comparability of the old NATED 550 and new *National Curriculum Statement* curricula, and on the comparative difficulty of the exams associated with each. The intention was that the findings of the research involving in-depth curriculum evaluation and exam paper analysis be used to support the just use of *pairs analysis* and new norms in 2008. The aim was that all of this information would be used to adjudicate the standard of the new NSC exams in 2008, in relation to the standard of the previous *Senior Certificate* exams.

The available budget, time, and capacity meant that six subjects could be researched: the main (high enrolment) 'gateway' subjects used to assess suitability for entrance to tertiary institutions were selected. The subjects included in the research were English FAL; Geography; Life Sciences (previously Biology); Mathematics; Mathematical Literacy; and Physical Science.

The plan is to continue this research in the medium to long term. Over time the other NSC subjects will be investigated, as will the subjects in other qualifications such as the National Certificate Vocational (NCV)

Several assumptions underlay this research, first, that a comparison of the three intended curricula (NATED HG and SG, and the *National Curriculum Statement*) would provide an indication of whether the demands made by each are comparable. It was also thought that a comparison of the expressed requirements for the setting of final exit examinations would provide an indication of whether learners are required to perform at similar levels in the old and new examination systems. The underlying thought here was that the 2008 NSC exams would be posed at such a level that they would enable learners achieving at the level of 33.3% in the old Standard Grade exams to

achieve 33.3% in the NSC papers. In addition, the new exams would also contain sufficient difficult items so that learners achieving at the highest levels would be earning results equivalent to the 'A-grades' achieved by previous learners at Higher Grade levels. In other words, it was expected that the new papers would contain items that distinguished accurately between learners with a range of academic proficiencies.

Teams of four researchers evaluated the NATED 550 Higher and Standard Grade, and *National Curriculum Statement* curricula for each subject. They also analysed all Higher and Standard Grade exam papers from 2005 to 2007, as well as the August 2008 exemplar and final papers for their subjects. In each case, the evaluators had to make a myriad of judgments prior to commenting on the respective levels of difficulty of the curricula and exams. Their final judgments are based on a series of prior judgments, for which they were required to provide trails of evidence in each instance. Research instruments used ensured consistency of reporting across individuals.

Some of the curriculum evaluation findings relate to the quality of the curricula in general, and serve to point towards the enhancement of the quality of those documents in their own right. Other findings from this evaluation pertain specifically to the levels of difficulty of the curricula and were of direct relevance for the 2008 standardisation. The exam paper analyses similarly led to some findings of immediate importance for the 2008 standardisation process, and others relevant for medium- to long-term refinement of the papers.

### **Main curriculum evaluation findings**

There were many fine-grained findings relating to the respective subjects. Overarching trends in these findings, and recommendations, are reported in **Part 1** of this report. Detailed subject reports are presented in **Part 2** of the report.

Regarding determining the precise levels of difficulty of the respective curricula, in the process of making judgments on the relative levels of difficulty of the NATED 550 and NCS curricula, the subject teams drew on various aspects of their fine-grained analyses. All the teams drew, for example, on their findings relating to the specification, weighting, and foci of content and skill topics. The Physical Sciences, Mathematics, and Geography teams found that information on amounts and levels of difficulty of content and skill topics yielded solid evidence of the respective overall levels of difficulty of the curricula. The Mathematical Literacy team focused on cognitive types and levels of skills in order to make their decisions. The English FAL team compared degrees of specification of content and progressive increase in complexity of skills in their comparisons.

The Life Sciences team drew on a wide range of aspects including specifications for external assessment, when making their judgments. The Geography team included the nature of the organising principles, finding that the *transmission* of disciplinary knowledge and skills required in the NATED 550 curriculum was easier than the *application* of this knowledge and these skills in the NCS system.

In all, three teams (Physical Science, Life Sciences, and Mathematics) found their NCS curricula to be midway between the NATED 550 Higher and Standard Grade equivalents, in 50:50 proportions. It must be borne in mind that the Mathematics Curriculum does not include the content and skill assessed in Mathematics Paper 3. The Geography team found the NCS Geography curriculum between the NATED 550 Higher and Standard Grade levels, but closer to that of the Higher Grade, in a 60 Higher Grade:40 Standard Grade relation. The English FAL team found the NCS curriculum for their subject more difficult than both the NATED 550 Higher and Standard Grade courses.



## **Main exam paper analysis findings: general comment on the difficulty levels of the 2008 final NSC papers**

The subject teams commented accurately on the overall cognitive character and difficulty levels of the final 2008 *National Senior Certificate* exam papers in relation to their Higher and Standard Grade counterparts in the years 2005–2007, and August 2008 Exemplars, based on total counts of items or marks at specified cognitive type and difficulty levels.

Three teams (Physical Sciences; Life Sciences; and English FAL) gave differing fine-grained results for the respective final 2008 papers for their subjects, but on the whole, showed that the papers were closer to the old NATED 550 *Higher Grade* than the Standard Grade papers for the subjects. A fourth team (Geography) found that their 2008 final papers contained *more comprehension and problem-solving* questions than the previous Higher Grade papers for this subject – these (2008) questions being of a cognitively demanding type, and in addition, set at *difficult* levels.

Since Mathematical Literacy is a new subject and they had no previous papers to consider, the Mathematical Literacy team evaluated the 2008 final papers in relation to requirements in the *Subject Assessment Guidelines* for their subject. They found that while the spread of items in Paper 1 roughly matched those in the *Subject Assessment Guidelines*, the percentage of questions at the lower cognitive levels in Paper 2 was almost three times higher than that recommended. They noted, however, that the pass rate for the subject would not be as high as expected from the levels of these questions, as a high proportion of the instructions to learners were ambiguous and confusing (see the booklet for Part 3 of this report for more detail).

The Mathematics team found the final 2008 papers closer to those of the old NATED 550 Standard than the Higher Grade papers. It must be remembered that the same content and skills were examined in Mathematics Paper 3, the question papers for which were not analysed as they were written by very few learners. However, the team noted that some of the questions regarded as reasonably straightforward were new in the NCS and thus might not have been experienced as easy by learners whose teachers were unfamiliar with the new content.

## **Comparability of A-grades in the NATED 550 Higher Grade and 2008 NSC papers**

The subject teams commented, again based on accurate counts of the types and difficulty levels of items or marks in the exam papers, on whether the August 2008 exemplar and final papers allowed for learners who would have achieved A-grades in the old Higher Grade papers to achieve A-grades in the new NSC exams where the A-grades were *comparable to the old Higher Grade A's*.

Three Umalusi teams (English FAL; Geography and Physical Science) found that because the spread of types and levels of questions in the respective papers were similar, this pattern suggested that the A's in the 2008 NSC papers would be equivalent to A's in the NATED 550 Higher Grade papers.

The Umalusi Mathematics team found that learners typically achieving at the level of high Cs, Bs and As in the NATED 550 Mathematics Higher Grade exams would be able to score As in the final 2008 NSC Mathematics papers. It was expected that the Mathematics Paper 3 would contain difficult questions, but this fact was not investigated in this research. It was found that the final 2008 NSC papers would *not* discriminate between top-end achievers in the subject, as the papers included on average only 22% rather than the 40% of higher cognitive-level questions recommended in the *Subject Assessment Guidelines* for the subject.

## **Whether the 2008 NSC papers allowed for learners scoring at levels of 33.3% in the old Standard Grade exams to pass**

Notwithstanding the overall difficulty levels of the papers, two Umalusi teams (English FAL and Mathematics) found that certain percentages of the lower cognitive order *basic conceptual* items were similar to those in the old Standard Grade papers for the subjects, and would therefore allow learners achieving at just-passing-Standard-Grade levels to pass, however the team note that some of the questions regarded as reasonably straightforward was on content that was new in the NSC and thus might not have been experienced as easy by learners whose teachers were unfamiliar with new content. The Umalusi Mathematical Literacy team noted that while there were more than enough easy items to enable these learners to pass, the ambiguity of many questions would lower the pass rate from that expected from the levels of the questions.

Three Umalusi teams (Geography; Life Sciences, Physical Sciences) found the proportions of easy items in the 2008 NSC final papers *lower* than those in the average Standard Grade papers for the subjects. The Umalusi Geography team noted, for example, that the amounts of *basic conceptual* questions in the NSC papers were closer to percentages in the old Higher Grade than in the Standard Grade papers. The Umalusi Life Sciences team pointed out that the number of easy questions in the NSC papers was very close to that needed to pass, leaving very small margins for error at that level. The Umalusi Physical Science group found that it would be much harder for a learner achieving at this level to pass the 2008 NSC exams than it would have been to pass the Standard Grade exams: the 2008 final exams contained an average of 23% of easy items, while the average for the Standard Grade papers between 2005 and 2007 was 39%. The papers for these subjects would clearly have been very difficult for learners at the lower end of the achievement spectrum, and in the case of Physical Science, especially so.

## **Additional comment on the exam papers**

The Umalusi subject teams commented on aspects of the exam papers other than their respective levels of difficulty. The relationship between the August 2008 exemplar and final papers was dealt with in each instance. The comparability of all the Higher Grade papers between 2005 and 2007 was considered. The degree of similarity of all the Standard Grade papers in that period was also looked at. The teams looked at the suitability of the 2008 NSC papers as models for future NSC exams, and considered language levels in these paper. These findings are discussed in **Part 3** of the report.

## **Conclusions and recommendations**

Despite the inclusion of only six subjects rather than the full range of national subjects in the research, the project provided meaningful results for the short, medium and long term. Having an accurate evidence-based idea of the levels of difficulty of the curricula and exams assisted the standardisation process, providing means for triangulating results in relation to the research findings, the new norms, and patterns shown through *pairs analysis*. As elaborated in **Subsection 8.1 (Part 1 of the report)**, it was possible to extend the reach of the findings by comparing learner performance in non-researched similar subjects with their performance in the researched subjects for which there were clear descriptions of difficulty levels.

The usefulness of the Umalusi evaluation instruments was confirmed in the curriculum and exam analyses.

Regarding the overall findings of the current study, four overarching comments are made. First, in terms of the levels of difficulty of the six new NCS curricula evaluated: three of these curricula (those for Life Sciences; Mathematics; and Physical Science) are judged to be midway between the NATED 550 Higher and Standard Grade curricula *overall*, but at the same time have pockets of difficulty that way exceed difficulty levels in the previous Higher Grade curricula. Again, it must be

borne in mind that the Mathematics Curriculum *does not include* the content and skill assessed in Mathematics Paper 3. A fourth curriculum (Geography) was found to be closer to the old Higher than Standard Grade level. A fifth curriculum (English FAL) was found, because of its greater degrees of specification, to be *effectively* more difficult than the NATED 550 curricula. The sixth curriculum (that for Mathematical Literacy) was found to be so different to the NATED 550 Higher and Standard Grade Mathematics curricula that comparison was not possible.

A second major overarching finding of the research was that exam papers were *variable*. There may be broad trends such as those showing the relatively high proportions of *difficult problem-solving* questions in Higher Grade papers over the years, and the relatively high proportions of *easy basic comprehension* questions in Standard Grade papers over time, but the study shows that *within these trends*, there was considerable variation in the *overall* difficulty levels of the papers.

The fact that exam papers were *not necessarily uniformly difficult or easy* comprises a third significant finding.

The fourth important aspect highlighted by the current study is the integrity of the Umalusi standardisation processes. No fewer than six means are utilised to increase the validity and reliability of these processes. When making standardisation judgments, the reports of internal and external moderators; patterns shown in *pairs analysis*; norms showing learner performance trends over five years; systematic evaluation of associated curricula; and rigorous analysis of the exam papers, item by item, were considered in turn, and then triangulated where patterns *between* the measures were taken into account.

The main recommendations regarding the curriculum are that the current set of NCS documents per subject are rationalised into single or at most two coherent documents per subject – and that these new documents be made universally available to *all* schools, in soft or hard copy form, as suits the contexts of the schools. There is also a need, for all subjects, for more guidance regarding teaching in differing social contexts; clarity regarding what comprises different kinds of assessment tasks and how to assess them; and teacher development of subject-appropriate assessment tools. This guidance needs to feature in the curriculum documents themselves, as well as in teacher-development workshops. Beyond these overarching curriculum recommendations, the Umalusi subject teams have also made important subject-specific suggestions.

## **Structure of this report**

The report is structured in three Parts. **Part 1** gives an overview of the whole project and is made up of nine subsections. **Subsection 1** introduces the reader to the project. **Subsection 2** sketches the broader background informing the curriculum evaluations and exam paper analyses. **Subsection 3** presents the research questions for the evaluations. **Subsections 4 and 5** detail how the analyses were conducted, and describe selection of the sample of subjects for which curricula and exams were analysed. **Subsections 6 and 7** outline broad trends in the findings of the curriculum evaluation and exam paper analysis respectively. **Subsection 8** reports on the uses and usefulness of the research, and its limitations. Concluding comments are made in **Subsection 9**.

**Part 2** of the report is a separate booklet focusing on the *curriculum evaluation*. It starts with a brief introduction, and reiterates the research questions; methodology followed for the evaluation; and selection of the subjects for evaluation. Most of this booklet is devoted to the individual in-depth reports on the curricula for English First Additional Language (English FAL); Geography; Life Sciences; Mathematics; Mathematical Literacy; and Physical Science. Trends between the analyses are reiterated.

**Part 3** of the report – the separate booklet focusing on the *analyses of the exam papers* – also starts with a brief introduction, and reiterates the research questions; methodology followed for the analyses; and selection of the exam papers for analysis. The bulk of this booklet focuses on the individual detailed reports on the exam papers for English First Additional Language (English FAL); Geography; Life Sciences; Mathematics; Mathematical Literacy; and Physical Science, in the period 2005–2008.

# PART 1

## LIST OF ACRONYMS

<b>Acronym</b>	<b>Meaning</b>
NSC	<i>National Senior Certificate</i>
NCV	<i>National Certificate: Vocational</i>
FAL	<i>First Additional Language</i>

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# 1. INTRODUCTION

Most large-scale examination systems include measures to ensure consistency of learners' performance over periods of time, and it is natural for these measures to be refined to incorporate systemic change from time to time. Umalusi currently manages a statistical moderation process whereby results obtained in final examinations by school, college, and adult learners are adjusted to maintain reasonably consistent standards over time. Prior to 2008, this moderation included several measures including adjusting raw scores on the basis of *norms* calculated from learner performance over three- or five-year periods. Moderation also took into account the results of *pairs analysis* in which the average results for a particular subject in each instance are compared to the average results of all other subjects, in turn, for the same group of learners. Third, moderation took into account reports made by internal and external moderators, on the fairness of the exam papers; language level and percentages of problematic questions; and perceived overall level of cognitive difficulty. Traditionally, these moderators worked individually or in small groups of two or three.

In 2008 Umalusi needed to review its systems in this area. First, there had been widespread criticism of its usual approach for which it was claimed that there was too heavy an emphasis on statistics, with insufficient qualitative input, and that the system favoured upward adjustments. The main reason for the urgency however was that new curricula and qualifications – the *National Senior Certificate* (NSC) – had been introduced at secondary school and college levels respectively. The first national exams for this new system took place at the end of 2008. What had to be addressed immediately was that there were no historical norms for the associated examination results. Further, to ensure the integrity of these results, Umalusi had to have a valid understanding of the quality and levels of cognitive demand of the new curricula relative to those just superseded. It should be drawn to the readers' attention that while prior to 2008 learners were able to take up subjects and be examined on these subjects at Higher or Standard Grade levels, in 2008 *all* learners in South Africa enrolled and were examined at the *same levels*. Single 2008 examination papers thus had to incorporate ranges of questions, from those typically at the highest difficulty levels in Higher Grade papers to those at 'just passing' levels in Standard Grade exams, as well as questions at all levels in between these extremes, in order to differentiate learners.

Umalusi's Quality Assurance of Assessment (QAA) and Statistical Information and Research (SIR) units, together with the Statistics and Assessment Committee of the Umalusi Council, put in place a range of different strategies with regard to strengthening Umalusi's quality assurance of assessment in 2008. These measures were aimed at all NSC gateway subjects, but due to budgetary and time considerations, it was not possible to conduct research for all the gateway NSC subjects, and the decision was made to focus research on selected NSC subjects.. Part of this overall strategy involved conducting in-depth research into the quality and type and levels of cognitive demand in the respective curricula in order to ascertain their relative levels of difficulty. The intention for this research was to utilise the expertise of Umalusi teams of subject experts, to establish sound, theory-based and logically argued evidence-based judgments of the relative levels of difficulty of both the intended and examined curricula. The aim was that the findings of the research be used to support the just use of *pairs analysis* and new norms.

Given the in-depth nature of the study, it was not possible in the time available to research more than six NSC subjects. For these six subjects, standardisation of the results would have the benefit of the new norms and pairs analysis, as well as systematic collective and evidence-based judgments on the levels of cognitive difficulty of the exam papers and curricula within which they were positioned. It was thought, however, that the research would also present advantages for the other NSC subjects beyond its immediate focus.

During standardisation it was expected that for the remaining (non-researched) NSC subjects, once the levels of difficulty of the six researched subjects had been 'anchored' by the systematic judgments of the Umalusi subject experts, it would be possible to position many of the other

subjects through pairs analysis comparison. In other words, it was thought possible that comparison of average learner results for non-researched subjects with the average results for the researched subjects would give the Umalusi Statistics and Assessment Committee an idea of the levels of difficulty of the exam papers not analysed.

Before sketching the broader context within which this research fits, a word on the 2008 norms utilised by Umalusi and a brief delineation of assumptions underlying the research itself.

## **1.1 STRATEGY FOR MAINTAINING STANDARDS IN THE TRANSITION FROM THE NATED 550 TO THE NEW NATIONAL CURRICULUM: THE CREATION OF NEW NORMS**

Given Umalusi's view that one of the key determinants of the fairness of learners' results is contextualisation of these results in relation to historical norms – situating the results within the context of the previous performance of several similar cohorts of learners in similar subjects – it was essential to have a valid and fair set of norms within which to standardise the 2008 results. Given also that many of the NCS subjects were thought to be similar to their NATED 550 predecessors, or to combinations of NATED 550 counterparts, it was decided to base the new norms on previous ones.

In consultation with the national Department of Education, Independent Examination Board (IEB) and Onafhanklike Afrikaanse Eksamensraad (OAER), and in line with the standards laid down in the 2008 *Subject Assessment Guideline* documents, Umalusi developed new norms based on, but not adopting wholesale, existing norms for use in the 2008 standardisation processes.

Where subjects had predecessors in terms of similar subjects, and even if these subjects had been offered and taken at differing levels in the old National Education (NATED 550) system, the norms of the preceding subjects were used. In cases where these subjects had been offered on Higher and Standard Grade levels, combinations of previous Higher and Standard Grade norms were used in 2008. In the case of Mathematics, the previous Higher Grade norm was used in 2008; for Mathematical Literacy, the previous Standard Grade norm was utilised.

For new subjects such as Civil-, Mechanical-, and Electrical Technology; Consumer and Hospitality Studies; and Information and Computer Applications Technology, hybrid norms were constructed. These hybrids incorporated the norms of old NATED 550 subjects thought to have been close in nature to the new *National Curriculum Statement* (NCS) subjects. In some cases up to eight or ten previous norms were combined in these hybrids.

While such use of the existing norms is logical, for the integrity of the 2008 standardisation process it was necessary to test the validity of the approach. The in-depth research into the six NSC subjects was part of this testing exercise: the study was used to triangulate as it were, the validity of the 2008 results in relation to the new guiding norms. As mentioned in the previous subsection, the research also assisted the positioning of the non-researched subjects through comparison facilitated by pairs analysis.

## **1.2 STRATEGY FOR MAINTAINING STANDARDS IN THE TRANSITION FROM THE NATED 550 TO THE NEW NATIONAL CURRICULUM: IN-DEPTH CURRICULUM AND EXAM PAPER EVALUATIONS**

The research towards maintaining standards in the transition from the NATED 550 to the *National Curriculum Statement* (NCS) system entailed mixed (qualitative and quantitative) in-depth research into the relative standards of the old and new curricula, for selected *National Senior Certificate* (NSC) subjects. The main purpose of this research was to provide Umalusi's Statistics and Assessment

Committee with succinct information on the comparability of the old and new curricula and on the comparative difficulty of the exams based on the old curriculum and those based on the new. It was intended that this information would be used to adjudicate on the standard of the new NSC exams in 2008 in relation to standard of the previous SC exams.

Ideally, the subjects to be analysed by teams of evaluators would have been the so-called 'gateway' subjects – subjects for which learner performance is assessed for entry to tertiary institutions – such as English Home Language; Afrikaans Home Language; English First Additional Language; Afrikaans First Additional Language; Mathematics; Mathematical Literacy; Biology/Life Sciences; Physical Science; Geography, History; Accounting; Economics; Business Economics; and Agricultural Sciences. Available budget, time, and capacity meant that six subjects could be researched, and a decision was taken to base the selection of these subjects on enrolment numbers. The subjects included in the research were Mathematics; Mathematical Literacy; Physical Science; Life Sciences (previously Biology); Geography; and English (First Additional language or FAL).

Five assumptions underlay this research, first, that a comparison of the three intended curricula (NATED HG and SG, and the *National Curriculum Statement*) would provide an indication of whether the demands made by each are comparable. It was assumed that the old and new curricula did require comparable levels of knowledge and skill in order to pass.

It was also thought that a comparison of the expressed requirements for the setting of final exit examinations would provide an indication of whether learners are required to perform at similar levels in the old and new examination systems. The underlying assumption here was that the requirements for the new subject examinations were basically comparable with a 'blend' of the old Higher and Standard Grade exam requirements.

A third assumption was that a comparison of the analyses of the August 2008 NSC *exemplar* exams and old SC exams would give an active indication of the level of difficulty of the 2008 NSC exemplars in relation to the old Higher and Standard Grade SC versions of those exams. Similarly, it was expected that a comparison of the analyses of the *final* 2008 NSC examinations with the analyses of the 2008 NSC exemplars and old SC exam papers would indicate the level of difficulty of the final 2008 NSC exams in relation to both the exemplars, and exams set prior to 2008.

The underlying thought here was that the 2008 NSC exams would be poised at such a level that they would enable learners achieving at the levels of past learners just passing at Standard Grade level to pass. In addition, the new exams would also contain sufficient difficult items so that learners achieving at the highest levels would be earning results equivalent to the 'A-grades' achieved by previous learners at Higher Grade levels. Finally, the new papers would contain items that distinguish accurately between learners with a range of academic proficiencies. In other words, the assumption was that the examinations would be set in such a way that their levels of cognitive difficulty could be used to identify learners achieving at the top and bottom ends of the spectrum, as well as to discriminate a range of levels between these extremes, capturing the range of achievement displayed in the old HG and SG exams.

A fourth assumption was that if all of the related research findings were presented in a sufficiently clear and systematic manner, they would be able to support the Umalusi Statistics and Assessment committee in making decisions associated with the fairness, reliability, and levels of the new 2008 examinations.

Finally, it was expected that the analysis of the intended curricula would range beyond the immediate requirements of the Umalusi Statistics and Assessment Committee. It was intended that the reports on the curriculum analyses would provide useful formats for meaningful comparison across curricula in future. In addition, it was hoped that the findings of the Umalusi subject teams would become input for future curriculum refinement.

The research reported here is part of a bigger and ongoing project aimed at setting and maintaining standards, aspects of which are linked to the current study. The plan is to continue this research in the medium to long term. Over time, the other NSC subjects will be investigated, as will the subjects in other qualifications such as the *National Certificate: Vocational* (NCV)

### 1.3 STRUCTURE OF THIS REPORT

The report is structured in three Parts. **Part 1** gives an overview of the whole project and is made up of nine subsections. **Subsection 1** introduces the reader to the project and presents the rationale for embarking on the study. **Subsection 2** sketches the broader background informing the research and points to a related pilot study and the location of the present research within the wider Umalusi project for maintaining and setting standards.

Umalusi policies, instruments and procedures are founded on thoroughly researched principles, and this research always aims to acknowledge its theoretical standpoints and bases. The theory in the current research is developed from previous Umalusi investigations and other studies (see, for example, the *Learning from Africa* project (Umalusi, 2008)). It should be noted that since this section is rather abstract, it is included as an appendix (see Appendix 1), and that if the reader skips the section, his or her reading of the rest of the report will not be prejudiced.

**Subsection 3** presents the research questions, and notes the care with which the study was designed to facilitate systematic and comparable reporting by all the subject teams, and the creation of a trail of evidence on which to base the answers to these questions.

**Subsections 4 and 5** detail how the analyses were conducted, and the selection of the sample of subjects for which curricula and exams were analysed, both of which build on methods used by Umalusi in other research projects (see, for instance, *Making Educational Judgments* (Umalusi, 2007)). The research instruments in the current project specify what the evaluators need to do to a far greater extent than did earlier Umalusi instruments.

Because of their length, the actual results of the curriculum evaluation and paper analyses are presented in detail in separate booklets, making up **Parts 2 and 3** of this report respectively. Readers interested in the particular details for specific school subjects will find these in-depth reports useful. In this overview report, **Subsection 6** outlines broad trends in the findings of the curriculum evaluation. **Subsection 7** similarly sketches patterns in the findings from the exam paper analyses.

**Subsection 8** reports on the uses and usefulness of the research, and its limitations. At the time of publication of this report, some of the research findings will already have been put to use, but this report with its three constituent parts comprises the first dissemination of the findings as a whole. The overview closes with some concluding comments on the research.

**Part 2** of the report – the separate booklet focusing on the curriculum evaluation – again starts with a brief introduction, and reiterates the research questions; methodology followed for the evaluation; and the selection of the subjects for evaluation. Most of this booklet is devoted to the individual in-depth reports on the curricula for English First Additional Language (English FAL); Geography; Life Sciences; Mathematics; Mathematical Literacy; and Physical Science. Trends between the analyses are reiterated.

**Part 3** of the report – the separate booklet focusing on the analyses of the exam papers – also starts with a brief introduction, and reiterates the research questions; the methodology followed for the analyses; and the selection of the exam papers for analysis. The bulk of this booklet focuses on the individual detailed reports on the exam papers for English First Additional Language (English FAL); Geography; Life Sciences; Mathematics; Mathematical Literacy; and Physical Science, in the period 2005–2008.



## 2. BACKGROUND TO THE PROJECT

The current research must be seen in the context of Umalusi's mandate as the Council for Quality Assurance in General and Further Education and Training. According to the acts defining Umalusi's work (see the *General and Further Education and Training Quality Assurance Act No. 58 of 2001*, as amended in 2008, and the *National Qualifications Framework Act No. 67 of 2008*, Government Gazette Volume 524, No. 31909 of 17 February 2009), Umalusi's mandate has recently been expanded, from maintaining to setting and maintaining standards in the sector.

Umalusi has a duty to develop, foster, and maintain the parts of the *National Qualifications Framework* within its ambit: it must ensure that South African qualifications in the General and Further Education and Training sector meet criteria determined by the Minister of Education; and are of acceptable, internationally comparable quality. Research forms an important part of the development of qualifications and the management of this sub-framework in general. In short, it (research) feeds directly into each of the following key aspects of Umalusi's work:

- 👤 Advising the Minister of Education
- 👤 Standards development and maintenance
- 👤 Quality assurance of qualifications, provision, and learning achievement

Umalusi proposes a qualifications model that identifies a small number of qualification types, each of which has a small number of variants. It also identifies features seen as prerequisites for quality assurance, such as rules of combination for different units of learning such that these rules facilitate movement along learning pathways; the accompanying of each qualification by a curriculum statement; external assessment at least in part; and minimum credit values. There is potential for increased interaction with the other two quality councils, the Quality Council for Trades and Occupations (QCTO), and the Council for Higher Education (CHE).

Umalusi has always anchored its work in soundly researched findings. As Umalusi's responsibilities grow, research feeding into its work broadens and deepens. The research reported here is part of a bigger and ongoing project aimed at setting and maintaining standards, aspects of which are linked to the current study. Three strands of ongoing study are outlined briefly here, namely, those relating to ongoing curriculum and exam paper evaluation, item banking, and learner performance analyses over time. Reports linked to each of these areas are indicated in the subsections that follow immediately, and can be accessed on the Umalusi website ([www.umalusi.org.za](http://www.umalusi.org.za)).

### 2.1 ONGOING IN-DEPTH CURRICULUM AND EXAM PAPER ANALYSIS

One on-going area of research embraced by Umalusi is the analysis of intended and examined curricula (curriculum documents and exam papers). The intention is to continue to refine Umalusi evaluation instruments with each successive cohort of evaluations, and to build on the subjects evaluated – and eventually to extend this work to all qualifications and parts of qualifications within Umalusi's sphere of responsibility.

The first of these evaluations examined the standard of the South African Senior Certificate exams over a ten-year period, and was designed at a moment when there was public outcry against what was perceived to be a lowering of standards (see Umalusi, 2004). The second research project compared the syllabi and examinations of a small number of subjects from the *Senior Certificate* (school qualification) and the *National Senior Certificate* (college qualification) respectively (see Umalusi, 2006). A third study compared selected subjects at senior secondary level, across four African countries: Ghana, Kenya, South Africa, and Zambia (see Umalusi, 2008). A fourth investigation considers the relative standards of compulsory fundamentals (Mathematics and English) offered by different providers and certified by different quality assurance bodies, as part of the requirements in all qualifications from what were then Levels 1 to 4 on the *National*

*Qualifications Framework* (see Umalusi, 2007b). The refinement of the research instruments over the course of these projects is clearly documented (see Umalusi, 2007). These tools formed the springboard for development of the instrument used in the current research.

The project will continue to investigate other subjects. The curricula and exam papers of History, Economics, Business Studies and Accounting will be analysed in 2009. Further research will consider vocational subjects.

## 2.2 PILOT STUDY: ITEM RESPONSE ANALYSIS AND THE CURRENT RESEARCH

Another area of Umalusi research focuses on work towards the long-term aim of building item banks of tested exam items (tested exam questions and sub-parts of questions). This project requires analysis of learners' scripts, item by item, over time. The idea is to re-use suitable items after appropriate time periods. Umalusi has considered various techniques to begin this process, including item response theory; equipercentile equating; calibration; and grade determination, and improving aspects of the moderation systems. In 2008 Umalusi commissioned a report into the international linking of assessment results (see Umalusi, 2008b).

Umalusi conducted a pilot study in 2008, using 120 000 *Senior Certificate* (2006) learner scripts and *item response* analysis to test the method as a means of discriminating learners and finding suitable items for re-use. The *item response* analyses were combined with qualitative analyses to pilot the exam paper analysis tool used in the current research, and to assess similarities and differences between the statistical and qualitative findings. Some of the relevant findings are mentioned briefly here.

First, combining qualitative and *item response* analysis was useful: in most instances the qualitative judgments were in line with those emerging from the statistical analysis of learners' results. In other words, the judgments made by the qualitative researchers regarding the levels of difficulty of items (exam questions and sub-questions) were in most cases borne out by patterns in learners' achievements. Where the magnitude of qualitative judgments differed slightly from those in the findings from the statistical analysis, they still followed a similar ranking sequence. This finding confirms the validity of Umalusi's exam paper evaluation instrument.

Second, a number of re-usable items were found in the pilot: these items have been banked for possible future use.

Third, challenges for future use of the techniques were identified, and the means to overcome them explored. Some of the difficulties experienced related to the current design of South African exam papers and the way marks are captured. Item independence is a precondition of *item response* analysis and there is currently considerable inter-item dependence (the dependence of items on 'parent' information (such as a sentence; paragraph, narrative, or visual) in South African papers. In the pilot study, this difficulty was addressed by grouping, inter-correlating, and factor-analysing test items using polytomous *item response* analysis. Another challenge was presented by the way in which markers currently record ticks: rather than recording a tick for each mark gained by learners, as required, many markers give single ticks for clusters of marks gained. Technical issues such as these would need to be addressed in the exam paper design phase of the examination process and in the training of markers – if *item response* analysis is to be utilised in the long term.

Of interest for the current study is the fact that *item response* analysis in the pilot did discriminate learners and mirror the associated qualitative judgments. *item response* analysis is useful for *post hoc* analysis of the difficulty of exam paper items, based on actual learner performance. It is also useful for triangulating the research results regarding the qualitative evaluations of the levels of difficulty of exam papers – the analyses of which will be conducted before the papers are written in any particular year. Put differently, *item response* analysis potentially provides a measure of the fairness of the norms and qualitative research findings used in any particular standardisation

process, *after* standardisation has taken place. Findings resulting from this type of analysis can also be fed into the following years' standardisation in each case.

## 2.3 SCHOOL PERFORMANCE ANALYSIS

A third area on which Umalusi research focuses is on the performance of particular General and Further Education and Training institutions over time, starting with schools. Trends linked to public schools and colleges as well as to institutions associated with private providers are carefully tracked and monitored. As part of this work, Umalusi reports on the average performance of schools in the *Senior Certificate* in the five years preceding the new NSC exams, and in the *National Senior Certificate* in 2008 (see Umalusi, 2009b, forthcoming). Future reports of this kind will include average school performance in the *National Senior Certificate* in subsequent years.

The importance of these analyses for the current research is that considering their findings in relation to the findings of the current research, and findings of the curriculum and exam evaluations in future years, may yield information on the types of schools showing progress in the current system with its regime of curriculum documents and exam papers. The forthcoming report (Umalusi, 2009b) reports on the following trends:

- 👉 schools performing consistently over the period 2003–2007, and whether or not they maintain this performance in 2008
- 👉 schools performing at consistently high levels in this period (top 10% of performance), and whether or not they maintain these positions in 2008
- 👉 schools performing at consistently low levels in this period (lowest 10% of performance), and whether or not they continue at these levels in 2008
- 👉 characteristics of schools consistently raising or consistently lowering their levels of performance over the period in question
- 👉 correlation between, and similarity in ranking of, continuous assessment (CASS) and exam marks for schools performing at differing levels.

The next subsection of this part of the report describes the research questions for the curriculum evaluation and exam paper analyses.

## 3. URGENT QUESTIONS

Umalusi evaluators knew that they were analysing each curriculum comprehensively in its own right, as well as making judgments regarding the respective levels of difficulty of the old and new curricula and exams. They were given lengthy research instruments consisting of sets of questions for which they had to report in highly specified ways, in the tables provided or in paragraphs with specific word counts (see Subsection 4 below for more detail regarding the research tool and methodology followed, and Appendix 2 for the tool itself). Evaluators were then asked to draw on their responses to answer the main research questions, as *concluding tasks*.

The specific research questions for the present study thus featured at the *end* of each part of the Umalusi evaluation instrument – one part of this tool being for the curriculum evaluation, and one for the analysis of exam papers. The reason for this positioning of the main questions was to ensure that the answers to them were based on the visible and comprehensive trails of evidence generated by the other questions. Umalusi insisted that all responses be based on this evidence (aggregated judgments, percentage counts of categories of items, and the like) from the body of the exam report of each Umalusi evaluator. Further, the intention was to make sure that the responses of the different Umalusi *subject* teams were based on comparable types of evidence and systematic reasoning.

The two specific research questions (or concluding tasks) for the curriculum evaluation were:

1. Is the assumption that the NATED 550 curricula and the *National Curriculum Statement* require similar levels of knowledge and skill in order to pass a justifiable assumption? Regarding the levels of cognitive difficulty comprised by the three curricula, in an overall sense, how do the *National Curriculum Statements* rank against the NATED 550 Higher Grade curricula and the NATED 550 Standard Grade curricula respectively? Are the NCS curricula comparable to the Higher Grade or Standard Grade curricula, or to mixtures of the two previous curricula? If the level of difficulty of the NCS curriculum for the subject in question is somewhere between that of the earlier Higher Grade and Standard Grade curricula, in what proportions are the respective percentages of the levels of each of the earlier curricula? How should it be rated – for example, would it be, say, 60:40 HG to SG – based on actual counts of ratings recorded for all preceding sets of questions?
2. Based on your whole evaluation of all of the aspects of the curriculum featuring in the Umalusi curriculum evaluation instrument, what would your comments and recommendations be to the Department of Education regarding the curriculum for your subject?

The specific questions for the analyses of the exam papers were:

3. Do the August 2008 exemplar and final papers allow for learners who would have achieved A-grades in the old Higher Grade papers to achieve A-grades in the new NSC exams, where *the new A-grades are comparable to the old Higher Grade A's*? (Indication of the exemplar and final NSC items that would reflect this new A-grade achievement needs to be provided. Responses must be based on specific findings from the body of the exam report for this research question and all those that follow.)
4. Do the August 2008 exemplar and final papers allow for the average learner passing at the level of the old Standard Grade papers to pass the new NSC exams? (Indication of the exemplar and final NSC items which would allow the Standard-grade level learners to pass needs to be provided.)
5. From the analysis of the 2005–2007 Senior Certificate examination papers, are the examinations of roughly comparable standards across the three years? Or is there any particular year, or even paper, that seems to be anomalous? (Motivation and evidence need to be provided for the position taken.)
6. What distinguishes most significantly, the Higher from the Standard Grade exams? (Responses are again to be based on specific findings in the body of the report.)
7. From the analysis of the Higher and Standard Grade papers, how do the 2008 NSC exemplars compare? And how do the 2008 NSC final papers compare with the exemplars on one hand, and the Higher and Standard Grade papers on the other? Are there any points of comparison not already covered?
8. Are the exemplar and final papers good models for future examinations, or should their format be critically re-examined immediately? Suggestions need to be specific.
9. How appropriate are the language levels in the August 2008 exemplar and final exam papers?

Umalusi evaluators were encouraged to critique this Umalusi evaluation instrument itself, and while they were required to adhere to its basic structure and detail, they were also asked to customise parts that needed to be adapted for particular school subjects. Differences between subjects emerge in the detailed reports on each, in the booklets for **Parts 2 and 3** of this report. The full methodology whereby Umalusi evaluators were selected, trained, and guided in answering these research questions is elaborated in the following section.

## 4. HOW THE CURRICULUM DOCUMENTS AND EXAM PAPERS WERE ANALYSED

In order to answer the curriculum-related research questions outlined in the previous subsection, it was intended that teams of Umalusi evaluators would evaluate and compare the NATED 550 Higher and Standard Grade curricula underpinning the *pre-2008 Senior Certificate* examinations on one hand, with the new *National Curriculum Statements* and related documents on the other. The intention was that each team member would complete a report in the required format, that Umalusi would review these reports, and once finalised, that the team leaders would create composite reports for their subjects, based on the integration of all the individual reports in their teams.

The aim was that the same teams of evaluators would then do retrospective analyses of the *Senior Certificate* exam papers for the period 2005–2007 (three years) to establish an understanding of the standards represented by those papers in terms of types and levels of cognitive demand they contained. The teams would then run similar analyses of the August 2008 exemplar and final Grade 12 NSC exams shortly after they had been written in each case, to judge the levels of difficulty of these papers in relation to the pre-2008 examinations. Reporting would again be in the formats required by Umalusi, and follow similar processes to those utilised for the curriculum evaluation, where individual exam analysis reports would eventually be integrated into one composite report per subject.

The full cohort of 24 Umalusi evaluators (four individuals per school subject, for six subjects in all) were commissioned to attend a two-day training workshop at Umalusi, where they were introduced to and given background, timelines, reporting formats, and other Umalusi expectations for, the research project. They were then trained as a single group in the use of the curriculum evaluation instrument. Once it was established that the whole group was familiar with the instrument, subject-groups were given time to work in their individual subject teams to create full lists of content and skill topics, and to further acquaint themselves with the tool. The intention was that teams would at least create lists of content and skill topics while together, as the separate work of each individual was going to involve making judgments in relation to these topics. It was expected that this exercise would be straightforward.

Following the curriculum exercise, the full cohort of evaluators was again trained as a single group for the exam paper analyses. This training was brief, as it was thought that the manner in which teams needed to proceed was clear, and that they needed as much time as possible to work as individual subject teams in order to come to a common understanding of how they would judge the exam questions using the Umalusi tool.

The Umalusi evaluators then went their separate ways to do the actual evaluations. Individual curriculum reports were submitted to and reviewed by Umalusi some weeks later. Team leaders then put together composite reports. Once this process was complete, the evaluators went through the whole cycle again for the exam paper analyses involving the 2005–2007 *Senior Certificate* papers and the August 2008 exemplar papers.

When the time came to analyse the 2008 final NSC papers, time was of the essence, as the analyses had to wait until learners had written the final papers, and the margin between this writing and actual standardisation of the results was extremely short. The whole cohort of Umalusi evaluators came together again to complete this final analysis in their subject teams. Final composite exam reports had to be ready for distribution to the Umalusi Statistics and Assessment Committee for standardisation just days after this final analysis workshop. By then the composite exam reports had been finalised apart from the findings of the final 2008 paper analyses, however, and the results of just the final analyses needed to be inserted into the reports.

The inputs needed for this two-part evaluation; outputs expected; discussion of the research instrument; and challenges emerging in relation to the *research processes* are dealt with in the next few subsections of this part of the report.

## 4.1 INPUTS NEEDED

Three areas of input were required to conduct the current research. First, teams of experts were needed to carry out the evaluations. It was imperative to choose experienced individuals for this task, individuals who had worked for sufficient numbers of years to have detailed inside knowledge of both the NATED 550 and NCS systems.

Second, the full array of NATED 550 and NCS documents needed for the curriculum analyses had to be supplied by Umalusi. In the case of the NATED 550 documents, the challenge was to locate the most widely used documents for the period running up to the end of 2007, where several versions of the Higher and Standard Grade curricula had been in circulation. In some instances, actually obtaining the documents was not straightforward as by the time of the research these documents were no longer in use. In the case of the NCS documents, the challenge was to obtain the most up-to-date versions of each of the component documents, of which there were at least three and sometimes more. The difficulty in this instance was to obtain the newest versions, as these are not necessarily on the Department of Education website and have been updated to the order of once or twice a annually over the last four years.

All SC exam papers and memoranda for each subject for the period 2005–2007, and the August 2008 exemplar and final NSC papers were also supplied by Umalusi.

The third input comprised research instruments for the curriculum and exam analyses; in the case of the present research, these instruments were adapted in minor ways to become the reporting tools. Training workshops were required to familiarise evaluators with these instruments.

Each of these inputs is discussed in a little more detail below.

### **Expert evaluators**

Expertise: teams of four evaluators for each school subject were chosen for (1) their knowledge and experience of the subject area and the education system; (2) their ability and willingness to engage with Umalusi's theoretical tools; (3) their commitment to the tasks required, which required ongoing rigorous engagement throughout the duration of the project, under pressure occasioned by the tight timelines. Further, attempts were made to ensure that at least one member of each team was a person able to think 'out of the box'. Each Umalusi team comprised:

- 👤 an Umalusi moderator – one who had been an Umalusi moderator for at least five years. This person was to be present at the relevant 2008 standardisation meetings;
- 👤 a subject methodology expert from a university school of education – a person with at least three years of experience in that position;
- 👤 a subject advisor – an individual with at least five years of experience in that position;
- 👤 a teacher – a individual considered by subject advisors to be an excellent teacher, with at least 10 years' teaching experience *and* a year or two of exam marking experience. This teacher also needed to have taught at a school or schools in lower middle-class or working class contexts for at least two of the 10 years

### **Documentation used**

Documentation supplied by Umalusi for the curriculum analysis included, for the old and new South African curricula:

- 👤 NATED 550 syllabus documents for Higher and Standard Grade (HG and SG) versions of the curriculum. Those previously used by House of Representatives schools were utilised since these documents were the most easily available ones and thought to be potentially the most comprehensive;
- 👤 Examination-setting guidelines for NATED 550 HG and SG, where in existence.
- 👤 *National Curriculum Statement* for Grades 10–12, January 2008

- 📖 *Subject Assessment Guidelines for Grades 10–12, January 2008*
- 📖 *Learning Programme Guideline for Grades 10–12, January 2008*
- 📖 *Instructions to examiners for the setting of the 2008 exams*

It was expected that each subject team would utilise about eight documents in their curriculum analyses. As it happened, it emerged that differing additional documents had been developed for many of the subjects during the time in which these main documents were in use (between 1996 and 2008, inclusive). The respective teams were able to identify and include these documents. So in reality each team worked with about 10–12 documents; these documents are referenced in detail in the booklet for Part 2 of this report.

Documentation for the exam paper analyses constituted the following:

- 📖 For the NATED 550 system, 2005–2007 examination papers, plus marking memoranda. All papers were included. For most subjects this number of papers included Papers 1 and 2 for Higher and Standard Grade levels respectively. For subjects such as English First Additional Language (English FAL), there were three papers for each exam, Papers 1, 2, and 3. For all subjects barring English FAL, all of the papers were nationally set, and locating the papers was relatively straightforward. In the case of English FAL, Papers 1 and 3 were national, while Paper 2 was provincial. Since this fact had the potential to increase the task of the English FAL team five-fold, it was decided to include provincially set versions of Paper 2 from only two provinces – those of the Western Cape and KwaZulu-Natal. The number of papers analysed by the English FAL team was still higher than that of the other teams.
- 📖 For the exemplars for the new system, Department of Education NSC exemplar examination papers dated August 2008, with associated marking memoranda. Additional exemplars issued by the Department of Education between September and October 2008 were *not* included in the analysis, as they had not been factored into the original timelines for the project. For most subjects this meant two papers to analyse. For subjects with three papers, Mathematics Paper 3 was not included, as it is only written by a small number of learners; for English FAL, national Papers 1 and 3 were analysed, and provincial Papers 2 from the Western Cape and KwaZulu-Natal.
- 📖 For the final 2008 exam paper analysis, 2008 NSC exam papers and memoranda issued by the Department of Education were considered.

Between 11 and 28 exam papers were analysed in total per Umalusi subject team. Importantly, each paper together with its memorandum was analysed by at least three team members. Details of the specific papers analysed feature in the booklet for **Part 3** of this report.

### **The evaluation instruments and reporting formats**

The Umalusi curriculum and exam evaluation instruments are described in **Subsection 4.3** below. The full instruments are included in **Appendix 2** below. At the training workshop at which the project commenced, it was explained that for reporting evaluators were to use the headings in the evaluation instruments, delete the instructions for evaluation, and use the headings for their reporting, as far as possible. Tables and paragraphs of running text compiled in response to the evaluation tasks were to be included under the specified headings.

All 24 Umalusi evaluators submitted individual curriculum and exam reports. Once these reports had been finalised, the six Umalusi team leaders for the six subjects put together composite reports for their subjects. The composite reports again utilised the headings in the evaluation instruments and were only submitted to Umalusi once all team members had commented on them: these reports feature in the booklets for **Parts 2 and 3** of this report.

## **4.2 OUTPUTS EXPECTED**

With the submitting of the individual curriculum and exam reports by the 24 evaluators, it was expected that each of these reports conformed to Umalusi expectations. In other words, each

evaluator was expected to have included evidence for *all* of the many judgment tasks required and arguments supporting their conclusions based on the evidence of their own judgments, in the reports. The process whereby versions of reports were refined until they included all of this information was followed to this end.

The fact that each evaluator was required to work individually is seen by Umalusi as increasing the credibility of the research. The composite reports constitute the *combined* results of the judgments and reasoning of four very experienced individuals in each instance. Further, if the four experts could independently come up with similar judgments, the Umalusi research instruments would be shown to be *reliable*. It was the intention that team leaders take into account the judgments of all of their team members when compiling their composite reports and take these composite reports back to their team members for comment before submitting drafts to Umalusi.

Mention should be made of the potential validity and reliability of the curriculum and exam results respectively. It is expected that the composite curriculum reports, capturing as they do, the combined views of all team members, and being predominantly discursive in form, are valid and reliable. Regarding reliability, where team members' judgments overlap, the views can be presented in straightforward ways. Where these judgments are complementary, narrow views can be expanded. Where judgments are contradictory, opposing views can be articulated and the merits of each argued. Team leaders were in fact encouraged by Umalusi to capture any differences that emerged. The fact that there are four experienced voices commenting fully and critically in each instance guarantees a certain degree of validity.

The results of the exam analyses in contrast, while being valid in that again four experienced individuals were judging specific exam question items according to particular and well-tested criteria were potentially less reliable. And in this instance, given that the results were to inform standardisation, the reliability of the results was of paramount importance. Since each exam paper item had to be categorised into one of nine possible categories, *if* evaluators did not have a common understanding of the categories, the possibility for potential lessening of reliability was increased. Umalusi took steps to facilitate this joint understanding of categories of evaluation by giving teams time to work together in the initial briefing workshop. How each subject team further increased the reliability of their exam analysis results is described in the individual subject reports in the booklet for **Part 3** of this report.

Over and above the individual and composite subject reports expected of Umalusi team members and leaders respectively, additional outputs were required of the team leaders. Each leader was asked to summarise the findings of the study, and present these to the Umalusi Statistics and Assessment Committee during the 2008 standardisation of matriculation results. The Umalusi instruments making these results possible are described in the next subsection.

## 4.3 RESEARCH INSTRUMENTS

The full Umalusi curriculum and exam paper evaluation instruments are included in Appendix 2 below. This section describes all the parts of these instruments and what the evaluators were required to do within them. The headings from the instruments, which are also those under which the evaluators were required to report, are preserved and presented here.

It should be noted that aspects of the curriculum included in previous Umalusi curriculum evaluations do feature here, but they are teased out so that reporting on each is required to be separate, in particular forms, and of a specified length. This approach has been adopted in an attempt to ensure that reporting is comprehensive, systematic, and comparable across subject groups.

### **Curriculum evaluation instrument**

The curriculum evaluation instrument is divided into subsections as elaborated here.



### 4.3 (1) Content specification and coverage

In this section, evaluators were asked to make separate judgments on content specification, content weighting, and content focus. Each of these aspects is elaborated briefly.

#### 4.3 (1.1) Content specification

In earlier Umalusi research, evaluators were given a couple of running-text paragraphs requiring them to comment on key content areas and content weighting in the curricula under study. Their comment was to include consideration of the appropriateness of the content range, depth, specification, and guidance for teachers with respect to achieving the desired coverage and depth (see Umalusi, 2007, Pages 62-63, for example). Responses to these requirements varied widely in length as well as in emphasis.

In the current research, subject teams were required to draw up lists of content topics as teams, and then individual team members were asked to make their content-related judgments individually, but in relation to these common lists. They had to tabulate the lists of content topics and then tick off whichever topics featured in each of the three curricula, and whether or not they were examinable. Evaluators also had to make and record judgments as to the precise levels of difficulty of each topic, as *difficult*, *moderate*, or *easy*, based on the degree to which the content was abstract, theoretical, and based on discipline-specific knowledge that could not easily be learned outside a school context.

In this way, the Umalusi evaluators generated visible data in the three curricula in relation to the pre-agreed list of content for the subject; they could make arguments as to the amount of content included and examinable in the respective curricula and regarding percentages of content at the respective difficulty levels. The Umalusi evaluators were required to submit both the tables showing their judgments and written paragraphs (for which there were specified maximum lengths), arguing certain points of view based on the evidence of their accumulated judgments. It was expected that this information would be useful later on for commenting on the overall levels of difficulty of the respective curricula.

#### 4.3 (1.2) Content weighting

In order to describe content weighting, evaluators were to ascertain, as far as possible, the amount of time specified in the respective curriculum documents to be spent on different content areas. This information was to be added to the content table. Taken together with the information on the specific difficulty levels of the content topics, it could also be factored into the judgment regarding the overall relative difficulty of the respective curricula.

#### 4.3 (1.3) Content focus

The Umalusi evaluators were asked to comment on the overall content focus in the respective curricula. They were to make this judgment on the basis of their own categorisations of individual content topics as *discipline-specific*, *generic*, or *everyday*. Content topics were to be categorised as *discipline-specific* when they were specifically applicable to the further study of the subject in question. They were to be described as *generic* when they were relevant for school subjects other than the subject being evaluated. They would be classed as *everyday* when they were clearly directly relevant for everyday life outside school.

This task was not aimed at contributing towards judging the relative difficulty levels of the curricula. It was designed to shed light on the *classification* of knowledge in the subject concerned. The intention was to assess the extent to which the knowledge was specialised, and the degree to which it was linked to everyday knowledge. This was part of the general curriculum evaluation, from which it was intended that recommendations would be made to the Department of Education.

### 4.3 (1.4) Skills specification

As for *content* specification, the Umalusi subject teams were required to draw up lists of *skills* for their subjects, as teams. Individual team members were again asked to make their skills-related judgments individually, but in relation to these common lists. As for content topics, they had to tabulate the lists of skills, record whichever topics featured in each of the three curricula, state whether or not they were examinable, and specify their difficulty levels (as *difficult*, *moderate*, or *easy*).

The tables were to be added to the data to be used in arguments around the overall levels of difficulty of the respective curricula, later on. For some subjects, it was possible to distinguish between content and skills, and for others it was not. Where content and skills were indistinguishable, as in Mathematics and Mathematical Literacy, 'content and skill' topics were treated as single items. The original intention was to analyse content and skills separately: it was only in the carrying out of the analysis that it became clear that for some subjects the boundaries between the two were not at all easy to define.

### 4.3 (1.5) Skills weighting

As for *content weighting*, evaluators were asked to describe the weighting of different *skills* in the three curricula, in terms of the amounts of time specified to be spent on each. This information was to be added to the skills table, and taken together with that on the specific difficulty levels of the content and skills topics, it could be factored judging the overall relative difficulty of the respective curricula. Again, if content and skills were not easily distinguishable, both were dealt with as single items.

### 4.3 (1.6) Skills focus

As for *content topics*, so were evaluators asked to comment on the *skills focus* in the respective curricula. They were to make these judgments on the basis of their own categorisations of individual *skills* as *discipline-specific*, *generic*, or *everyday*. As for the content topics, skills would be categorised as *discipline-specific* when they were specifically applicable to the further study of the subject in question. They would be described as *generic* when they were relevant for school subjects other than the subject being evaluated. They would be classed as *everyday* when they were directly relevant for life outside school.

It was the intention that responses to this task would shed light on the *classification of skills* in the subjects concerned. The intention was to assess the extent to which *skills* were specialised, and the degree to which they were linked to everyday knowledge.

### 4.3 (1.7) Text specification

This task was to be done by the language team only. Language evaluators were required to record, in separate tables provided, the numbers and types of texts recommended and compulsory in the respective curricula. The assumption was that the range of text types and the actual texts selected would remain more or less on the same level of conceptual complexity across the various curricula. Evaluators were asked to point out if this assumption was incorrect. It was the intention that all of this information be used to assess the volume and level of work to be covered in the curricula being evaluated, with the ultimate aim of factoring the findings into the judgment of the overall difficulty levels of the curricula.

## 4.3 (2) Organising principle and coherence

While earlier Umalusi curriculum evaluations stipulated that curriculum-organising principles had to be clear, and to mirror the organisation of the disciplines from which subjects had been recontextualised (see, for example, Umalusi, 2007), the current study asked evaluators to ascertain whether there were organising principles underlying the curricula for their subjects. They were to describe these principles, furnish examples as evidence of their existence, rate the clarity with

which they were elaborated, and rate the extent of their coherence as principles. The assumption underlying the current organising principle-related task was that differing organising principles could lead to coherence in a variety of ways. The closeness of the fit between school subjects and academic disciplines is hotly contested in science education, with some researchers, such as Aikenhead (2006), arguing in favour of school science curricula structured around humanistic policies that prioritise science relevant to learners' everyday lives. Aikenhead claims that traditional science curricula embedded in discipline-based content fails to produce scientifically literate learners, and fails to attract marginalised learners into science. The contrasting point of view is exemplified by Donnelly (2006), who argues that ignoring the disciplinary structure of science and ways of building knowledge in science denies learners access to higher level cognitive processes. Muller (2007) points out that the disciplines of Physics and Biology have a strong vertical structure in that they "develop through integration, towards ever more integrative or general propositions, eventually converging in a single general principle" (ibid., Page 70). Subjects with strong vertical structures have the capacity to develop learners' cognitive processes, if the school subject versions retain the organisation of the disciplines.

The analysis conducted in this study sought evidence of the organising principles in each subject, since these principles potentially gave an indication of the relative importance of disciplinary and everyday knowledge. The prediction was that all the school subjects except Mathematical Literacy would mirror their parent disciplines to a greater or lesser extent. Mathematical Literacy, while being partly related to tertiary-level subjects, was explicitly intended to be relevant to life outside study. Mathematical Literacy was expected to be different in *kind* and in *purpose* to traditional subjects such as Mathematics (see, for example, Department of Education, 2005, Page 9).

The assumption remains that organising principles should be as clear as possible (*as strongly framed as possible*) and the selection of content and skills should be allied to the organising principles. This task was part of assessing the *framing* of the curricula, and like the task related to content and skills focus, was not expected to factor into assessing the relative difficulty levels of the curricula. It and the following two tasks – 'sequencing and progression', on one hand, and 'aims, purpose, vision, general outcomes, and articulation', on the other, required both numerical and written judgment and argumentation of the Umalusi evaluators. Rating scales, based on Umalusi's view that organising principles, sequencing, and aims should be clearly specified, were provided in the instrument. Evaluators were asked to rate the curricula in terms of these scales, and then provide evidence for and argue their views.

### 4.3 (3) Sequence, progression and pacing

As in earlier Umalusi research (Umalusi, 2007), evaluators were asked to find evidence of progression should be evident in the content and skills covered within a curriculum in any given year, and from one school year to the next. It was thought that progression should comprise development within content and skill areas as well as increasing levels of cognitive complexity. Further, evaluators were asked to find evidence of time allocations for differing parts of the curriculum. Clear statements of progression would indicate *strong framing*, while lack of clarity about progression would indicate *weak framing*.

These assumptions underlay and formed the basis of rating scales in the evaluation instrument. The Umalusi evaluators were specifically asked to provide, in table form, ratings for the degree of progression within and between each of the years in the Further Education and Training (FET) phase (Grades 10, 11, and 12), and for the clarity with which guidance for this sequencing was elaborated. They were also asked to describe how content and skills showed progression within and between years in the FET phase, and to provide evidence for their ratings and points argued in their descriptions.

### 4.3 (4) Aims, purpose, vision, general outcomes and articulation

Again, as in earlier Umalusi research (Umalusi, 2007) and as with sequencing, analysts were asked to evaluate the clarity of aims, and their linkage with content, skills, sequencing, progression, pacing, and the social contexts within which the curriculum would be implemented. *Strong framing* would be indicated by clear aims and linkages, while *weak framing* would be indicated by unclear aims and linkages. Umalusi's view is that aims should be designed to work towards enabling achievement of the desired curriculum outcomes.

These ideas again informed the rating scales in the instrument. Evaluators were asked to rate the curricula in terms of the clarity with which aims were specified and in terms of the guidance provided with respect to how the aims should be achieved. In addition, they were required to describe the actual aims, types of guidance given for achieving these aims, how contexts within which the curricula were to be implemented were taken into account, and how articulation with other parts of the system was facilitated in the documents. As for the other tasks, they were required to provide evidence for all of their ratings and the views argued in their descriptions.

### 4.3 (5) Teaching approach and subject methodology

For this task, evaluators were asked to assess *general* and *subject-specific* pedagogy and methodologies outlined and advocated in the respective curriculum documents. In the evaluation instrument, *general* and *subject-specific* approaches are dealt with separately, but the same questions are asked about each. When carrying out the evaluation, some subject teams found that assessing the *general* pedagogic approaches in their curricula covered the pedagogy for their subjects. For other teams, *subject-specific* approaches were very specialised although nested within general outcomes-based approaches.

For both *general* and *subject-specific* pedagogic approaches, evaluators were asked to respond to sets of questions: some teams gave single sets of responses, while others provided separate responses for the two approach levels.

Umalusi continues to hold the view that pedagogic methods should be stated in explicit ways, i.e., they should be *strongly framed*. Evaluators were asked to compare and rate the three curricula for the degree to which each expresses *the teaching approach or pedagogy* that informs and can be used to enact the curriculum as a whole. Rating scales were provided. Evaluators rated the amount of guidance regarding pedagogic approaches and how these were to be implemented. They also rated the degree of alignment of the approaches with curriculum aims. They described the actual approaches and their suitability for the contexts within which they would be implemented; the types and levels of content and skill in the curricula; and the interests and capacities of learners for whom the curricula were intended. As for the other tasks, they were required to provide evidence for all ratings and descriptions.

### 4.3 (6) Assessment guidance

Earlier Umalusi curriculum evaluations (see, for example, Umalusi, 2007), together with many studies investigating the links between pedagogy and achievement (see, for instance, Bolton, 2005; Morais et al., 1992 and 1995; Morais and Miranda, 1996; Reeves, 2005, and others) emphasise the importance of clarity with respect to evaluation criteria.

Evaluators in the current research were asked to judge the quality of guidance for internal and external assessment in their curricula. They rated this guidance in terms of its comprehensiveness and explicitness. They also described numbers and types of tasks, weightings for tasks, evaluation criteria and how these were clarified, and guidance regarding internal and external assessment in general. As for the other tasks, they were required to provide evidence for all of their ratings and the views put forward in their descriptions.

### 4.3 (7) Availability and user-friendliness of the curricula

The Umalusi evaluators were asked to comment on the availability and user-friendliness of their respective curricula for teachers, subject advisors, the Departments of Education, examiners, moderators, materials developers, and methodology departments in schools of education, and to provide evidence for their views.

### 4.3 (8) Concluding tasks

The concluding tasks were the research questions (see **Subsection 3** above), responses to which could only be given once all of the other curriculum evaluation tasks had been completed. Evaluators were expected to draw on all of their other judgments made, in order to answer these key questions.

### Exam paper analysis instrument

A separate instrument was designed for the evaluation of exam papers.

### 4.3 (9) Exam paper analysis reporting formats

When analysing the 2005–2007 NATED 550 Higher and Standard Grade papers and their NSC exemplar and final examination paper counterparts, evaluators were asked to use **Table 1**, below, to report on the following per question (or per subsection of the question, whichever was the smaller of the units):

- 👉 The exam paper codes, question or item numbers, maximum marks, and the types and levels of cognitive difficulty of the items in Columns 1, 2, 3 and 4 respectively. This information was to be used to assess the relative levels of difficulty of the papers;
- 👉 The content and skill topic areas (as listed for the first task in the curriculum evaluation) and suitability of the items for use in future exam papers. This information, together with that used to describe the difficulty levels of the items, was necessary for future use of the items for item banking and psychometric (IRT-type) analysis.

**Table 1: Table for recording analysis of matric examination papers**

E.g. BIOHGP1							
Item	Max	Type of cognitive demand	Level of Difficulty	Content/skill/ topic	Comment	NCS assessment standard	NCS PAPER
e.g. 1.1.1	2						
e.g. 1.1.2	2						
(add rows needed)							

*(Umalusi exam paper evaluation instrument, 2008)*

### 4.3 (10) Judgment tool for exam analyses

Evaluators were given an Umalusi Tool (see **Table 2**, on the following page) to judge the difficulty levels of questions or items.

**Table 2: Umalusi exam paper analysis instrument showing type and levels of cognitive demand**

Type of Cognitive Demand	Level of Difficulty
<b>Basic conceptual, knowledge</b> - recall, - literal comprehension, - making simple evaluative judgements in terms of previously acquired facts - etc.	Easy
	Moderate
	Difficult
<b>Comprehension, Application</b> - understanding, application, analysis of previously acquired information in a familiar context, - making evaluative judgments that require the use of a range of previously acquired facts/ information - etc.	Easy
	Moderate
	Difficult
<b>Problem-solving</b> - analysis, interpretation and application of information in a new or unfamiliar context, - synthesis, creation of a novel solution or product, - evaluation or making judgment in relation to a mixture of old and new material or information	Easy
	Moderate
	Difficult

### 4.3 (11) Procedure for exam paper analysis

Once they had completed **Table 1** for each exam paper analysed, evaluators had to address the concluding tasks relating to the exam paper analyses. As for the curriculum evaluation, these tasks were the exam paper-related research questions (see **Subsection 3** above). Responses to these key questions could only be given once a table had been completed for each exam paper analysed. Evaluators were expected to draw directly on information in the tables when answering the questions.

## 4.4 CHALLENGES IN THE RESEARCH PROCESSES, AND HOW THESE DIFFICULTIES HAVE BEEN OVERCOME

Use of the Umalusi evaluation tools, generally speaking, went smoothly. Almost all of the Umalusi evaluators found that the instruments enhanced their understanding and ability to critique the curricula. The success of the tools is in fact one of the contributions of the current project to understanding the curriculum in the sector (see **Subsection 8** below) So while there were a number of challenges in the processes of applying the instruments, these issues did not deflect the use of the tools in any way. It is still worth noting the challenges and how they were addressed before going on to presenting the results of the evaluations carried out using the instruments.

Challenges have been grouped into seven categories. First, in some of the NATED 550 curricula (such as those for English FAL and Physical Science), content and skills topics were insufficiently elaborated to easily make the lists of topics required for the first group of curriculum evaluation tasks. The subject-specific experience and disciplinary training of the Umalusi evaluators, in this instance and in all situations where this was potentially the case, were the only resources that could be used to make up for such a shortfall.

Second, evaluators found it difficult at times to work with the categorisations provided by Umalusi. Several subject groups were not sure about how to define an *organising principle*. Several groups found distinguishing between *disciplinary-specific*, *generic* and *everyday* difficult, as it often

appeared that content and skills topics could span all three categories. The Mathematics and Mathematical Literacy groups commented that it was not easy to categorise content and skills as *difficult, moderate, or easy*, as each topic could be taught at two or all of the levels, depending on the levels of understanding of teachers and learners. The Physical and Life Sciences groups pointed out that while skills could involve *application in new contexts*, once learners were familiar with those contexts, application of knowledge and skill would then be *in familiar contexts* (and therefore slightly easier). In each instance, definitions and categorisations were thrashed out in the subject groups, with or without assistance from Umalusi. The ways in which the different groups handled these difficulties can be seen in the results sections that follow.

Third, evaluators felt that some aspects were simply not addressed in the Umalusi instruments. The Life and Physical Sciences and English teams noted that the sheer number of documents, 'the extent and complexity' of the documents, was not considered. The Life Sciences team wrote about what other teams mentioned verbally, that is, the contradictory information within single curricula.

In other instances, evaluators expressed the need for more elaboration than the current instruments allowed. Examples of this problem include lack of space to give details on the differences between content breadth and depth, and misrepresentation of the parent discipline in the respective curricula (see the Life Sciences report), as well as comment on the length of the curricula (see the Life and Physical Sciences reports). Other examples include lack of opportunity to express differences between individual evaluators (see the Geography report). While the space for some of these concerns had been deliberately limited in light of Umalusi's urgent need for a pronouncement on the relative levels of difficulty of the curricula for each subject, Umalusi also encouraged evaluators to include all important concerns.

Fifth, evaluators were not specifically asked to assess the language levels in the curricula – they were asked to do so for all exam papers, but not for the curriculum analysis. Several subject groups pointed out that the language was indeed too complex in some of the documents evaluated: this awareness has now been captured in the current research.

Although the Umalusi instrument deliberately links the curriculum to contextual features (see, for example, the tasks relating to curriculum aims, sequencing, pacing, evaluation criteria and pedagogy), five of the Umalusi subject teams noted a sixth challenge, that there could have been more emphasis on contextual features. The Geography team felt, for instance, that the impact of textbooks and textbook-related issues could have been included in a more explicit way. The Mathematical Literacy, Physical Science, English and Geography teams all felt that aspects such as curriculum resources and support structures could have been mentioned specifically in the instrument. The general feeling was the instrument on its own may tend slightly towards upholding a curriculum more easily implemented in advantaged than disadvantaged contexts. Evaluators were again encouraged to include all of these aspects in their reports: how these issues play out in the different subject areas can be seen in the subject reports in the booklets for **Parts 2 and 3** of this report.

The seventh category of challenges was a fundamental one. The Mathematics team had difficulty quantifying (assigning numerical values to) their qualitative judgments. They were asked to try to – and managed to – use numbers in this way. The Physical Science and English FAL teams had difficulty establishing reliable results when operationalising the exam paper analysis instrument in its general form: both teams customised this tool for their subjects; these versions appear in the subject reports below. The Life Sciences team did not want to make 'gut-feel' judgment calls with respect to the language levels in the exam papers, so they introduced a carefully theorised technique for describing these levels precisely and in a very reliable way.

The reliability of the judgments made for the exam paper items was a matter of concern from the start, because this reliability was exactly what was needed to make the results of the evaluation valid. Where teams spent time clarifying the exam evaluation tool *before* they began their individual analyses inter-rater differences were minimal. For all of the teams at least a proportion

of judgments were similar. In some cases, where some of the judgments differed considerably, evaluators discussed those differences and came to agreements after they had completed their individual analyses as to where the difficulty levels of the problematic items should be pitched. In one case, once the whole exam evaluation was complete, the team decided that their ratings were too varied. They went back to the instrument and, as a group, clarified all the categories, adding examples for each category of item. Team members then re-analysed all their papers individually, and the resulting judgments were more similar than they had originally been. The results can be seen in the English FAL report.

The sample of subjects included in the study, and the reasons for their inclusion are described in **Subsection 5**; thereafter, overall trends in the results of the evaluations, using the instruments just described, are presented in **Subsections 6 and 7**, which follow. The reader is reminded that the full detailed reports for each subject are presented in the booklets for **Parts 2 and 3** for this report.

## 5. SCHOOL SUBJECTS CHOSEN FOR ANALYSIS

Since the main immediate aim of this project was to provide Umalusi's Statistics and Assessment Committee with information on the comparability of the old and new curricula and on the comparative difficulty of their associated exams, it would have been ideal to include as many subjects as possible in the study, or at least one of each *type* of subject (one Science, one Social Science, etc). Given budget and time constraints, however, it was feasible to include only six subjects.

The Umalusi Statistics and Assessment Committee requested that the selection of subjects be on the basis of their 'gateway' status (their importance for university entrance) and high enrolment numbers. Since English Home Language; Afrikaans Home Language; English First Additional Language; Afrikaans First Additional Language; Mathematics; Mathematical Literacy; Biology/Life Sciences; Physical Science; Geography, History; Accounting; Economics; Business Economics; and Agricultural Sciences could be categorised as gateway subjects, the enrolment figures for these were considered (see Department of Education, 2007) and found to be as follows:

1. English Second Language 490 909
2. Biology 370 622
3. Mathematics 347 570
4. Geography 255 716
5. Business Economics 244 818
6. Afrikaans Second Language 236 371
7. Physical Science 214 510
8. Economics 181 744
9. Accounting 181 389
10. Agricultural Sciences 161 633
11. History 116 308
12. English First Language 87 914
13. Afrikaans First Language 53 825

It was decided to include the four subjects in this group with the highest enrolment numbers, namely, English Second Language (currently referred to as English First Additional Language, or English FAL), Biology (currently Life Sciences), Mathematics, and Geography. Physical Science was included because of its national importance as a subject. Mathematical Literacy was included as it was an unknown quantity and, although it had not yet been examined, as it would have enrolment numbers; that this would therefore affect the results of many learners was known.

While the full results of the evaluations of the curricula for these subjects can be seen in the booklet for **Part 2** of this report, trends in these results are discussed in detail here.



## 6. TRENDS ACROSS NSC CURRICULA

While the individual subject reports are unique – both in the subtle details of their findings and in how they combine their different data sets – in differentiating aspects of their evidence in order to pronounce judgments on the respective levels of difficulty of the curricula and on the adequacy and fairness of the Umalusi evaluation instrument, some overarching trends emerge if the reports are considered as a cluster. These trends are discussed briefly in this section.

### *Regarding curriculum content and skills*

It must be said that each of the Umalusi teams engaged with content and skills in the curricula for their subjects in depth, and in original ways, and reported extremely insightfully on their findings, as a result. While each team worked rigorously and systematically, resulting in the highly comparable subject reports making up the booklet for **Part 2** of this report, each crafted a unique, three-dimensional, and internally coherent view. When considering commonalities and variances in the comments on content and skills, six aspects emerge.

First, while some subject teams, such as those for Physical Sciences, Life Sciences, and English FAL, were able to report separately on content and skills, other teams found distinguishing between these aspects difficult, if not impossible. The Geography team expressed difficulty in some instances but ultimately distinguish between content and skills in their report. The Mathematics and Mathematical Literacy teams did not distinguish between the two. These differences between the teams speak to the structuring of knowledge in their subjects, and do not affect the substance of this report. It is worth noting for future research, however, that sometimes separating the two aspects yields fine-grained results, while on other occasions similar results may be obtained when the distinction between content and skills is blurred.

Second, the teams compared content and skills (or content skills) across the NATED 550 and NCS curricula for their subjects. While they were asked to consider the relative specification, weighting, and focus of content and skills, many teams also assessed the relative *amounts* of what will here be termed content and skill topics (distinguishable content and skill areas), the *nature* of these content topics and skills, and the *levels of difficulty* of these items. Three teams – those for Mathematics, Geography, and English FAL – reported respectively that while there are some significant changes (in the Mathematics curriculum), some small content additions and new skills (in the Geography curriculum) and far more comprehensive specification of content and skills (in the English FAL curriculum), the NCS documents for these subjects cover largely similar content and skills to their NATED 550 counterparts.

The Physical Science team reported significant increases in the *amounts* of content and skills covered. The evaluation team estimated that 35% and 31% more classroom time is needed to cover all the required content topics than that needed for the topics comprising the NATED 550 Standard and Higher Grade courses respectively.

A third common trend relates to the degree to which the content and skill topics are seen by the teams to be more highly explicated in the NCS than in the NATED 550 curricula for their subjects. Four Umalusi teams – those for Physical Science, Life Sciences, Mathematical Literacy, and English FAL – commented on the fact that their NCS curricula made content and/ or skill topics to be covered extremely clear. The Life Sciences team noted that this comment applies more to content than skill topics, a comment illustrating the advantages for future curriculum revision of distinguishing between content and skills. The other teams noted this degree of clarity in relation to both content and skills in their curricula.

The English FAL team pointed out, not only that the comprehensiveness of descriptions of content and skills to be covered in their NCS curriculum made it *appear* broader when it in fact covered roughly the same work as that comprising the NATED 550 Higher and Standard Grade curricula, but that it increased the likelihood of desired implementation. In other words, an effect of the detailed descriptions of content and skills to be covered may present teachers with subject-

specific knowledge and processes that they may be missing, and so assist them with the associated classroom delivery.

A fourth commonality was the extent to which the NATED 550 curricula were reported to have more 'pure' *disciplinary* foci than their NCS equivalents. The Physical Science, Life Sciences, and Mathematics teams noted that their NATED 550 curricula – especially the Higher Grade versions – began to induct learners into the disciplines of Physics and Chemistry, Biology, and pure Mathematics, respectively. The Standard Grade versions of these curricula began to induct learners in similar *directions* but not to similar *extents*, as knowledge in the Standard Grade curricula was more basic. The NCS curricula for these subjects in contrast, are more wide-ranging. In the Physical Science NCS curriculum, there is an emphasis on identifying links across disciplines and in the broader South African context (see **Subsection (1.3)** of the Physical Sciences chapter in the curriculum booklet (**Part 2** of the report)). The NCS for Life Sciences is closer to science-for-everyday-living contexts than to the *disciplinary* route, including healthy living, environmental, and current medical topics (see **Subsection (2)** of the Life Sciences (Biology) chapter in the curriculum booklet). The Mathematics team commented on the broad shift from a pure Mathematics focus in the NATED 550 curricula towards that of the 'region of Mathematical Sciences' in the NCS by including broader topics such as those relating to Statistics and Finance (see **Subsection (3.2)** of the Mathematics chapter in the booklet). The subject Mathematical Literacy takes this 'applied' focus to the extreme: by definition, this subject emphasises the use of relatively basic Mathematical principles in other disciplines and everyday life. For this subject, it was the *contexts of application* that showed marked increases in cognitive complexity (see **Subsection 3** of the Mathematical Literacy chapter in the curriculum booklet).

Interestingly, the two Umalusi subject teams – those for Geography and English FAL – who reported that the content and skills foci in their respective NATED 550 and NCS curricula are relatively similar could be seen to have already included both *disciplinary* and 'applied' aspects in the NATED 550 versions of their curricula.

A fifth content-skills-related trend comprises the difficulties experienced by all of the subject teams when attempting to describe the weighting of content and skills in their curricula. It appears that the weighting of, and time to be spent on, particular content and skills topics was not fully clear in any of the curricula considered. The Mathematics team outlined rather neatly the advantages and disadvantages of using curriculum topic weightings, curriculum time specifications, and exam weightings respectively (see the introductory section of the Mathematics chapter in the curriculum booklet). To determine content and skill weighting, for example, the Mathematics team used examination weightings. The Physical Science team noted paucity of information in their NATED 550 documents and discrepancies in the NCS curriculum and, ultimately, using estimations of the numbers of 45-minute lessons, needed to cover topics. The Umalusi Life Sciences, Mathematical Literacy, Geography, and English FAL teams used combinations of class time, exam-weighting allocations, and combined personal experience to determine the weighing of content and skills for their subjects.

Lastly, all of the subject teams used one or more aspects of their content and skills analyses when judging the relative levels of cognitive complexity of their NATED 550 and NCS curricula.

### **Regarding curriculum aims and organising principles**

When considering the aims, visions, and outcomes of the curricula, on the one hand, and the underlying organising principles lending coherence to these sets of documents, on the other, the subject teams again commented in unique ways appropriate to their subjects. Some common threads can again be teased out of the responses. Overlapping comments made by the subject teams can be categorised into the nature of the aims or organising principles and the degree to which these items were made explicit in the documents. There are also similarities in the ways in which teams commented on the guidance given for these aims and organising principles.

All of the subject teams, barring that for Mathematical Literacy, which it emerged, did not have a direct NATED 550 precursor, described the underlying organising principles in their NATED 550 curricula as *disciplinary*: these NATED 550 subjects were organised along the lines of their parent disciplines. Taken on the Higher Grade, the subjects began inductions into their parent disciplines. Taken at Standard Grade level, the subjects were conceived along disciplinary lines, although concepts were addressed at far more basic levels than they were in the Higher Grade courses. School Physical Science thus began to induct learners into concepts needed for tertiary-level Physics and Chemistry. School Biology began induction into the discipline of Biology, although it failed to include the highest integrating principle, that of evolution by natural selection (see the Life Sciences chapter, curriculum booklet). School Mathematics and Geography began induction into the disciplines of pure Mathematics (algebra, geometry, trigonometry) and Geography (physical, human, and regional Geography) respectively.

The NCS curriculum's organising principles, in contrast, are all broader. There are six broad knowledge areas in NCS Physical Science; disciplinary Biology has become the 'humanistic' Life Sciences, with emphasis on its current human and environmental applications. Mathematics has moved from having a 'pure' to a 'regional' organising principle, where topics from Statistics and Finance and an emphasis on Mathematical modelling are integrated into the disciplinary topics. In Geography, *transmission* of disciplinary knowledge and skills is replaced by an emphasis on the *application* of Geographic knowledge and skills in real-life contexts. The Mathematical Literacy team identified the learning outcomes and assessment standards, defined in terms of Mathematical Literacy skills, as the fundamental principles underlying the subject. The English FAL team noted that the teaching and learning of language in the NCS curriculum was underpinned by social principles such as socio-political transformation; inclusivity and human rights; applied competence, articulation, and portability; environmental and social justice, and others.

While in some of the NATED 550 curricula (those for Biology; Mathematics, and English FAL), these organising principles are explicit, in other documents – such as those for Physical Science and Geography – they are implied only, and can be read in the structuring and sequencing of content and skills. In the NCS curriculum documents, in contrast, these underpinning principles are made relatively explicit for all subjects.

These *disciplinary* and broader 'applied' foci in the organising principles for the subjects are mirrored in the respective curriculum aims. The aims in the NATED 550 curricula appear to be fairly clear for all the subjects, and could be said to emphasise proficiency and knowledge in the subjects concerned. Aims in the NCS curricula – as specifically pointed out by the Physical Sciences, Geography, and English FAL teams in particular – are nested in the social principles of transformation, human rights and inclusivity, the applications of specialised knowledge in the world beyond the classroom, and others. Aims in these curricula are also, like their NATED 550 counterparts, clear.

Importantly, all six Umalusi subject teams reported that their NCS curricula provided more guidance for achieving these aims than did the NATED 550 documents. Three teams – those for Physical Science, Geography, and English FAL – noted, however, that even although this guidance is considerable in the NCS documentation, it is not sufficient to ensure achievement of the aims in all South African school contexts.

### **Regarding sequencing, progression, pacing, and articulation in the curricula**

With respect to sequencing, progression, and pacing, four subject teams (those for Physical Science, Life Sciences, Mathematical Literacy and English FAL) reported that these aspects of the curriculum are relatively implicit in the NATED 550 curricula, as they are embedded in the structuring of content and skills and the way in which these items are presented in the documents. For three of the Umalusi subject teams, sequence, progression, and pacing are made far more explicit in the NCS curricula, through their constituent learning outcomes and assessment standards.

This contrast between sequencing that is so implicit that it almost seemed absent in the NATED 550 documents, and explication of a steady increase in cognitive complexity over time in the NCS curricula was especially stark in the case of English FAL. In the NATED 550 curricula for this subject, there was neither distinction between the cognitive complexities required for the Higher and Standard Grade levels of the course, nor were differences between the three FET years apparent. The English FAL team showed how progression in the NCS curricula was spelled out at differing levels in the assessment standards for each of Grades 10, 11, and 12, using appropriate adjectives and verbs (see **Subsection (3)** in the curriculum booklet for **Part 2** of this report).

For Life Sciences, while sequencing in the NATED 550 Biology curricula occurs via content topics that mirror topics key in the discipline of Biology, the documents fail to achieve the highest integrating principle, namely, evolution by natural selection. While this principle is covered in the NCS Life Sciences curriculum, sub-topics taught and learned in Grades 10, 11, and 12 do not mirror the sequence usually followed in the discipline of Biology. Further, while there was clear progression in the NATED 550 Biology curricula, in terms of steadily increasing percentages of *difficult* topics and questions over the three FET years (Grades 10, 11, and 12), there is an increase in *moderate* topics and questions in assessment associated with the NCS curriculum, and decreases in the percentages of both easy and *difficult* topics and questions over the same years. In addition and contrary to logical expectation, there is progressively less content covered in NCS Life Sciences between Grades 10 and 12.

For the Mathematics and Geography teams, sequencing was similarly clear in the NATED 550 Higher and Standard Grade curricula as well as in the NCS documents. For the Mathematics evaluators, this sequencing was apparent by virtue of the content itself: it is necessary to cover certain Mathematical principles before progressing to others – prior knowledge and skills are necessary before it is possible to proceed to the subsequent knowledge and skill concerned. It could be said that this sequencing is created by virtue of the knowledge structure of Mathematics: the discipline is a vertical knowledge structure where concepts are progressively integrated into increasingly generalised principles (see Bernstein 1996). Mathematics has been regarded as comprising a number of separate vertical knowledge structures (see O'Hollaran in Christie and Martin (2007))

Four of the subject teams (all of the teams except that for Mathematics, for which sequencing was said to be clear anyway, and Life Sciences) reported that there was more *guidance* with respect to sequencing and progression in the NCS curricula than in the NATED 550 documents, and that this guidance was more explicit. This guidance was in all of the instances, however, still not sufficient. The Physical Sciences team reported that while the desired sequencing of content and skills was clear, the mechanics for achieving this progression are not. The Mathematical Literacy and English FAL teams noted that more explicit guidance and detailed suggestions are needed to assist teachers. The Geography team pointed out that the depth at which content and skill topics should be covered was not at all clear.

Lastly, articulation or, in other words, progression into, through, and beyond the FET phase (Grades 10, 11, and 12) was not made explicit in any of the NATED 550 curricula. In the NCS curricula it is addressed, sometimes clearly and in relative detail (such as in the Physical Sciences and English FAL curricula), and at other times merely as unelaborated statements of intent (as in the NCS Geography curriculum).

### **Regarding guidance in relation to teaching approaches and subject methodologies**

Some of the subject teams reported separately on *general* and *subject-specific* teaching and learning approaches and methodologies, while others reported generally – these patterns reflect distinctions made or blurred in the curricula themselves.

It appears that general pedagogic approaches, if at all advocated, are indicated only briefly in the NATED 550 curricula. There are brief suggestions in the Physical Science and Mathematics

curricula; the overarching pedagogic approach is implicit in the Biology curricula. There is no mention at all of pedagogic approach in the national Geography documents; suggestions are made in some of the provincial documents, but these were reported by the team to be neither clear nor aligned to the NATED 550 curriculum aims, and guidance for implementing them is scant.

All of the Umalusi subject teams, in contrast, mentioned *Outcomes-Based Education (OBE)* as the general approach advocated in the NCS curricula. The teams noted that this *outcomes-based* approach is aligned to curriculum aims, and that there is guidance in the documents for implementing it. The approach is integrated throughout the curricula through the learning outcomes and assessment standards comprising it. Several teams (see the Geography and Mathematics curriculum reports, for example) pointed out, however, that the guidance provided was not sufficient. Importantly, they all also pointed out the dangers of the approach in the South African context, given that it requires highly skilled and resourceful teachers of whom there is a scarcity in South Africa classrooms.

Most of the teams noted the lack of context-sensitivity in the NATED 550 documents: as the Life Sciences team pointed out, these curricula adopted a positivist approach, where context was not taken into account at all. The NCS curricula, in contrast, continually address contextual issues, emphasising the need for inclusivity, local environmental awareness, for valuing indigenous knowledge, and other contextual factors. To reiterate, implementing high-quality context-specific teaching requires a workforce of highly skilled teachers, something lacking for the majority of schools in South Africa.

The Umalusi Physical Science, Life Sciences, and Geography teams reported more detail with respect to subject-specific teaching approaches and methodologies in the NCS than in the NATED 550 curricula. At the same time, all of these teams noted partial but lack of sufficient guidance for implementing these approaches fully. The Mathematics team made the same point in relation to *both* Mathematics curricula: problem-solving methods are advocated in both, but there is little guidance as to the mechanics by means of which this technique can be followed.

Only the English FAL team detailed subject-specific approaches in both curricula: *Communicative Language Teaching* and *Language Across the Curriculum* approaches were encouraged in the NATED 550 curricula, and the *Text-based Approach* and *Communicative Language Teaching* are advocated in their NCS counterpart. Further, the team described the guidance for these methodologies in the NCS, as 'comprehensive': suggestions and strategies are combined with examples, useful competency descriptors, assessment rubrics, and other tools necessary for following guidelines in the classroom.

### **Regarding assessment guidance**

It appears that guidance for internal assessment is fairly clear for all three curricula for most subjects. Whether this guidance on the nature, number, and weighting of tasks was presented in the national or provincial documents for the NATED 550 curricula, and across several documents in those for the NCS, it was reported to be clear by the Umalusi Mathematics, Mathematical Literacy, Geography, and English FAL teams. The Geography team nevertheless pointed to shortcomings in relation to both sets of curricula: in the NATED 550 Geography documents there were examples of tasks learners needed to produce; in the NCS equivalents there are detailed descriptions of tasks required, but no suggestions as to what counts as quality, or evidence for differing levels of achievement. The English FAL team's findings are at the other end of the spectrum: for this subject the NCS documents include detailed recommendations, examples, and assessment tools – in short, comprehensive guidelines.

Two subject teams noted a lack of adequate guidance for internal assessment: for NATED 550 Biology there was clear guidance for Grade 12 assessment tasks, but scant information for those needed in Grades 10 and 11. The team reported that the NCS Life Sciences curriculum made up for this lack. NATED 550 internal assessment guidelines for Physical Science were in list form only; the

NCS equivalentents are extensive in relation to planning and outlining of tasks required, but do not include the rather essential descriptions of the tasks themselves.

Most Umalusi subject teams reported a decrease in the number of internal assessment tasks required: in many cases those stipulated in the NATED 550 documents were more than double the number of tasks required in the NCS curricula.

Regarding the requirements for external assessment, all of the subject teams reported that guidance was clear in both sets of curricula, most noting that information was briefer and in more list-like form in the NATED 550 than in the NCS documents, where descriptions are fuller. Despite this greater comprehensiveness, some shortcomings are reported in relation to guidance for external assessment in the NCS. The Physical Science team pointed to 'small pockets' in which more clarity is needed (see **Subsection (6)** of the Physical Sciences chapter in the curriculum report). The Umalusi Life Sciences team found that the NCS exam papers are likely to be a lot less predictable than their NATED 550 counterparts.

### **Regarding the user-friendliness and use of the curricula**

Regarding the use and user-friendliness of the curricula, one Umalusi team (Life Sciences) found the NATED 550 documents sufficient and straightforward, and preferable to the NCS curriculum. Two teams (those of Mathematics and Mathematical Literacy) found the NATED 550 documents too brief and cryptic, with many confusing provincial versions in use, noting that the NCS documents are clearer and contain much of the necessary detail.

Two teams pointed to strengths and weaknesses in both sets of curricula. The Geography team found that the NATED 550 documents for the subject provide the clearest guidance for external assessment, while the NCS curricula are clearer with respect to the competences, knowledge, and skills required of learners. This team found the contradictory information relating to assessment in the NCS documents, problematic. The Physical Sciences team found that the NATED 550 documents for the subject provide insufficient guidance, but that the associated textbooks made up for this lack. This team and that for English FAL found the fact that various documents had to be used together, and that different versions of the documents contain different aspects of the most up-to-date information was confusing.

According to the combined experience of the English FAL team, neither the NATED 550 nor the NCS curricula for this subject are as extensively used as they could be.

### **Regarding the relative levels of difficulty of the NATED 550 and NCS curricula**

In the process of making judgments on the relative levels of difficulty of the NATED 550 and NCS curricula, the subject teams drew on various aspects of their analyses. All the teams drew, for example, on their findings relating to the specification, weighting, and foci of content and skill topics. The Physical Sciences, Mathematics, and Geography teams found that information on amounts and levels of difficulty of content and skill topics yielded solid evidence of the respective overall levels of difficulty of the curricula. The Mathematical Literacy team focused on cognitive types and levels of skills in order to make their decisions. The English FAL team compared degrees of specification of content and progressive increases in complexity of skills in their comparisons.

The Life Sciences team drew on a wide range of aspects, including specifications for external assessment, when making their judgments. The Geography team included the nature of the organising principles, finding that the *transmission* of disciplinary knowledge and skills required in the NATED 550 curriculum was easier than the *application* of this knowledge and these skills in the NCS system.

In all, three teams (Physical Science, Life Sciences, and Mathematics) found their NCS curricula to be midway between the NATED 550 Higher and Standard Grade equivalentents, in 50:50 proportions. It must be noted that the Mathematics curriculum analysed does not include the content and skill

assessed in Mathematics Paper 3. The Geography team found the NCS Geography curriculum between the NATED 550 Higher and Standard Grade levels, but closer to that of the Higher Grade, in a 60:40 Higher: Standard Grade relation. The English FAL team found the NCS curriculum for their subject to be more difficult than both of the NATED 550 Higher and Standard Grade courses are.

### **Regarding the adequacy and fairness of the Umalusi curriculum evaluation instrument**

The Umalusi curriculum evaluation instrument, on the whole, was found to be extremely useful, leading to rigorous and systematic analyses and the desired clear, well-reasoned and evidence-based findings. Several evaluators claimed that it helped to deepen their understanding of, and ability to engage with and verbalise ideas around, the curriculum.

Evaluators experienced some challenges in relation to specific conceptual categorisations in the tool, such as the separation of content and skills; the quantification of qualitative judgments; and a clear understanding of categories such as *generic*, *life-related*, *application of skills in familiar contexts*, and *application of skills in new contexts*.

Further, some evaluators noted that certain aspects such as the contexts in which curricula are implemented; textbooks; use of language in the curriculum documents; and the numbers and versions of documents making up curricula were not addressed sufficiently by the tool.

These shortcomings are summarised here, but are dealt with in more detail in **Subsection 4.4** above.

### **Recommendations for future curriculum review**

Recommendations are made on the basis of the findings of each Umalusi subject team for future curriculum reviews. These recommendations are elaborated in **Subsection 8.2** below, and are summarised in the concluding comments (**Section 9** below).

The next section of this report presents the results of the exam paper analyses.

## **7. TRENDS ACROSS 2008 MATRIC EXAM PAPERS**

As for the curriculum reports, individual exam paper analysis reports vary. The teams also used the Umalusi analysis tool differently. One team (the Geography group) used the Umalusi instrument for evaluating the exam papers as it was given to the teams (and as it is presented in Section 4 above). Two teams (those for English FAL and Physical Science) customised and clarified this instrument by adding examples to each theoretical category. Having these examples served to increase the consistency of judgments relating to exam paper items across all team members: the examples kept individual members' judgments 'in line'. Another team (the Physical Science team) renamed theoretical categories in the tool, to match types of cognitive skill in the discipline. Both the Mathematics and Mathematical Literacy teams replaced the tool with the typologies of cognitive skills and levels in their respective *Subject Assessment Guidelines*, as these categorisations enabled finer-grained analysis than that afforded by the Umalusi instrument. All of these tools can be seen in the individual subject reports in the booklet for **Part 3** of this report.

While individual exam paper analysis reports are also presented in detail in the booklet for **Part 3** of this report, *trends* in the teams' responses to the exam paper questions are discussed here. That the difficulty levels of exam papers varies from year to year for any given subject and differs between papers for single subjects in single exams, and that *parts* of papers can be at desired levels while *other parts* of the same papers can be pitched at the wrong levels emerges clearly in these trends.

### **General comments on the difficulty levels of the 2008 final NSC papers**

The Umalusi subject teams commented accurately on the overall cognitive character and difficulty levels of the final 2008 *National Senior Certificate* exam papers in relation to their Higher and Standard Grade counterparts in the years 2005–2007, and August 2008 exemplars, based on total counts of items at specified cognitive type and difficulty levels.

Three teams (Physical Sciences, Life Sciences, and English FAL) gave differing fine-grained results for the respective final 2008 papers for their subjects, but on the *whole*, the results show that the papers are closer to the old NATED 550 *Higher Grade* than the *Standard Grade* papers for these subjects. A fourth team (Geography) found that their 2008 final papers contain *more comprehension and problem-solving* questions than the previous *Higher Grade* papers for this subject – these (2008) questions being of a cognitively demanding type, and in addition set at *difficult* levels.

The two remaining Umalusi teams found their papers, on the whole, too easy. Since Mathematical Literacy is a new subject and there were no previous papers to consider, the Mathematical Literacy team evaluated the 2008 final papers in relation to requirements in the *Subject Assessment Guidelines* for their subject. They found that while the spread of items in Paper 1 roughly matched that in the *Subject Assessment Guidelines*, the percentage of questions at the lower cognitive levels in Paper 2 was almost three times higher than that recommended. They noted, however, that the pass rate for the subject would not be as high as expected from the levels of these questions, as a high proportion of the instructions to learners were ambiguous and confusing (see the booklet for **Part 3** of this report for more detail).

The Mathematics team found the final 2008 papers closer to the old NATED 550 *Standard Grade* than the *Higher Grade* papers. Mathematics Paper 3 was not investigated in this research. However, the team note that some of the questions regarded as reasonably straightforward was on content that was new in the NSC and thus might not have been experienced as easy by learners whose teachers were unfamiliar with new content.

Regarding the relationship between the August 2008 exemplar and final papers, most teams found that the exemplars were similar to the final papers for their subjects, and noted that the exemplars would have given teachers and learners a fair idea of the types and levels of questions to expect in the final papers. The Umalusi Physical Science team noted, however, that one of the final papers (Paper 1: Physics) contains an unexpectedly high proportion of items at the highest difficulty level and too small a number of recall questions, making the paper a hard one for learners at both ends of the achievement spectrum. The Geography team found the Geography final papers considerably more difficult than the exemplars for the subject, with higher numbers of *difficult comprehension* and *problem-solving* items than featured in the exemplars: these exemplars could have lead teachers and learners into a false sense of security.

### **Regarding the comparability of A-grades in NATED 550 Higher Grade and 2008 NSC papers**

The Umalusi subject teams commented, again based on accurate counts of the types and difficulty levels of items in the exam papers, on whether the August 2008 exemplar and final papers allowed for learners who would have achieved A-grades in the old *Higher Grade* papers to achieve A-grades in the new NSC exams where the A-grades *are comparable to the old Higher Grade A's*.

Four Umalusi teams (English FAL; Geography; Life Sciences; and Physical Science) found that because the spread of types and levels of questions in the respective papers was similar, the A's in the 2008 NSC papers would be equivalent to the A's in the NATED 550 *Higher Grade* papers.

The Mathematics team found that learners typically achieving at the level of high C's, B's and A's in the NATED 550 Mathematics *Higher Grade* exams would be able to score A's in the final 2008 NSC Mathematics papers. It was expected that Mathematics Paper 3 would contain difficult questions, but these difficulty levels were not investigated in this analysis .

The Mathematical Literacy team, again not having previous *Higher* and *Standard Grade* papers, considered the value of potential A-grades achieved in relation to the proportions of items at stipulated difficulty levels in the *Subject Assessment Guidelines* for the subject. The team found that the final 2008 NSC papers would *not* discriminate between top-end achievers in the subject, as the papers included on average only 22% rather than the 40% of higher cognitive-level questions recommended in the *Subject Assessment Guidelines*.



## **Regarding whether the 2008 NSC papers allow for learners just passing at Standard Grade-type level, to pass**

For this item, the Umalusi teams commented on whether the August 2008 exemplar and final NSC papers allowed for average learners achieving at the level of 33.3% in the old Standard Grade papers to pass the new NSC exams.

Notwithstanding the overall difficulty levels of the papers, two teams (English FAL and Mathematics) found that percentages of the lower cognitive order *basic conceptual* items were similar to those in the old Standard Grade papers for the subjects and would therefore allow learners achieving at just-passing-Standard-Grade levels to pass. The Mathematical Literacy team noted that while there were more than enough easy items to enable these learners to pass, the ambiguity of many questions would lower the pass rate from that expected from the levels of the questions.

Three teams (Geography, Life Sciences, and Physical Sciences) found the proportions of *easy* items in the 2008 NSC final papers to be *lower* than those in the average Standard Grade papers for the subjects. The Geography team noted, for example, that the amounts of *basic conceptual* questions in the NSC papers were closer to percentages in the old Higher than in the Standard Grade papers. The Umalusi Life Sciences team pointed out that the number of easy questions in the NSC papers was very close to that needed to pass, leaving very small margins for error at that level. The Physical Science team found that it would be much harder for a learner achieving at this level to pass the 2008 NSC exams than it would have been to pass the Standard Grade exams: the 2008 final exams contained an average of 23% of easy items, while the average for the Standard Grade papers between 2005 and 2007 was 39%. The papers for these subjects would clearly have been very difficult for learners at the lower end of the achievement spectrum, and in the case of Physical Science, especially so.

## **The standards of Senior Certificate papers in the period 2005–2007**

The five teams whose papers had NATED 550 predecessors looked at the comparability of the Higher Grade papers between 2005 and 2007, and similarly at the Standard Grade papers, the idea being to check the degree of variance between the papers as a kind of *post hoc* assessment of the comparability of standards across years in general. These teams also considered differences between the Higher and Standard Grade papers, given that these distinguishing features, if any, would now need to be contained in single NSC papers, and would serve to distinguish between differing parts of the same papers.

Three of the Umalusi teams (Life Sciences; Mathematics; and Physical Sciences) found the fluctuations between years for all papers very small. The Life Sciences team, for example, found that although the Biology Standard Grade papers became easier from 2006 to 2007, the percentages of *moderate* items remained stable throughout, and those of the *difficult* and *easy* items fluctuated slightly. The Higher Grade papers for the subject were similarly stable, with the percentages of *moderate* items increasing slowly between 2005 and 2007, with corresponding decreases in *difficult* items in these papers. In the Mathematics Higher Grade papers between 2005 and 2007, the split between items at lower and higher cognitive levels respectively was roughly 50:50, with a 10% variation across the years. The Standard Grade papers for Mathematics showed a similar degree of variation, within a low to high cognitive level split of 80:20. The Umalusi Physical Sciences team found the 2005 Standard Grade paper slightly easier than those for the other two years were, and the 2007 Higher Grade paper slightly harder than those in 2005 and 2006 were. However, the three teams emphasised that these differences were insignificant – suggesting that the papers were comparable for these subjects across the years.

The other two teams (Geography and English FAL) found greater degrees of fluctuation. The English FAL group had three papers to evaluate for each year (where other subjects had two), where Papers 1 and 3 were nationally set in each case, and Paper 2 was provincial. The team found the 2005 and 2007 national papers to be comparable and the 2006 national papers to be anomalous (more difficult). They also noted that the provincial papers varied, with some containing more items

than others did. The Umalusi Geography team found their Standard Grade papers comparable over the years 2005–2007, with a small increase in the percentages of easy items in this period, a corresponding small decrease in the number of *moderate* items, and similar proportions of *difficult* items. It was in the Geography Higher Grade papers that a fluctuation in terms of levels of difficulty was higher, with the 2007 papers including a considerably higher number of *difficult* items.

This part of the exam paper analysis lends weight to the importance of the analyses themselves: while exam-setters and moderators aim for specific levels of difficulty per paper, achieving those levels accurately is not an easy task. The fluctuations found in the analysis stress the need for the analysis – for putting *teams of expert* minds to the task of judging the difficulty levels of items – and point to the need for *post hoc* analysis of learners' results (to verify difficulty levels in relation to actual learner performance) and standardisation *per paper* rather than per subject.

Regarding fundamental differences between the Standard and Higher Grade papers, all teams found that all of the papers contained ranges of questions spanning *easy, moderate, and difficult, basic recall, comprehension, application, and problem-solving* questions and that the Higher Grade papers were distinguished, not surprisingly, by their greater proportions of *difficult comprehension, application, and problem-solving* questions. The Life Sciences team, for example, found that over 20% of items in the Biology Higher Grade papers were *difficult*, while there was under 20% of this level of item in the corresponding Standard Grade papers. The Mathematics team found that over the 2005–2007 period there were 35–58% *difficult complex problem-solving* items in the Higher Grade papers, and 19–23% of such items in the Standard Grade papers. The Physical Science group found that, on average, in the Higher Grade papers around 20% of items are *difficult*, while 5% of items in the Standard Grade papers can be classified as such. Clearly, if the *National Senior Certificate* papers are to cater for learners achieving at levels spanning those found in the Higher and Standard Grade papers, the correct amounts of *difficult, moderate* and *easy* items need to be included.

### **The 2008 NSC papers as models for future NSC exams**

All the Umalusi teams commented on the suitability of the 2008 *National Senior Certificate* exemplar and final papers as models for future NSC exams. In the process, the evaluators compared percentages of different types of items in the papers to those recommended in the *Subject Assessment Guidelines* for their subjects.

Four of the teams (English FAL; Physical Science; Life Sciences, and Geography) suggested that the 2008 papers were good models for future use. The English FAL team commended its papers most strongly, pointing out the suitability of many aspects such as formatting; instructions to learners and general accessibility; the variety of question types and additional explanations provided in brackets; careful editing so that errors are minimised; and choice of genres on which questions are based.

The Umalusi Physical Science team also commended its papers, supporting the variety of types of questions included, as well as the sequencing in the papers, whereby learners were led from easily manageable questions to more challenging ones further into the papers. Additionally, it commended the proportions of items, which the team asserted, would clearly discriminate between learners. This team also voiced concern that some items were examined when they were not in the curriculum; that some questions contained irrelevant and potentially confusing information; that a small number of questions were incorrect; that there was too little emphasis on numerical calculations, and that proportions of differing types of questions did not match those suggested in the *Subject Assessment Guidelines* for the subject.

The Umalusi Geography and Life Sciences teams, while finding the papers good models in *general*, also voice serious shortcomings. Both groups pointed to over-coverage of some learning outcomes and failure to cover others: proportions of questions for particular learning outcomes did not match those in the respective *National Curriculum Statements, Learning Programme Guidelines*, and

*Subject Assessment Guidelines*. In addition, the Life Sciences team recommended fewer questions requiring only general knowledge, pointing out that Biology papers traditionally include small percentages of questions requiring general, non-biology-specific knowledge, but that the 2008 NSC papers contained far too many of these items. The team noted that learners could have passed the 2008 Life Sciences exams without any specialised Life Sciences knowledge. Further, it suggested that mark allocations and accompanying memoranda should encourage argumentation.

The Mathematics and Mathematical Literacy teams did not commend their 2008 papers as future models. The Mathematics team noted a lack of sufficiently challenging questions – there were too few questions to discriminate between learners at the upper end of the achievement range. There were also too few questions requiring the application of Mathematical principles and Mathematical *modelling*. The team was concerned about the absence of *proof*; and the too few really easy questions allowing those passing at levels comparable to just passing Standard Grade, to pass.

Noting that questions in the Mathematical Literacy papers are always context-based, the Mathematical Literacy team expressed serious concern about many of the contexts in the 2008 papers. In roughly a fifth of items in final Paper 1, contexts were gratuitous; just over a third of questions in final Paper 2 were found to be ambiguous and confusing. Where formulae were given, they were also sometimes presented in confusing ways. The spread of levels of cognitive difficulty varied greatly from proportions of questions given in the *Subject Assessment Guidelines*.

In summary, while some of the Umalusi teams recommended modelling future NSC papers on the 2008 ones, none of the 2008 papers in fact fully matched the proportions of question types and levels of cognitive difficulty stipulated in the respective *Subject Assessment Guidelines* and *Learning Programme Guidelines*.

### **Language levels in the 2008 NSC papers**

Two of the Umalusi teams (English FAL and Mathematics) found language levels in the 2008 final NSC papers for their subjects suitable for the average South African learner. The English FAL team, in particular, although noting small ambiguities and obscurities in some questions, and isolated instances of inaccessible language in the memoranda, found the phrasing of exam questions extremely clear. The Mathematics team similarly found accessible language throughout. This team noted the importance of never ceasing to monitor language levels in these papers, as Mathematics questions are often context-based (language-based), opening the possibility of complex language.

The four remaining Umalusi teams – Geography, Life Sciences, Mathematical Literacy, and Physical Science – found language levels in the 2008 final papers too high. While noting that language levels in the exemplar Geography papers would have been accessible for the majority of South African learners, the team pointed to confusing instructions and new and difficult terminology (not covered in the curriculum) in the final papers. The Life Sciences, Mathematical Literacy, and Physical Science teams found the papers too wordy: there was too much text and too many difficult words for the average South African learner.

The findings – of both the exam paper and curriculum evaluations – are useful in ways outlined in the following section.

## **8. USES AND USEFULNESS OF THE RESEARCH**

There are important uses for this research into selected curriculum documents and exam paper analyses – it was designed to feed into the standardisation of the first *National Senior Certificate* results in 2008 in the absence of tried-and-tested norms, as well as being an evaluation in its own right. In addition, this research is significant beyond these aims: it forms part of the new *standard-setting* role created for Umalusi in the new *National Qualifications Framework* bill of March 2009 (see Department of Education, 2009).

By accurately evaluating the quality of curricula against defined benchmarks and measuring the difficulty levels of the associated exam papers in quantifiable and reliable ways, it becomes possible to describe existing standards against desired ones. The process of establishing desired standards is an iterative one; establishing *existing* standards is part of the process by which desired standards are attained.

Despite the analyses in the current investigation being limited to just six of 29 national subjects, that the research proved its worth many times over is beyond question. Each of its uses is discussed briefly here.

It has already been noted that the investigation has been extended to other NSC subjects as well as to subjects in other qualifications such as the *National Certificate: Vocational*.

## 8.1 FOR STANDARDISATION OF THE 2008 MATRIC RESULTS

The findings of the curriculum and exam paper evaluations were fed into the standardisation of matriculation results at the end of 2008. Along with other sub-processes feeding into the final decision-making process regarding fine-tuned standardisation judgments for each subject, these findings formed a valid basis for understanding the relative levels of cognitive difficulty of the papers concerned.

Two of the four items feeding into the 2008 standardisation judgments were similar to those items in previous years when the examinations were based on the NATED 550 curricula. These items were fed into the 2008 standardisation processes, much as they had been prior to 2008. To reiterate, findings from the *pairs analyses* showed 2008 learners' average grades for subjects in relation to their averages for other subjects taken; both internal and external subject moderators' reports provided descriptive explanations of the levels of difficulty of particular 2008 exam papers and other issues such as language levels used (see **Subsection 1**, above, for more detailed descriptions of these strategies).

Regarding the new norms, use of the constructed and hybrid norms was deemed successful by Umalusi's Statistics and Assessment committees in light of the patterns emerging from the triangulation of findings from all sources considered during the 2008 standardisation. Three observations can be made in this regard. First, actual learner performance was in most cases not far from the new norms. In roughly half of the matric subjects, standardised, raw marks were accepted. This pattern suggests a match between desired and actual levels of learner achievement, and the suitability of the system within which the new norms were operating. It must be remembered that the *National Senior Certificate* results incorporate those marks of learners who would previously have achieved at levels typically found separately in Standard or Higher Grade exam papers. The fact that the Umalusi Committee found it possible to use raw marks in certain subjects signals that the 2008 papers might be seen to differentiate successfully between learners performing at, on one hand, the old NATED 550 Higher Grade levels, and on the other, those achieving at levels previously associated with Standard Grade papers.

Second, *pairs analysis* made possible the comparison of average learner performance in any particular subject against the average performance of those same learners in all other subjects taken by them. It was possible to look at how *groups* of learners fared in similar subjects such as Physical Sciences, Mathematics, and Information Technology; or Accounting, Economics, and Business Studies. Where there were research findings for analysis of the difficulty levels of the exam papers concerned, these findings could be compared with the *pairs analysis* results. Further, it was possible to extend the reach of the research findings, through comparison of learners' average results for these subjects, with the average grades for similar subjects not yet forming part of the research sample, via the *pairs analysis* results. Bearing in mind that the *pairs analysis* results were always considered in relation to all the other measures used.

Third, where the findings from the qualitative curriculum and exam paper analyses were available for a subject, these systematically arrived-at findings could be considered in relation to the reports of moderators, results of *pairs analysis*, and new norms. Looking at all of this information (results of *pairs analysis*, moderators' reports, and research findings) *in relation to* the new norms gave a relatively three-dimensional view of learner performance in relation to desired standards for particular subjects. Where research had not been conducted for any particular subject, there was heavier reliance on the new norms, results of *pairs analysis*, and moderator reports.

In all, given the triangulation of the different types of findings, the 2008 standardisation is deemed to have been very rigorous, systematic, and fair. The results of the curriculum and exam paper analyses were particularly useful in the 2008 standardisation process, as they provided more robust information than other items in the background information set. The norms had been constructed *a priori* – before the exams had been written – and the extent to which these norms would be valid was not known before the availability of the 2008 learners' results. *Pairs analysis*, at best, provides a *relative measure* of performance (performance in one subject can be viewed against performance in another subject). Moderators' reports are the comments of individuals only. The judgments emanating from the research, in contrast, comprised the combined work of *four* individuals in each instance, and constituted the integrated overall findings of a wide array of a myriad of smaller judgments made in systematic and consistent ways.

## 8.2 FOR ENHANCING THE QUALITY OF NSC CURRICULA

The curriculum evaluations and exam paper analyses are useful in their own right, over and above having provided necessary measures for the standardisation of the 2008 *National Senior Certificate* results. The fact that the research teams were required to comment comprehensively on the curricula and exams for their subjects, and in given formats, meant that reporting included wide ranges of comparable information for each subject. In addition, the fact that the evaluators were only allowed to comment on the relative levels of difficulty of the old and new curricula and exams once they had made *separate* judgments on a considerable number of aspects of the curriculum, as well as on each and every item (sub-part of exam questions) in exam papers meant that there was solid recorded evidence for each judgment made.

The results of the curriculum evaluations and exam paper analyses include detailed recommendations for improvement of the curricula and their associated exams. Almost all of the teams noted that the NCS curriculum documents for their subjects (*National Curriculum Statement; Learning Programme Guidelines; Subject Assessment Guidelines*) contradicted each other, and called for single (or two) comprehensive and coherent documents per subject. All teams also recommended clearer and more comprehensive guidance regarding what constitutes particular types of assessment tasks; how to assess these tasks in subject-appropriate ways; and how to develop suitable assessment tools. The teams made subject-specific recommendations beyond these general suggestions: these recommendations have been passed on to the assessment bodies concerned.

## 8.3 FOR UMALUSI'S INTERNAL PROCESSES AND INSTRUMENTS

Umalusi operates with a complex set of internal processes to quality assure qualifications and curricula; educational institutions; and assessment in the general and further education and training sector in South Africa. Each of the processes and instruments involved are firmly based on research findings and are benchmarked nationally and internationally. Research projects such as the current curriculum evaluations and exam paper analyses yield findings that can be ploughed back into several Umalusi processes and tools.

The effects of the presence of researchers and the research findings in the 2008 standardisation process have already been described (see **Subsection 8.1** above). The presence of researchers

contributed towards particular kinds of minute-taking during standardisation, and the taking forward of key processes into future standardisation work. It is likely, for example, that some of the instruments developed for the research may in future be used to moderate exam papers before they are written. This practice has implications for Umalusi's training of its moderators and for the moderation processes themselves. It is also likely that the findings of the research will feed into the creation of future exam papers and the standardisation of results linked to these papers.

The finding that exam papers differed across exam-writing sessions, both within subjects (such as when Papers 1 and 2 for a particular subject had been shown to differ with respect to difficulty levels) and within levels (such as when Higher Grade papers had been shown to differ regarding difficulty levels between one exam session and the next) leads to a recommendation by Umalusi that learners' results be standardised *per paper* rather than per subject in future.

Based on the comprehensiveness and comparability of the curriculum evaluation reports for the different subjects afforded by the most recent Umalusi evaluation instrument, it is likely that this tool will be used or customised for future Umalusi curriculum evaluations – whether as part of the evaluation of specific whole qualifications or as part of Umalusi's ongoing evaluation of South African curricula in the interests of continual improvement of the system. Its use has implications for the training of future Umalusi curriculum evaluators.

Thus, it is evident that the current research feeds into Umalusi's internal work, contributing to and strengthening its processes and instruments in ongoing ways. This **Part 1** of the report ends with some concluding comments.

## 9. CONCLUDING COMMENTS

Despite the inclusion of only six subjects, rather than the full range of national subjects in the current research, the project has provided meaningful results for the short, medium and long term. In addition, as elaborated in **Subsection 8.1** above, it was possible to extend the reach of the findings by comparing learner performance in similar subjects with their performance in the researched subjects for which there were clear descriptions of difficulty levels.

The usefulness of the Umalusi evaluation instruments was confirmed in the curriculum and exam analyses. Some teams customised or elaborated on the instruments for use in relation to their subjects; future teams will be encouraged to do the same. Importantly, the instruments are customisable, and at the time of publication of this report, will already have been customised for use at different levels in the education system.

Regarding the overall findings of the current study, four overarching comments can be made. First, in terms of the levels of difficulty of the six new NCS curricula evaluated, three of these curricula (those for Life Sciences, Mathematics, and Physical Science) are judged to be midway between the NATED 550 Higher and Standard Grade curricula *overall*, but at the same time, they have pockets of difficulty that way exceed difficulty levels in the previous Higher Grade curricula. The new Physical Science curriculum has a far greater volume of content than do both NATED 550 curricula for the subject – there is more *difficult*, as well as more *moderate* and more *easy* content than previously. In the new Life Sciences curriculum, the applications of some principles are found to be beyond the reach of most South African learners. A fourth curriculum (the NCS curriculum for Geography) was found to be closer to the old Higher than Standard Grade level. A fifth curriculum (that for English FAL) was found, because of its greater degrees of specification, to be *effectively* more difficult than the NATED 550 curricula but was found at the same time to be a very commendable set of documents, for which more mediation in the form of teacher training is recommended. The sixth curriculum (that for Mathematical Literacy) was found to be so different to the NATED 550 Higher and Standard Grade Mathematics curricula that comparison was not possible.

A second major overarching finding of the research is that exam papers are *variable*. There may be broad trends such as those showing the relatively high proportions of *difficult problem-solving* questions in Higher Grade papers over the years and the relative high proportions of *easy basic comprehension* questions in Standard Grade papers over time, but the study shows that *within these trends*, there is considerable variation in the *overall* difficulty levels of the papers.

The fact that exam papers are *not necessarily uniformly difficult* or easy comprises a third significant finding. The relative proportions of questions at particular difficulty levels are especially important in the *National Senior Certificate* papers, where single papers are expected to discriminate between extremely high-achieving learners and those performing at low levels, and all grades of performance in between. Where in the previous system the Higher Grade papers discriminated learners achieving at the highest levels, for example, the high-level questions in the *National Senior Certificate* papers are now needed to accomplish the same task. The present research shows that some of the difficulty levels of the *difficult, moderate* and *easy parts* of the 2008 NSC papers were at the desired levels, and some were too low or too high.

The fourth important aspect highlighted by the current study is the integrity of the Umalusi standardisation processes. No fewer than six means were utilised to increase the validity and reliability of these processes. When making standardisation judgments, the reports of internal and external moderators; patterns shown in *pairs analysis*; norms showing learner performance trends over five years; systematic evaluation of associated curricula; and rigorous analysis of the exam papers, item by item were considered in turn and then triangulated where patterns between the measures are taken into account. In all, a minimum of seven individuals independently and some as teams evaluated the difficulty levels of the exam papers in question before the large Umalusi Statistics and Assessment Committees carried out standardisation. In 2008, robust qualitative and quantitative findings underscored decisions made for the standardisation of NSC results. It is Umalusi's intention that these practices be continued and enhanced in future.

The main recommendations regarding curriculum are that the current set of NCS documents per subject be rationalised into single, or at most two, coherent documents per subject and that these new documents be made universally available to *all* schools, in soft or hard copy form, as suits the contexts of the schools. There is also a need, for all subjects, for more guidance regarding teaching in differing social contexts; clarity regarding what comprises different kinds of assessment tasks, and how to assess them; and teacher development of subject-appropriate assessment tools. This guidance needs to feature in the curriculum documents themselves, as well as in teacher-development workshops. Beyond these overarching curriculum recommendations, the subject teams have also made important subject-specific suggestions (see **Subsection 8.2** above).

Regarding NSC examinations, given that variation in difficulty levels occurs from paper to paper within subjects as well as across years and that subsections within papers can be at the desired cognitive levels or too low or too high, Umalusi recommends that standardisation in future be *per paper* rather than per subject. Further, it is recommended that the Umalusi exam paper evaluation tool be used for the moderation of future exam papers.

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# APPENDIX 1:

## THEORETICAL FOUNDATIONS

The theoretical framework within which the research was conceptualised is based on Bernstein's (1971; 1975a; 1975b; 1981; 1990; 1995; 1996; and 1999) theory of pedagogy as operationalised by a group of researchers working in various countries around the world (see, for example, Morais 1998; 2002a and 2002b; Morais et al. 1992 and 1995; Morais and Miranda 1996; Morais and Camara 1997; Morais and Rocha 1997; Morais and Pires 2002; Bolton 2005; Hoadley 2005; Reeves 2005; Ferreira and Morais 2008, and others). This theory informed the design of the research and the content and format of the research instrument, but this was not made explicit to the evaluators. Interestingly, one team leader independently explicated this theory when putting together the findings of the group in her composite report for the subject, finding that it helped to explain the group's findings. The basic concepts of the theory are outlined in Sections 1 and 2 below. How these concepts have been employed in other research informs the construction of the research design and instruments for the research undertaken, and will be discussed briefly in **Section 3** below.

This section of the report is fairly abstract and may be too heavy for some readers. For this reason, it has been put into Appendix 1 rather than being inserted into the main body of the report. Not reading this appendix will not prejudice an understanding of the remainder of the report.

### 1. THEORETICAL FOUNDATION: BERNSTEIN'S THEORY OF PEDAGOGY

When investigating the quality of curricula and exam papers as components of pedagogy, it is important to theorise the concepts utilised so that one lifts the analyses above the level of the individual, discrete, actual item under review. Lifting the analysis to the level of (abstract) principles makes possible comparison of the findings with those from other research and increases possibilities for change and improvement.

Bernstein (1971; 1975a; 1975b; 1981; 1990; 1995; 1996; and 1999) theorises pedagogic relationships. His theory encompasses transmission-acquisition processes and their contexts. It facilitates a systematic exploration of relations within and between components of pedagogy, and can be used to link curriculum principles, teaching practice, assessment, learner achievement, social contexts, and other aspects of pedagogy. It facilitates an extremely high level of generalisation (see, for example, Bolton, 2005, Pages 28-29), a characteristic unusual for theory in the education sector. In the current research, the theory is used to establish categories for analysis of the NATED 550 and NCS curricula and exams.

Bernstein's (ibid.) theory utilises the concepts of pedagogic code, classification, and framing. Code is defined as a 'regulative principle' which selects and integrates relevant meanings (orientation to meanings); realisation of meaning (textual productions); and evoking contexts (interactional practices) (Bernstein, 1995: 12). The idea of 'code' has been used to distinguish between orientation to meanings *and* realisation of meanings (ibid.). Code orientation can be restricted (such as when meanings are particularistic and context-dependent) or elaborated (when meanings are universalistic and context-independent) (Bernstein 1971: 14). Transfer of knowledge at secondary school level involves an elaborated code, but this has different forms or modalities of realisation. For the purposes of the current research, it is assumed that curriculum documents and exam papers need to *provide access* to the elaborated codes for each subject evaluated. In the current South African context, which is characterised by *diversity*, it is expected that this access will be facilitated through use of elaborated codes in the documents themselves.

The principles of codes are described in terms of 'classification' and 'framing': different classification and framing values constitute varying modalities of pedagogic code. Classification and framing values shape interactional practices, and these practices give rise to differences in the selection of relevant meanings, orientation to meanings, and textual productions (Bernstein 1995: 12). In other words, classification and framing in the curriculum documents and exam papers will orient their users to particular meanings.

Classification and framing refer to power and control relations respectively. These concepts are used together to create a model which can be applied to any pedagogic practice, at any level (for instance, from that of education system to that of school or classroom). They can also be applied to documents such as those pertaining to the curriculum and exams. Pedagogic code can be written as follows (ibid.):

$$\frac{O^{e/r}}{C+/- F+/-}$$

where  $O^{e/r}$  = an elaborated or restricted orientation to language, and  $C+/-$  and  $F +/-$  = a strong or weak classification or framing respectively.

Classification denotes the degree of specialisation of categories or separation between categories. When classification is 'strong', categories will have clearly distinguishable identities and specialised rules of internal relations. When it is 'weak', categories will be less easily distinguishable, with less specialised internal relations. Curriculum content and skills, for example, can be strongly or weakly classified. Strongly classified curriculum content and skills are that which is more highly specialised than weakly classified content and skills; weakly classified content and skills may be closely linked to the content of other curricula or to everyday life. Particular strengths of classification require particular 'recognition rules', by means of which individuals recognise the demands of particular contexts. Needless to say, strongly classified content would require more specialised knowledge than would weakly classified content.

Framing constitutes forms of communication and control that legitimise relations within contexts. With 'strong' framing, the transmitter has explicit control. With 'weak' framing, the acquirer has more apparent control. Strongly framed curriculum documents and exam papers would be those in which information was made very explicit by the respective authorities. It is worth noting that when framing is weak – when communications are not explicit – more control lies in the hands of the *transmitter* concerned. It could, therefore, be said that strong framing is more democratic than weak framing.

## 2. THEORETICAL FOUNDATION: BERNSTEIN'S THEORY OF KNOWLEDGE STRUCTURES

Bernstein's (1996) theorising around different types of knowledge is also important for the reported on research. He writes (1996: 170) of two types of discourse. The first of these (ibid.: 171-2), 'horizontal discourse', is local, context-dependent, tacit, and contradictory across contexts but not within contexts. It is everyday knowledge, the knowledge to be gained from living daily life. It is not generally the type of knowledge to be sought within schools.

The second type of knowledge, 'vertical discourse' (ibid.: 171-9), consists of coherent, explicit, systematically principled, hierarchically organised, specialised languages or modes of interrogation with specialised criteria for the production of texts. This knowledge can be any type of specialised knowledge that is passed on by someone specialised in that form of knowledge.

According to Bernstein (1996: 173), vertical *discourse* can have 'hierarchical' or 'horizontal' knowledge *structures*. Hierarchical knowledge structures are regulated by an 'integrated code' in



which knowledge is integrated into increasingly abstract or general propositions (Bernstein, 2000b: 161-5). In other words, increasingly difficult and abstract concepts are progressively built on simpler concepts. An example of such a knowledge form is Physical Science.

In vertical discourses with horizontal knowledge *structures*, a 'serial' or 'collection' code operates in the production of knowledge, where non-translatable, non-comparable specialised languages are accumulated (Bernstein, 1996: 173). In these bodies of knowledge, in other words, there are different ways of understanding phenomena (these approaches could be described as 'different languages'). The Social Sciences are examples of such types of knowledge.

It is likely that different types of information would need to feature in the curriculum documents and exam papers of school subjects allied to different knowledge forms. While the sample for the reported on research was selected on the basis of learner enrolment figures, it is fortunate that the six subjects include knowledge forms with both hierarchical and horizontal knowledge structures. While Physical Science, Life Sciences (Biology), and Mathematics are arguably hierarchical in structure, it could be said that Geography, Mathematical Literacy, and English First Additional Language are more horizontal. These concepts are referred to again within some of the individual subject reports (see especially the Life Sciences reports).

### 3. USE OF THE THEORY IN THE CURRENT RESEARCH

Bernstein's (1971, 1975a; 1975b; 1981; 1990; 1995; 1996; and 1999) theory of pedagogy has been used for a variety of types of research foci, from pre-school to university-level learning, and from the sciences to the arts. There is a body of research that refers to learner achievements in relation to the classification of types of knowledge (discourses); spatial aspects of pedagogy; and agents (or types of educational institution) (see, for example, Daniels, 1988 and 1989). There is another large group of studies which focuses on these and other concepts such as the framing of aspects of pedagogy, and especially on the framing (locus of control) regarding the selection, sequencing, pacing, and evaluation criteria of knowledge and skills in the classroom (see, for example, Morais 1998; 2002a and 2002b; Morais et al. 1992 and 1995; Morais and Miranda 1996; Morais and Camara 1997; Morais and Rocha 1997; Bolton 2005; Hoadley 2005; Reeves 2005; Ferreira and Morais 2008, and others).

The concepts of the framing of selection, sequencing, pacing, and evaluation criteria can be applied to a range of pedagogic features, from micro-level classroom interactions to macro-level education policies. Umalusi used the ideas of selection framed as 'content coverage (breadth)' and 'content coverage by cognitive demand (depth)'; sequencing, described as 'sequence and progression'; pacing, in terms of 'pacing within and across years', and evaluation criteria phrased as 'assessment specifications' in recent research (see the *Learning from Africa* evaluation tool, published in *Making educational judgments*, Umalusi, 2007).

The current study – the curriculum evaluation in particular – uses similar concepts. Selection is operationalised as 'the specification, weighting, and foci of content and skills'. As such, it incorporates the selection by South African education authorities of the breadth and depth of content and skills under consideration for each subject. By asking evaluators to make judgments on the clarity with which content is explained in the documents, the *framing of selection* of curriculum content and skills by the authorities is being assessed. The questions for which findings will be generated are, in other words: how explicit is the elaboration of what has been selected; is it sufficiently clear to facilitate access-to-information for most curriculum users? Through asking evaluators to describe the 'weighting and focus' of what has been included in the curriculum, and the 'aims' and 'principles of organisation and coherence' structuring it, *classification (or degree of specialisation) of types of knowledge* is being considered. Making judgments on the specification and weighting of content also reveals something about the *framing of pacing* in the curriculum.

In asking evaluators to consider the sequencing, progression, and articulation of content and skills within and across years, as well as the degree of clarity with which these aspects are expressed in the curricula, the study considers the *framing of sequencing* communicated in the curriculum documents. The research instrument, again, was designed to generate responses regarding *what* sequencing comprises and the clarity of guidelines for *how* sequencing is to be achieved. Umalusi needed to know if guidelines around sequencing are sufficiently clear to facilitate general access to understanding this information.

In asking detailed questions around the content and specifications for internal and external assessment, the Umalusi instrument was investigating the *framing of evaluation criteria*. Umalusi needed to know *what* was being evaluated, and *how* these criteria are elaborated. Importantly, strong framing of evaluation criteria has been shown to be one of the key characteristics for success for learners in all social contexts (see, for example, Morais et al., 1992 and 1995; Ferreira and Morais, 2008; Bolton, 2005 and 2009 forthcoming, and others).

In each instance, *what* is in the curriculum as well as guidelines for *how* it is to be achieved is evaluated. In other words, by looking at both what is selected, sequenced, and evaluated, and at *how* these aspects are to be accomplished, the reported on research was considering the classification and framing in the curriculum concerned. By describing these aspects in theoretical terms as well as in everyday terms, it was hoped that the findings of the research would be more easily comparable with the findings of other similar studies the world over. The Umalusi evaluators of the reported on research answered the curriculum-related research questions listed in the next section of this report by gathering evidence on the classification and framing of the aspects of curriculum described, without referring to these theoretical terms.

# APPENDIX 2:

## UMALUSI CURRICULUM EVALUATION AND EXAM PAPER ANALYSIS INSTRUMENTS

### Part 1: Comparison of the old South African NATED 550 curricula (Higher and Standard Grades) and the new National Curriculum Statements

#### Details of evaluators:

**Subject:**

**Grade:**

**Evaluator:**

**Date:**





#### Documents:

For this comparison, you will need to be familiar with, and refer to the following:

##### Old South African Curricula

-  Syllabus document (NATED 550) Higher Grade, and any related documentation
-  Examination-setting guidelines for associated Higher Grade exams
-  Syllabus document (NATED 550) Standard Grade, and any related documentation
-  Examination-setting guidelines for associated Standard Grade exams

##### New South African Curricula

-  *National Curriculum Statement for Grades 10–12*
-  *Subject Assessment Guidelines*
-  *Learning Programme Guideline*
-  Instructions to examiners for the setting of the 2008 exams

#### Task

In this comparison, you are asked to describe specific aspects of the three curricula (old NATED SC, Higher and Standard Grade curricula and the NSC curricula), in terms of criteria Umalusi has identified for the evaluation of curricula. The purpose for providing these opinions is twofold:

1. Your evaluations will identify specific aspects of the curricula, including an estimate of the level of difficulty of the curricula – in terms of the elements identified in Umalusi's *Guideline for the evaluation of curriculum statements*. You will be asked to do your evaluation in terms of the reporting format provided.
2. Your evaluation will indicate if the new intended curriculum (NCS), in your opinion, occupies a positive middle ground somewhere between the old Higher and Standard Grade curricula, to provide equitable learning and assessment opportunities for learners who would previously have been at two different levels or grades of learning. The question in other words is, does the NCS provide a baseline that is sufficiently similar to both of the other curricula for Umalusi's Statistics committee to say that examinations based on the old and new curricula can be meaningfully compared?

# Specific aspects of the curriculum

## 1. Content specification and coverage

### 1.1 Content specification (yellow section of Table 3)

1. In **Table 3** (yellow sections), identify *all* the major content areas represented in all three curricula (Grades 10, 11, 12), and list these in Column 1. In brackets after naming each area/ sub-area of content, in the same column, estimate the apparent cognitive complexity level of each area/ sub-area of content, as *difficult*, *moderate*, or *easy*. Use the degree to which the content is abstract, theoretical, and based on disciplinary-specific knowledge that cannot easily be learned outside a school context, to estimate this degree of difficulty. Please see the examples provided in the table below.
2. Indicate whether the content specified is covered in each of the three curricula in the columns marked '**Specified**' with a **Y** for 'yes' and an **N** for 'no' (please indicate where it is specified, namely, in the Grade 10, 11, or 12 curricula).
3. Indicate whether the content specified forms part of examinable content in the final (Grade 12) exam. Enter an **E** for 'Examinable' and an **N** for 'Not examinable' in the boxes marked '**Examinable**'.

### 1.2 Content weighting (blue section of Table 3)

1. In **Table 3** (blue sections), identify as a percentage, how much classroom time is allocated to the content specified. Write that *percentage* into the block marked '**% Class time**'. Where proportion of classroom time is not ascertainable, please write **N** for '**Not ascertainable**'. Where the content is not a part of the particular curriculum, enter **0** (please use the total time for Grade 10, 11, and 12 as the 100% amount of time)
2. Identify, as a percentage, the weighting allocated to the content specified in the exam (final Grade 12 exam only). Write the *percentage* in the block marked '**% Exam time**'. Where the content is examinable, but its weighting is not ascertainable, please write **N** for '**Not ascertainable**'. Where the content is not allocated a weighting in the exam specification, enter **0**.

### 1.3 Content focus (green section of Table 3)

1. In **Table 3** (green sections), rate content as either discipline-specific and required for a single subject only or as useful for more than one school subject/ useful for academic study in general or as general knowledge required by a school leaver in order to cope with everyday living (please note that the generality of content does not imply that it is easy: it may be cognitively demanding, but general). Once you have rated all the content areas, please make a *global judgment* as to how much content is disciplinary, how much is relevant to several subjects, and how much is general – over the three final years of secondary school.

**Table 3: Table for recording analysis of content**

SUBJECT	
Full bibliographical details of curriculum documents	#
	1
(add more rows as needed)	2

1. Content required	CONTENT DETAILS			NATED		NATED		NCS		NATED		NATED		NCS							
	Document #	Page	Level	550 SG	550 HG	550 SG	550 HG	2008	550 SG	550 HG	2008	550 SG	550 HG	2008							
List all content described in the curriculum documents here (1.1=yellow; 1.2=blue; 1.3=green)(inc-lude document and page references please)				Specified	Examinable	Specified	Examinable	Specified	Examinable	%Class time	%Exam time	%Class time	%Exam time	%Class time	%Exam time	Discipline	General	Discipline	General	Discipline	General
(add as many rows as are needed)	1		E																		
	8		M																		
	3		D																		
<b>Totals</b>																					
% Discipline-specific curriculum content																					
% Curriculum content that is general information																					

### 1.4 Skills specification (yellow sections of Table 4)

1. In **Table 4**, identify *all* the skills specified in all three curricula (and include Grades 10–12), and make a complete list of these skills in Column 1 of the table immediately below. In so doing, estimate and place each skill under the most likely *type of cognitive demand* required.
2. Indicate whether the skill specified is specified in each of the three curricula in the columns marked '**Specified**'; enter **Y** (for yes) if the skill is specified, and **N** (for no) if the skill is not specified (use the Grade 10–12 curricula).
3. Indicate, in the level-of-difficulty column ('Difficulty'), the level of difficulty at which the skill specified is apparently expected to be learned/ taught. Use a 3-way distinction: *Easy (E); Moderate (Mod); Difficult (Diff)*.

### 1.5 Skills weighting (blue sections of Table 4)

1. Identify as a *percentage*, how much classroom time is allocated to the skill specified. Write that percentage into the block marked '**% Class time**'. Where it is not possible to ascertain how much time is allocated to a specific skill, write **N** for '**Not ascertainable**'. Where the skill is not a part of the particular curriculum, enter 0 (please use the total time for Grade 10, 11, and 12 as the 100% amount of time).
2. Identify as a percentage, the weighting allocated to the content specified in the exam (final Grade 12 exam only). Write the *percentage* in the block marked '**% Exam time**'. Where the skill is identified as examinable, but no weighting can be ascertained, please write **N** for '**Not ascertainable**'. Where the content is not allocated a weighting in the exam specification, enter **0**.

## 1.6 Skills focus (green sections of Table 4)

- In **Table 4** (green sections), rate skills as either discipline-specific and required for a single subject only; as generic cross-cutting skills useful for more than one subject; or as general skills required by school leavers in order to cope with everyday living (please note that the generality of skills does not imply that they are easy: they may be cognitively demanding, but general). Once you have rated all the skill areas, please make a *global judgment* as to how many skills are subject-specific, how many are relevant to several subjects, and how many are general – over the three final years of secondary school.

**Table 4: Table for recording analysis of skills**

SUBJECT	
Full bibliographical details of curriculum documents	#
	1
(add more rows as needed)	2

Skills specified	SKILL DETAILS			NATED			NATED			NCS			NATED			NATED			NCS					
	Document #	Page	Type	550 SG	550 HG	2008	550 SG	550 HG	2008	550 SG	550 HG	2008	550 SG	550 HG	2008	550 SG	550 HG	2008	550 SG	550 HG	2008			
List all skills described (1.4=yellow; 1.5=blue; 1.6=green)(include document and page references please)				Specified	Difficulty	Specified	Difficulty	Specified	Difficulty	% Class time	% Exam time	% Class time	% Exam time	% Class time	% Exam time	Discipline %	Generic %	Life skill %	Discipline %	Generic %	Life skill %	Discipline %	Generic %	Life skill %
E.g. Add 3-digit numbers (basic)																								
E.g. Multiply 3 algebraic terms (application-familiar)																								
E.g. Integrate the square root (application-new)																								
<b>Totals</b>																								
% Discipline (subject)-specific skill																								
% Generic cross-cutting skills																								
% Life skills																								

## 1.7 Text specifications (to be answered only by Language groups)

1. In **Table 5**, indicate the *number* of texts in that particular category which are recommended, in the box marked '**Recommended**'. If the category of text is *not* specified, write NA (*Not applicable*) in the box.
2. In the columns marked '**Compulsory**', indicate the *number* of texts of that kind which must be studied. If the text type is not dealt with at all, write NA in the box.
3. If teachers have a choice in literature of doing, say, three genres of the five, please indicate as much in the space provided in the table.

**Table 5: Table for analysis of texts specified for languages**

LANGUAGE SUBJECTS	NATED 550		NATED 550		NCS	
	SG		HG			
	Recommended	Compulsory	Recommended	Compulsory	Recommended	Compulsory
<b>Text types specified</b>						
Language – grammar						
Dictionary – thesaurus						
<b>Literature ( ... genres to be chosen)</b>						
Novels						
Poems						
Drama						
Short stories						
Essays						
<b>Visual texts</b>						
Films, videos, DVDs						
<b>Other</b>						
Specify other						
<b>Total number of texts</b>						

Note: The assumption is that the range of text types and the actual texts selected have remained more or less on the same level of conceptual complexity across the various curricula. If this assumption is incorrect, please bring this to the attention of the team leader, in a note.

## 2. Organising principle and coherence (yellow and pink parts of Table 6)

1. Decide if there is an organising principle underlying the curriculum for your subject. In the table below (yellow section), describe this organising principle briefly but comprehensively. If an organising principle cannot be found, enter NA for not applicable (please provide all document and page references).
2. Indicate (in the pink section) whether this organising principle is explicitly stated or not (**1** = not clear; **2** = moderately clear; **3** = very explicit and clear). If an organising principle cannot be found, enter **NA** for not applicable (please provide all document and page references).
3. Indicate (in the pink section) the degree of coherence of the organising principle (if applicable): **1** = piecemeal; **2** = moderately or partly coherent; **3** = very coherent. If an organising principle cannot be found, enter **NA** for not applicable (please provide all document and page references).

### 3. Sequence, progression and pacing (turquoise parts of Table 6)

1. In **Table 6** (turquoise parts), compare the three curriculum documents in terms of the degree to which they have been structured with regard to sequencing, progression and indications of expected achievement by the end of each year. For each statement, rate each curriculum on a scale of 0 to 3, where **0** = no guidance is given; **1** = minimal indications are provided; **2** = a fair degree of guidance is given to teachers that help with ordering content and skills/ increasing the level of cognitive demand; **3** = substantial guidance is provided to help teachers.
2. Add up the ratings you have given each curriculum, and put that score in the last block.
3. In a maximum of 150 words per answer, please provide brief descriptions to back up your four ratings for the sequence, progression and pacing for each curriculum, of the following:
  - 👉 Describe content/ skills showing progression within each year (maximum 150 words). Please list the documents and page numbers where evidence for your first rating can be found.
  - 👉 Describe content/ skills showing progression over the three years in FET (maximum 150 words). Please list the documents and page numbers where evidence for your second rating can be found.
  - 👉 Describe increases in cognitive demand over the three FET years (maximum 150 words). Please list the documents and page numbers where evidence for your third rating can be found.
  - 👉 Describe briefly what must have been covered by the end of each year of study (maximum 150 words). Please list the documents and page numbers where evidence for your fourth rating can be found.

### 4. Aims/purpose/vision/outcomes (green section of Table 6)

1. In **Table 6** (green section), compare the three curriculum documents for the degree to which they express *aims* that clearly inform the curriculum as a whole. For each statement, rate each curriculum on a scale of 0 to 3, where **0** = the curriculum provides no information or guidance with respect to aims/ outcomes; **1** = the curriculum refers to its aims/ outcomes, but provides little detailed guidance with respect to how these aims are to be understood/ achieved; **2** = the curriculum specifies its aims/ outcomes and provides a fair amount of guidance as to how these aims are to be understood/ achieved; **3** = the curriculum specifies its aims/ outcomes and provides substantial guidance as to how these aims are to be understood/ achieved.
2. Add up the ratings you have given each curriculum, and put that score in the last block.
3. In a maximum of 150 words per answer, please provide brief descriptions to back up your four ratings for the aims/ purpose/ vision/ outcomes in each curriculum, of the following:
  - 👉 Describe (briefly) aims expressed in the curriculum documents (maximum 150 words). Please list the documents and page numbers where evidence for your first rating can be found.
  - 👉 Describe (briefly), the type of guidance provided for achieving the aims (maximum 150 words). Please list the documents and page numbers where evidence for your second rating can be found.
  - 👉 Describe (briefly), the contexts taken into account (maximum 150 words). Please list the documents and page numbers where evidence for your third rating can be found.
  - 👉 Describe briefly, how articulation with other parts of the education system is described (maximum 150 words). Please list the documents and page numbers where evidence for your fourth rating can be found.



## 5. Teaching approach and subject methodology

### 5.1 General teaching/ learning approach (purple section of Table 6)

1. In **Table 6**, compare the three curriculum documents for the degree to which they express *the teaching approach or pedagogy* that informs/ could be used to enact the curriculum as a whole. For each statement, rate each curriculum on a scale of 0 to 3, where **0** = the curriculum provides no information or guidance about pedagogic approach; **1** = the information provided refers to appropriate pedagogic approaches, but gives little information as to how these approaches are to be implemented; **2** = there is a fair degree of guidance given with respect to appropriate pedagogic approaches and how they are to be implemented/ fair degree of relevance for the related content, context, aims, and learners; **3** = substantial guidance is provided with respect to appropriate pedagogic approaches and how these are to be implemented effectively at the levels required/ extensive relevance for the related content, context, aims, and learners.
2. Add up the ratings you have given each curriculum, and put that score in the last block.
3. In a maximum of 150 words per answer, please provide brief descriptions to back up your five ratings for the general teaching approach, of the following:
  - 👉 Describe briefly the teaching/ learning approaches given (maximum 150 words). Please list the documents and page numbers where evidence for your first rating can be found.
  - 👉 Describe briefly how the approaches are aligned with the curriculum aims (maximum 150 words). Please list the documents and page numbers where evidence for your second rating can be found.
  - 👉 Describe briefly how the approaches are suited to contexts in which the curriculum might be enacted (maximum 150 words). Please list the documents and page numbers where evidence for your third rating can be found.
  - 👉 Describe briefly how the approaches are suited to types and levels of content and skills in the curriculum (maximum 150 words). Please list the documents and page numbers where evidence for your fourth rating can be found.
  - 👉 Describe briefly how the approaches are suited to the interests and capacities of learners at this level (maximum 150 words). Please list the documents and page numbers where evidence for your fifth rating can be found.

### 5.2 Subject-specific methodology (blue section of the Table 6)

1. In **Table 6** (blue section), compare the three curriculum documents for the degree to which they most clearly and comprehensively explain how to teach/learn *the particular subject discipline* in the curriculum of the subject being investigated. For each subject, rate the curriculum on a scale of 0 to 3, where **0** = the curriculum provides no information or guidance about how to teach the particular subject discipline; **1** = the information on how to teach the particular subject discipline is present but provides minimal guidance; alignment to aims, content, context, and learners is minimal; **2** = there is a fair degree of guidance on how to teach the particular subject discipline – there are areas of elaboration and areas where scant guidance is given; there is a fair amount of alignment with aims, content, context, and learners; **3** = substantial guidance on how to teach the particular subject discipline effectively at the levels required, is provided – approaches are clearly and comprehensively elaborated throughout the curriculum documents; there is close alignment with aims, content, context, and learners.
2. Add up the ratings you have given each curriculum, and put that score in the last block.
3. In a maximum of 150 words per answer, please provide brief descriptions to back up your five ratings for the subject-specific teaching approach, of the following:
  - 👉 Describe briefly the subject-specific teaching/ learning approaches given (maximum 150 words). Please list the documents and page numbers where evidence for your first rating can be found.

- 👉 Describe briefly how the subject-specific approaches are aligned with the curriculum aims (maximum 150 words). Please list the documents and page numbers where evidence for your second rating can be found.
- 👉 Describe briefly how the subject-specific approaches are suited to contexts in which the curriculum might be enacted (maximum 150 words). Please list the documents and page numbers where evidence for your third rating can be found.
- 👉 Describe briefly how the subject-specific approaches are suited to types and levels of content and skills in the curriculum (maximum 150 words). Please list the documents and page numbers where evidence for your fourth rating can be found.
- 👉 Describe briefly how the subject-specific approaches are suited to the interests and capacities of learners at this level (maximum 150 words). Please list the documents and page numbers where evidence for your fifth rating can be found.

**Table 6: Table for recording analysis of organising principles; sequencing; aims; and pedagogy**

SUBJECT:	NATED 550 SG	NATED 550 HG	NCS 2008
	Document # Page Reference	Document # Page Reference	Document # Page Reference
The organising principle for SG is ...			
The organising principle for HG is ...			
The organising principle for NCS is ...			
SUBJECT:	NATED 550 SG	NATED 550 HG	NCS 2008
<b>2. Curriculum Organising Principle</b>			
The degree to which the organising principle is clear			
The degree to which the organising principle is coherent			
<b>3. Sequence, Progression and Pacing</b>			
1. Progression/ advancement is evident in the sequencing of skills and content within each year.			
2. Progression/ advancement is evident in the sequencing of skills and content across the period encompassing the three final years of secondary school.			
3. The level of cognitive demand demonstrably increases across the three years.			
4. The curriculum documents identify clearly what must have been achieved/ covered by the end of each year of study.			
<b>Total (maximum score=12):</b>			
<b>4. Aims/purpose/vision/outcomes</b>			
1. The curriculum document expresses explicit aims/ outcomes for the subject in easily/ readily understandable language.			
2. The curriculum document provides guidance as to how its aims/ outcomes are to be understood/ achieved.			
3. The aims take into account a range of potential contexts in which this curriculum is likely to be enacted.			
4. The articulation of the current curriculum with other levels in the educational system is described.			
<b>Total (maximum score=12):</b>			

**Table 6: Table for recording analysis of organising principles; sequencing; aims; and pedagogy (continued)**

SUBJECT:	NATED 550 SG	NATED 550 HG	NCS 2008
	Document # Page Reference	Document # Page Reference	Document # Page Reference
The organising principle for SG is ...			
The organising principle for HG is ...			
The organising principle for NCS is ...			
SUBJECT:	NATED	NATED	NCS
	550 SG	550 HG	2008
<b>5. General teaching-learning approach/ pedagogy</b>			
1. The curriculum documents expressly state the desired teaching/ learning approach(es) which underlie the curriculum, and provide guidance as to how these approaches are to be effectively implemented at the levels required.			
2. The approach(es) selected are aligned to the purpose and aims of the curriculum.			
3. The approach(es) selected are suited to the likely context(s) in which the curriculum could be enacted.			
4. The approach(es) selected are suited to the types and levels of content and skills outlined in this curriculum.			
5. The approach(es) selected are suited to the interests and capacities of learners at this level.			
<b>Total (maximum score=15):</b>			
<b>6. Subject-specific methodology</b>			
1. The curriculum documents expressly state the desired teaching/ learning approach(es) for the <i>particular subject discipline</i> , and provide guidance as to how these approaches are to be effectively implemented at the levels required.			
2. The specific subject methodology selected is aligned to the purpose and aims of the curriculum.			
3. The specific subject methodology selected is suited to the likely context(s) in which the subject will be taught and learned.			
4. Strong evidence is present that the specific subject methodology is congruent with the selection of content and the cognitive demands of the subject at this level.			
5. The methodology is suited to the interest and capacities of learners at this level.			
<b>Total (maximum score=15):</b>			

## 6. Assessment guidance

### 6.1 Level of guidance for, and weighting of, internal and external assessment

1a. and 1b. In **Table 7**, for each curriculum, indicate whether guidance is provided for **internal assessment** (**0** = no; **1** = yes), and please provide document and page numbers where evidence of this guidance can be seen;

2a. and 2b. Indicate whether this information, if present for **internal assessment**, provides specific, clear, explicit, and comprehensive guidance with respect to evaluation criteria to be used (**0** = no/ not present/ not applicable; **1** = information is present but is sketchy, general, implicit, and unclear; **2** = information is present and is partly sketchy, general, implicit, and unclear and only partly clear and explicit; **3** = information is present and specific, clear, explicit, and comprehensive). Please provide document, page, and paragraph references for guidance that is **clear**;

3a. and 3b. Indicate the number of tasks specified for **internal assessment**. If no number of tasks is specified *but* internal assessment is required, put a **0** in the box. If no internal assessment is required, put **00** in the box. If internal assessment tasks are specified, enter the number and type of tasks, and give the relative weighting of each. Please provide document and page references for information on the type and weighting of these tasks;

4a. and 4b. In **Table 7**, for each curriculum indicate whether guidance is provided for **external assessment** (**0** = no; **1** = yes), and please provide document and page numbers where evidence of this guidance can be seen;

5a. and 5b. Indicate whether this information, if present for **external assessment**, provides specific, clear, explicit, and comprehensive guidance with respect to evaluation criteria to be used (**0** = no/ not present/ not applicable; **1** = information is present but is sketchy, general, implicit, and unclear; **2** = information is present and is partly sketchy, general, implicit, and unclear, and only partly clear and explicit; **3** = information is present and specific, clear, explicit, and comprehensive). Please provide document, page, and paragraph references for guidance that is *clear*;

6a. and 6b. Indicate the number of tasks specified for external assessment. If no number of tasks is specified but external assessment is required, put a **0** in the box. If external assessment tasks are specified, enter the number and type of tasks, and give the relative weighting of each. Please provide document and page references for information on the type and weighting of these tasks;

## **6.2 Indicate the relative weighting of each form of assessment (internal and external) as a percentage of the final mark (e.g. 25% internal; 75% external).**

### **6.3 In a maximum of 150 words per answer, please provide brief descriptions to back up your ratings for the seven questions above, as follows:**

- 👉 Describe briefly, the types and clarity of *guidelines* given for **internal assessment** (maximum 150 words). Please list the documents and page numbers where evidence for your rating in 2a and 2b can be found.
- 👉 Describe briefly, the types and clarity of *tasks* given for **internal assessment** (maximum 150 words). Please list the documents and page numbers where evidence for your rating in 3a and 3b can be found.
- 👉 Describe briefly, the types and clarity of *guidelines* given for **external assessment** (maximum 150 words). Please list the documents and page numbers where evidence for your rating in 4a and 4b can be found.
- 👉 Describe briefly, the types and clarity of *tasks* given for **external assessment** (maximum 150 words). Please list the documents and page numbers where evidence for your rating in 5a and 5b can be found.

**Table 7: Table for recording analysis of internal and external assessment**

6. Assessment guidance	NATED 550 SG	NATED 550 HG	NCS 2008
1a. <b>Internal assessment</b> guidelines present (yes/no)			
1b. Insert document number and page reference indicating where <b>internal assessment</b> guidance can be found			
2a. Is guidance for <b>internal assessment</b> specific, clear, explicit, and comprehensive?			
2b. Insert document number, page reference, and paragraph where clear information can be found for <b>internal assessment</b>			
3a. Number of <b>internal assessment</b> tasks, plus weighting			
3b. Insert document and page numbers for evidence of weighting for <b>internal assessment</b> tasks			
4a. <b>External assessment</b> guidelines present (yes/no)			
4b. Insert document number and page reference indicating where <b>external assessment</b> guidance can be found			
5a. Is guidance for <b>external assessment</b> specific, clear, explicit, and comprehensive?			
5b. Insert document number, page reference, and paragraph where clear information can be found for <b>external assessment</b>			
6a. Number of <b>external assessment</b> tasks, plus weighting			
6b. Insert document and page numbers for evidence of weighting for <b>external assessment</b> tasks			
7. Indicate the <b>relative weighting</b> of each form of assessment (internal and external) as a percentage of the final mark (e.g. 25% internal; 75% external).			

## 7. Availability, user-friendliness and use of curriculum documents

Complete the table below, relying on your knowledge of the availability of these curricula, and the uses to which you understand they are put.

**Table 8: Table for recording analysis of availability and user-friendliness of curriculum documents**

7. Availability/ user-friendliness of the document	NATED 550 SG	NATED 550 HG	NCS 2008
1. From your experience, is the documentation for this curriculum readily available?	Yes/ No/ Not sure	Yes/ No/ Not sure	Yes/ No/ Not sure
1.1 To teachers			
1.2 To subject advisors			
1.3 In provincial departments of education			
1.4 In the DoE itself			
1.5 To examiners			
1.6 To moderators			
1.7 To materials developers			
1.7 In methodology departments in schools of education			
1.8 On the Internet?			
<b>Counts: Yes No Not sure</b>			
2. From your experience, is the documentation available for this curriculum...?	Yes/ No/ Not sure	Yes/ No/ Not sure	Yes/ No/ Not sure
2.1 A single document?			
2.2 A complete/ comprehensive document?			
2.3 Readily identifiable by title and date?			
2.4 Internally consistent?			
2.5 Used regularly by teachers?			
<b>Counts: Yes No Not sure</b>			
3. From, your experience, has the documentation for this curriculum strongly underpinned day-to-day classroom practice?			
	Yes/ No/ Not sure	Yes/ No/ Not sure	Yes/ No/ Not sure

## 8. Concluding tasks

Once you have completed all of the tasks in Points 1–7 above, please submit a written report with full responses to the following questions:

1. Is the assumption that the NATED curricula and the *National Curriculum Statement* require similar levels of knowledge and skill in order to pass, a justifiable assumption? Regarding the levels of cognitive difficulty comprised by the three curricula – in an overall sense, how do the *National Curriculum Statements* rank against the NATED 550 Higher Grade curricula and the NATED 550 Standard Grade curricula respectively? Are the NCS curricula comparable to the Higher Grade or Standard Grade curricula, or to mixtures of the two previous curricula? If the level of difficulty of the NCS curricula is somewhere between that of the earlier Higher Grade and Standard Grade curricula, in what proportions are the respective percentages of the levels of each of the earlier curricula? How would you rate it? For example, you could say 60:40 HG to SG, based on actual counts of your ratings up to this point (counts which need to be stated here please). Please use specific evidence from *all* of the applicable tables for tasks in Points 1–7 above to answer this question (for example, specific amounts of content and skills at specific levels, *and* amount/ pacing of content and skill acquisition, *and* sequencing of content/ skills, etc.)(1000 words maximum).
2. Having undertaken this form of evaluation of the curricula, do you regard the questions asked about the curriculum as providing a reliable indicator of the usefulness of the curricula as (i) tools to guide classroom practice; (ii) guidance to examiners and moderators; and (iii) guidelines for materials developers and others who may have an interest in the curriculum? Please motivate your answer (500 words maximum).
3. Do you think that the elements identified in the evaluation (namely, content specification, organising principle, pacing, etc.) unfairly advantage – or disadvantage – a particular expression of what needs to be taught and learned in classrooms in the senior secondary phase of school? Please explain why you are of this opinion (400 words maximum).
4. This reporting format has been provided in an attempt both to focus your evaluation of the curricula, but also to find ways of gathering data that is more directly comparable than has emerged from previous evaluations. It has not been intended as a straitjacket for your capacities. In your opinion, has completing this report provided an opportunity for you to be able to express your understanding of the curriculum? If this formatting has excluded insights that are critical to a better understanding of the value and levels of the curricula being examined, please could you add your judgments here – please tell us how the reporting format has either enhanced or constrained your professional capacity to make judgements about the curricula, and please also add any extra points here (400 words maximum).

## Part 2: Comparison of examinations set using the old South African NATED 550 curricula (Higher and Standard Grades) and the new National Curriculum Statements

### Details of evaluators:

Subject:

Grade:

Evaluator:

Date:

1. In this part of the research, you will analyse the 2005 – 2007 NATED 550, and 2008 exemplar NSC examination papers for your subject using **Table 9 and 10** provided below;
2. You will analyse the final 2008 NSC papers in a workshop immediately after the last exam for your subject has been written (October/November 2008), using the same **Table 9 and 10**.

### For Table 10:

1. Closely analyse the 2005–2007 Higher and Standard Grade examination papers for your subject, and report on the following per question (or per subsection of the question, whichever is the smaller of the units):
  - 👉 Please enter the *exam paper code* at the top of each table (indicate in abbreviated form, the subject, level (HG/ SG), paper number (1, 2, 3), and the date of the paper (2005/ 2006/ 2007));
  - 👉 Please place the *question*, or the *subsection* of the question in Column 1 (the 'item' column) in **Table 10** (if, in your opinion, one or more subsections of a question could stand independently, please treat it as a separate item in the table);
  - 👉 Enter the mark for that item in the second column, marked '**max**' (for **maximum mark**);
  - 👉 Enter the **type of cognitive demand** and level of **cognitive difficulty** in the third and fourth columns, using the typology listed in the table below (**Table 9**):
  - 👉 Please list the **content/ skill area** in the fifth column, using the same phrasing that was used in the curriculum evaluation in Part 1 of this study;

**Table 9: Umalusi exam paper analysis instrument showing types and levels of cognitive demand**

Type of Cognitive Demand	Level of Difficulty
<b>Basic conceptual, knowledge</b> - recall, - literal comprehension, - making simple evaluative judgements in terms of previously acquired facts - etc.	Easy
	Moderate
	Difficult
<b>Comprehension, Application</b> - understanding, application, analysis of previously acquired information in a familiar context, - making evaluative judgments that require the use of a range of previously acquired facts/ information - etc.	Easy
	Moderate
	Difficult
<b>Problem-solving</b> - analysis, interpretation and application of information in a new or unfamiliar context, - synthesis, creation of a novel solution or product, - evaluation or making judgment in relation to a mixture of old and new material or information	Easy
	Moderate
	Difficult

- In the sixth column, please add your comment as to whether or not this item is **suitable in content and form** for use in future NCS papers (e.g. 'Suited to the requirements for the old syllabus and the NCS in content and form. Can be used as an item in future NCS examinations', or 'Suitable for the old syllabus but not for NCS', etc.)
- In the seventh column, please insert the NCS Learning Outcome and Assessment Standard for which this item could be used;
- In the eighth column, please insert the NCS paper in which the item could be used.

**Table 10: Table for recording analysis of matric examination papers**

e.g. BIOHGP1							
Item	Max	Type of cognitive demand	Level of Difficulty	Content/ skill/ topic	Comment	NCS assessment standard	NCS PAPER
e.g. 1.1.1	2						
e.g. 1.1.2	2						
e.g. 1.1.3	2						
e.g. 1.1.4	2						
e.g. 1.1.5	2						
e.g. 1.1.6	2						
e.g. 1.2.1	1						
e.g. 1.2.2	1						
1.2.3	1						
1.2.4	1						
1.2.5	1						
1.2.6	1						
1.2.7	1						
1.2.8	1						
1.3.1	2						
1.3.2	2						
1.3.3	2						
1.3.4	2						
1.3.5	2						
1.3.6	2						
1.4.1	2						
1.4.2	2						
1.4.3	2						
1.5.1	1						
1.5.2	2						
1.5.3	1						
1.5.4	2						
1.6.1	2						
1.6.2	2						
1.6.3	2						
2.1.1	1						
2.1.2	2						
2.1.3	2						
2.2.1	3						
2.2.2	2						
2.2.3	1						
2.2.4	2						
2.2.5	6						



Table 10 continued: Table for recording analysis of matric examination papers

e.g. BIOHGP1							
Item	Max	Type of cognitive demand	Level of Difficulty	Content/ skill/ topic	Comment	NCS assessment standard	NCS PAPER
2.2.6	6						
3.1.1	5						
3.1.2	4						
3.1.3	2						
3.1.4	2						
3.2.1	6						
3.2.2	3						
3.2.3	3						
4.1.1	1						
4.1.2	3						
4.1.3	1						
4.1.4	2						
4.1.5	2						
4.2.1	3						
4.2.2	2						
4.2.3	2						
4.3.1	3						
4.3.2	6						
5.1.1	4						
5.1.2	3						
5.2.1	1						
5.2.2	2						
5.2.3	2						
5.2.4	2						
5.2.5	3						
5.2.6	1						
5.3.1	3						
5.3.2	4						
TOTAL	150						
Qu 1	50			% BE; BM; BD			
Qu 2	25			% CE; CM; CD			
Qu 3	25			% PE; PM; PD			
Qu 4	25						
Qu 5	25						
TOTAL	150						

(Please add as many rows as are needed)

## Concluding tasks

Once you have completed the analyses of the Higher and Standard Grade examinations, and those of the August 2008 exemplar papers, please submit a written report with full responses to the questions that follow. When you have completed the analysis of the 2008 final exam papers, please answer Questions 3 and 4, which relate to these papers. Please answer fully, and provide evidence for all of your answers based on the countable facts in **Table 10** for each of your analyses.

1. Do the August 2008 exemplar papers allow for learners who would have achieved A-grades in the old Higher Grade papers to achieve A-grades in the new NSC exams *where the new A-grades are comparable to the old Higher Grade A's*? Please indicate the exemplar NSC items which would reflect this new A-grade achievement. Please base your answer on specific findings shown in **Table 10** (maximum number of words: 600).
2. Do the August 2008 exemplar papers allow for the average learner passing at the level of the old Standard Grade papers to pass the new NSC exams? Please indicate the exemplar NSC items that would allow the Standard-grade-level learners to pass. Please base your answer on the specific findings shown in **Table 10** (maximum number of words: 600).
3. Do the 2008 final papers allow for learners who would have achieved A-grades in the old Higher Grade papers to achieve A-grades in the new NSC exams *where the new A-grades are comparable to the old Higher Grade A's*? Please indicate the final NSC items that would reflect this new A-grade achievement. Please base your answer on specific the findings shown in **Table 10** (Maximum number of words: 600).
4. Do the 2008 final papers allow for the average learner passing at the level of the old Standard Grade papers to pass the new NSC exams? Please indicate the final NSC items that would allow the Standard-grade-level learners to pass. Please base your answer on the specific findings shown in **Table 10** (maximum number of words: 600).
5. From your analysis of the 2005–2007 Senior Certificate examination papers, are the examinations, in your opinion, roughly of a comparable standard across the three years? Or, is there any particular year, or even paper, that seems to be an anomaly? Please motivate and provide evidence for your position (maximum number of words: 300).
6. What, in your opinion, distinguishes most significantly between the standard of the Higher and Standard Grade exams? Please answer fully, and base your answer on the facts in the analytical tables (maximum number of words: 300).
7. From the analysis of the NSC exemplar papers, how do they compare with the Higher and Standard Grade papers that have preceded them? If there are any points of comparison not covered in the tables you have already drawn up, please describe these in detail (maximum number of words: 300).
8. From the analysis of the Higher and Standard Grade papers, and the NSC exemplar papers, how do the final 2008 papers compare with those that have preceded them? If there are any points of comparison not covered in the tables you have already drawn up, please describe these in detail (maximum number of words: 300).
9. In your opinion, are the exemplar papers themselves a good model for future examinations, or should their format be critically re-examined immediately? Please make specific suggestions (maximum number of words: 300).
10. Please comment on the language level in the August 2008 exemplar and final exam papers (maximum number of words: 300)

## Part 3: Composite reports (team leaders only)

### 3.1 Composite report on curriculum evaluation

The subject team leaders will each be asked to submit a composite report for their subjects. This report should be a Word document, but also include the Excel-tables with composite findings. These reports will combine the Word and Excel reports of all four experts in the team, and be submitted to Umalusi once all three other team members per subject have looked at and agreed to drafts of these composite reports. The composite curriculum reports will use the same headings as used in **Part 1** of this study (the curriculum evaluation), please see the list below. For each subsection, a maximum of 500 words is required, with the exceptions of **Sections 6 and 8.1**, for which a maximum of 750 words is required:

1. **Content specification and coverage**
  - 1.1 **Content specification**
  - 1.2 **Content weighting**
  - 1.3 **Content focus**
  - 1.4 **Skills specification**
  - 1.5 **Skills weighting**
  - 1.6 **Skills focus**
  - 1.7 **Text specifications (to be answered only by Language groups)**
2. **Organising principle and coherence**
3. **Sequence, progression and pacing**
4. **Aims/purpose/vision/outcomes**
5. **Teaching approach and subject methodology**
  - 5.1 **General teaching/ learning approach (pedagogy)**
  - 5.2 **Subject-specific methodology**
6. **Assessment guidance**
  - 6.1 **Level of guidance for, and weighting of, internal and external assessment (750 words max.)**
7. **Availability, user-friendliness and use of curriculum documents**
8. **Concluding tasks**
  - 8.1 **Concluding task 1 (level of NCS curricula) (750 words max.)**
  - 8.2 **Concluding task 2 (suitability of evaluation tool)**
  - 8.3 **Concluding task 3 (fairness of elements of evaluation tool)**
  - 8.4 **Concluding task 4 (additional insights)**

### 3.2 Composite report on exam-paper evaluation

The Umalusi subject team leaders will each be asked to submit a composite report for their subjects. This report should be a Microsoft™ Word™ document, but should also include the Microsoft™ Excel™ tables with composite findings. These reports will combine the MS Word and MS Excel reports of all four Umalusi experts in the team and will be submitted to Umalusi once all three other team members per subject have looked at and agreed to drafts of these composite reports. The composite exam-paper reports will use the same headings as those used in **Part 2** of this study (the exam-paper evaluation), please see the list below. For each subsection, the maximum number of words is given in brackets below:

1. **Level of difficulty of the items in each paper (from Table 10)** (1000 words maximum)
2. **Suitability of items for use in future NCS exams (from Table 10)** (1000 words maximum)
3. **Concluding tasks**
  - 3.1 Concluding task 1 (level of NCS exemplar exams for A-grade Higher-Grade-level learners) (1000 words maximum)
  - 3.2 Concluding task 2 (level of NCS exemplar exams for passing Standard-Grade-level learners) (1000 words maximum)
  - 3.3 Concluding task 3 (level of NCS final exams for A-grade Higher-Grade-level learners) (1000 words maximum)
  - 3.4 Concluding task 4 (level of NCS final exams for passing Standard-Grade-level learners) (1000 words maximum)
  - 3.5 Concluding task 5 (comparability of exams) (1000 words maximum)
  - 3.6 Concluding task 6 (HG/ SG distinguishing factors) (500 words maximum)
  - 3.7 Concluding task 7 (exemplar NCS versus HG/ SG exam paper levels) (500 words maximum)
  - 3.8 Concluding task 8 (final NCS versus exemplar and HG/ SG exam paper levels) (500 words maximum)
  - 3.9 Concluding task 9 (exemplars as models) (500 words maximum)
  - 3.10 Concluding task 10 (language level) (500 words maximum)

END OF PART 1





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