The 'F' in NC(V)

Benchmarking common subjects in the NSC and the NC(V)

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May 2010

PUBLISHED BY

UMALUSI

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General and Further Education and Training

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Acknowledgements

The present research is an organic extension of work undertaken by Umalusi in the 2008 *Maintaining Standards* project, and uses the evaluation instrument developed and refined in that project. The instrument has a long developmental history in Umalusi research, but the instrument in its current form was designed by Dr Heidi Bolton and Ms Elizabeth Burroughs. Minor changes as a result of input from the previous research to hone the tool for its new purpose were ably effected by Ms Celia Booyse and Dr Sharon Grussendorff. Each of the four Umalusi teams involved in the current research will also have made small but necessary adjustments to the instrument to ensure a fit between it and their particular subject.

Ms Booyse managed the project, coordinating the work of the four Umalusi teams and ensuring the interpretation and application of the research instrument. Ms Joan Houston and Ms Booyse wrote the present overview report, with additional input from Ms Burroughs. The report is based on the findings and recommendations in the four final subject reports, which were crafted by Mr Matthys de Jager, Ms Lynn Bowie, Dr Grussendorff and Ms Houston. These reports will be published separately in due course, and their respective authors and contributors will be acknowledged.

Umalusi would nevertheless here like to thank and formally acknowledge the Umalusi subject teams responsible for the data analysis – with respect to both the curricula and the exams – which made this final report possible. Without the sustained and painstaking work of these Umalusi teams and the detailed, extensive reports written by the people duly acknowledged above, this overview report could not have been written. The positive attitude within the teams and the in-depth discussions and collaboration are commendable. The teams are as follows:

Mr Matthys de Jager (Umalusi team leader: English First Additional Language)
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Mr Rajen Govender

Within Umalusi, support for this project came from many quarters. The project was financially supported by the QCC, QAA and SIR units, and members of staff in these units need to be

duly acknowledged. In QCC, Ms Booyse was ably assisted by Ms Helen Matshoba, Ms Lesego Mgidi and Ms Lilygirl Bodila. From SIR, the longstanding support of Mr Emmanuel Sibanda is acknowledged. The administrative support of Mr Frank Chinyamabomvu, also from SIR, in finding curriculum documents needed for the analysis must also be noted with thanks. In QAA, support for the examination analyses came from QAA, and the help of Ms Marisa du Toit and Ms Heather Erasmus is thankfully acknowledged.

Ms Burroughs and Ms Booyse assisted with finalising the draft report, while Mr Russell de la Porte edited the report, and *Ideaology Communication & Design* was responsible for the final design and layout.

Umalusi once again extends its thanks to all who have made this report possible.

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List of acronyms

Acronym	Meaning
PoA	Portfolio of Assessment
FET	Further Education and Training
DoBE	Department of Basic Education
DHET	Department of Higher Education and Training
EFAL	English First Additional Language
HEI	Higher Education Institution
IEB	Independent Examinations Board
LOLT	Language of Learning and Teaching
NCS	*National Curriculum Statement*
NC(V)	*National Certificate (Vocational)*
NQF	National Qualifications Framework
NSC	*National Senior Certificate*
GET	General Education and Training
HESA	Higher Education South Africa
GETC	General Education and Training Certificate
ISAT	Internal Summative Assessment Task
ICASS	Internal Continues Assessment
GTZ	Gesellschaft fur Technische Zugsammenarbeit (The German Technical Aid Agency)

Glossary

Applied Competence	Practical application of an ability or skill
Examination Guidelines	The formal written explanation of required content / skills expected to be assessed in the examination, a required part of any curriculum
Learning Outcome	An explanation of what to be achieved by the learner through the learning process
Learning Programme Guidelines	Guidelines to inform teachers how they might structure a programme for learning based on the curriculum
National Curriculum Statement	The curriculum underpinning the *National Senior Certificate*
National Senior Certificate	School-leaving NQF Level 4 qualification in the GET sub-framework, written after the completion of 12 years of learning
Outcomes-Based Education (OBE)	The approach underpinning the NCS which places the emphasis on the learners' successful achievement of identified abilities
Subject Assessment Guidelines	Written guidance informing the assessment in a particular subject

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Executive Summary

Umalusi has a history of research, which has had as its primary purpose the establishment and understanding of the standard of the South African *matric* – first the *Senior Certificate*, and more recently, its successor, the *National Senior Certificate (NSC)*. In 2008, Umalusi conducted research which compared the NSC curriculum and examination (exemplars and the first 2008 papers) to those of the *Senior Certificate*, both Higher and Standard Grades. The primary purpose for this research was to ensure continuity of standard between the old and new qualifications. The research, which became known as the *Maintaining Standards* project, was primarily undertaken to strengthen the relationships between the old and new *matric* examinations for standardisation purposes.

In 2009, Umalusi extended the research to evaluate and compare certain subjects in the *National Certificate (Vocational)*, the NC(V), with the same subjects in the NSC. While the research clearly forms a part of the *Maintaining Standards* research, it also makes connections with other, earlier research undertaken by Umalusi, notably on the role of the *fundamental* component in qualifications in General and Further Education and Training (2007), and with the even earlier comparison between school and college subjects (2006). As the new Quality Council, Umalusi is taking a great interest in these two major qualifications it quality assures and certifies. And so, the present research was commissioned in order to ensure a more detailed and sophisticated understanding of both the two Level 4 qualifications. It is important for Umalusi – and the education and training system at large – to know:

1. In what respects the two qualifications are similar;

2. How they differ (Is the one more vocationally oriented – at least in terms of its *fundamental* component – while the other provides a more academic form of learning?);

3. How the NC(V) Levels 2 and 3 map against Grades 10 and 11 to allow for the possibility of exemptions at those levels;

4. Whether there is sufficient overlap in terms of the curricula and shared standards to allow for subject exemption between the qualifications for certification purposes;

5. Whether the various NC(V) qualifications are correctly placed on the NQF levels, since there are perceptions to the contrary.

In order to answer these questions, the research process made use of two data-collection tools. The first instrument facilitated the comparison of the NC(V) subject curriculum with the NSC equivalent, while the second evaluation tool was used to analyse the levels of cognitive demand of the NC(V) Level 4 examination. Once the tools had been used for the purpose of analysis, the Umalusi teams were asked to answer a series of questions designed to help answer a range of questions.

It was also eventually agreed that the findings of the exam analysis of the NSC Grade 12 examinations, which had been undertaken previously, could be used to make a set of provisional judgements regarding the level of difficulty of the 2009 NC(V) examination. These observations need to be regarded as tentative as both qualifications have a very

short history. It was nevertheless felt that to venture a preliminary comparison might provide insights that could help to inform the decisions regarding exemption from having to do certain subjects for a second time, if for example, the learner enrols for the NC(V) after having passed the NSC. Umalusi did not make a formal comparison between the two exams because the NC(V) Level 4 exam had had no precedent.

The research planned to deal with two areas of uncertainty. The first was to establish the comparability of the NC(V) curriculum at Levels 2, 3 and 4 with that of the NSC curriculum across the three final years of schooling. The second was to establish a baseline understanding of the level of difficulty and cognitive demand of the very first set of NC(V) Level 4 examinations in the subjects evaluated, so that from 2010, both the NSC and NC(V) exams can be monitored against one another as the two new qualifications bed down.

It needs to be remembered that the original purpose of the *Maintaining Standards* research was to provide substantive support to decisions made in standardising the subjects in the new NSC qualification. Yet, because the NSC is being used as a benchmark against which to assess the NC(V), this does not *in any way* suggest that the NSC is somehow the superior qualification. The NSC happens to be the qualification that, through research, Umalusi has come to know well, at least in terms of its intended and examined curricula. In the present report, the focus of the questions asked of the Umalusi evaluation teams were different, and the detailed findings were intended to provide insightful information, which Umalusi could offer in support of strengthening the educational system through curriculum review and examination analysis.

In terms of the structure of the report:

Part 1 locates the present research within the family of research projects that Umalusi has undertaken over the years. This overview shows the common concerns that link it to earlier research related to vocational and occupational qualifications in General and Further Education and Training.

Part 2 provides a fairly detailed description of the two qualifications being compared, the NC(V) and the NSC. The descriptions indicate the duration of the qualification, its target group, the number of subjects included in the qualification, and the rules of combination that determine the qualification. These descriptions will help readers to understand that the comparison cannot be regarded as a straightforward process, since qualifications differ in terms of duration, the number of subjects candidates are expected to study, and the additional demands that may be made on learners in terms of how the qualifications are defined.

Part 3 provides a very brief overview of Umalusi's standard-determining research in order to locate the present evaluation. It also presents the research questions that the Umalusi evaluation teams were asked to address. They were:

a. Comparability of the *National Certificate (Vocational)* curriculum with that of the *National Senior Certificate*

The Umalusi teams were required to determine whether the NC(V) curricula for four subjects – Mathematics, Mathematical Literacy, Physical Science and English First Additional Language – are comparable with their *National Curriculum Statement* counterparts underpinning the NSC. The following questions were posed to each team:

1. Are the exit points for the NC(V) Level 4 curriculum and that of the NSC curriculum of a comparable standard?

2. Are the exit points for the NC(V) Levels 2 and 3 comparable to the levels of achievement intended in Grades 10 and 11?

3. Could you find reliable evidence in the curricula of
   a. tools to guide classroom practice
   b. guidance for examiners and moderators, and
   c. guidelines for materials developers and others who may have an interest in the curriculum?

4. Are there indicators in the documentation regarding content specification, the organising principle, pacing, etc. that may fairly advantage, or disadvantage, teaching and learning of one of these curricula in the classroom?

5. Are the NC(V) curricula vocational in their content, context and application?

The matter of the comparability of the curricula (including exams) is important, not only in terms of a more nuanced national understanding of how the two major South African school exit qualifications compare, but this understanding is also of importance to South African Higher Education institutions, which also have admission requirements determined for both these qualifications.

b. The level of difficulty and cognitive demand of the NC(V) Level 4 examination

Regarding levels of difficulty and cognitive demand, the Umalusi teams were requested to analyse the NC(V) Level 4 exam papers in an item-by-item manner and to focus especially on the following:

1. Whether there is evidence of progression from the Level 2 and Level 3 papers (as previously evaluated) towards the 2009 Level 4 papers.

2. The extent of evidence there is to confirm that the 2009 Level 4 exam paper(s) comply with the Subject Assessment Guidelines (SAG) as set in the curriculum. (The teams were to use their findings in the curriculum analysis and with the data collected in Column 3 and 5 in the Exam Analysis Table for reference in their reporting.)

3. Identification and description of the level of difficulty and cognitive demand in the paper(s) and commentary on how vocationally oriented the examination questions are. (The teams could use the data gathered in Column 3 and 4 of the exam analysis data collection sheets.)

4. Consideration of whether the 2009 NC(V) Level 4 final papers were a good model for future examinations, or whether the format of the papers should be critically reviewed before the next examination.

5. Whether the language level in the exam papers was appropriate.

Part 4 of the report draws together the curriculum findings made by the four Umalusi subject evaluation teams in order to highlight significant features within each of the curriculum documents, and where possible, to identify important similarities and differences between the ways in which these NC(V) curricula have been constructed.

The chapter ends with a fairly detailed conclusion, in which findings from the 2008 Maintaining Standards document for the NSC curricula are drawn in to allow for some reflection on the

similarities and differences between the NC(V) and NSC curricula, in an attempt to answer some of the questions about how these sister qualifications relate to one another in the education system. This section also makes some recommendations, which the Umalusi teams believe will be useful in future curriculum review processes.

Part 5 describes the examination analysis process and summarises the findings made through applying this tool to the NC(V) exams – at all three levels – to provide an insight into progression with respect to cognitive demand and levels of difficulty. The description for each subject concludes with a paragraph that looks across to the NSC examination findings for the same subject. Although not a formal part of the mandated research, it was felt that reflection, even if informal, on the comparative challenge represented by the respective examinations would be a helpful guide to future work.

Part 6 provides a conclusion and draws together the recommendations already proposed in earlier chapters.

1. Background to the research project

1.1 The role of *fundamental* subjects in General and Further Education and Training Qualifications

The inclusion of the so-called *fundamental* subjects – Mathematics or Mathematical Literacy, and a language(generally taken to be the language of learning and teaching (LOLT)) – at the NQF Level of the qualification has been a compulsory requirement determined by the South African Qualifications Authority (SAQA) as a basic principle of qualification development and registration for NQF Levels 1 - 4. The term, *fundamental*, is one of the three categories introduced by SAQA for organising learning into qualifications. The intention behind the regulation requiring a *fundamental* component at the same level as the qualification itself has been to frame qualifications so as to ensure that learners have sufficient general education to serve as a foundation for the learning that they undertake, as well for further learning, in order to "progress to higher levels". (SAQA, 2004:1).

The *fundamental* component became that part of the qualification structure that in many SAQA-registered qualifications contains a number of disparate unit standards for language and for Mathematics. The outcomes of these unit standards are supposed to specify and identify the necessary and critical standard for providing the basic educational grounding for study, without any further documentation being necessary.

Umalusi has concurred with the principle that mathematics and a language should form the basis of any general education qualification, even suggesting that the term *compulsory* subjects replace the term *fundamental* component*, but* it has resisted how the *fundamental* component has frequently been constructed (through SGB processes separated from any educational locus), described (as small, discrete units of learning), taught (without a syllabus or curriculum) and assessed (locally, by individual assessors without recourse to some form of established standard). Umalusi's position has been that for a cost-effective approach to an education and training system with large numbers of learners involved, there needs to be detailed documentation – a syllabus or a curriculum – which guides teaching and learning, *external assessment* that counts for at least 50% of the learners' final results, and careful monitoring of the quality of tuition and assessment offered by the teaching institution.

1.2 The issue of 'embedding' or contextualising the *fundamentals*

Within unit standards-based qualifications, which have been offered primarily in the workplace and quality assured by SETAs through their ETQA functions, one of the models used for offering the *fundamentals* has been that of 'embedding' the *fundamentals* into the vocational/occupational training. This practice, researched and reported on in *The 'f' word* (Umalusi, 2007), gives rise to numerous difficulties, which include the following: highly selective coverage of the necessary learning required for the acquisition of general mathematical and/or language knowledge and skills; the teaching of these basics subjects by a person whose field of expertise is occupational/vocational, and who may not have the necessary

background to teach language or Mathematics; limited, local forms of assessment that do not form part of a nationally recognised record for the learner that is comparable to that of learners coming from other, supposedly, similar programmes, and so on.

The assumption that has driven this approach has been that it is easier for learners to learn the principles of mathematical problem-solving in a context that is already familiar than it is when the *fundamental* subject is separate from the vocational environment. Umalusi's earlier research (2007) indicates that the opposite is likely to be true since the approach to the teaching and learning of the language or mathematics is piecemeal and subject to the exigencies of the teaching of the vocational subject. Such an approach, as was evident in the programmes reviewed, fails to build up a coherent body of knowledge that can be transferred to other contexts.

The converse approach – that of teaching the relevant discipline in its own terms – and expecting the learner to find the relevant applications in the workplace was how generations of post-school adult learners acquired the necessary maths or science theory or language in order to fulfil the learning requirements for artisanship (Gamble, 2009). The approach does not preclude the possibility of using examples requiring problem-solving from the learners' area of interest, but never sacrifices the demands of the discipline to other considerations.

A tendency to move away from clear divisions between learning areas arose from the notion that the integration of learning would promote a transfer of knowledge and skills and that, especially with adult learners, because learning time was limited, many things ought to be taught simultaneously. While this insight may be true, it requires exceptional teaching skills and learning materials for the focus of the process not to be diluted.

So, should *fundamental* curricula be more or less constant across qualifications, regardless of whether the qualifications would be typified as 'general academic' or as 'general vocational', or not? In other words, should the curricula for subjects such a languages, Physical Science and Mathematics be somehow 'tweaked' to be suited for more specific vocational purposes in a general vocational qualification, or should they be offered more or less recognisably as the *fundamental* general learning blocks of an education? Should the adjustment lie in somehow 'vocationalising' the curriculum and the exam? Should the curriculum for language in the NC(V) Early Childhood Development (ECD) programme be different from the language in the NC(V) programme for Engineering programmes? Or should the adaptation be located in the level and manner of teaching and assessing instead, bearing in mind that the learners for the NC(V) will have chosen it because it is *not* the NSC?

Over the years, Umalusi has maintained that an unambiguous focus on the learning of the relevant discipline is required. Learning sufficient Mathematics, a language or Physics and Chemistry require time dedicated to learning in accordance with a well-structured syllabus or curriculum, and sufficient assessment to guide the learners' understanding of their progress and, ultimately, of their achievement. The acquisition of a recognisable general form of learning has sometimes been accused of being 'irrelevant' and of being elitist, but if one goes back to the principle that these subjects, properly taught and learned, are the building blocks for all other learning, then it is important for these subjects to be offered on their own terms, and not as an adjunct to other learning.

It is worth noting that the option of providing Mathematics as Mathematics and language in its own terms has been the one chosen in the innovative Foundational Learning Competence (FLC) projects initiated by the Department of Labour and supported by the GTZ. This pilot project, which formed part of preparatory work done in advance of the founding of the

QCTO, chose to separate the learning essential to basic competence in a language, English, and Mathematics, arguing that *any additional* language or Mathematics *skills* required by a class of occupations should be located in the qualification and the curriculum of that particular group of qualifications reflected, and not in the foundational curriculum. In short, the project has suggested that there are certain competences that learners must acquire if they are to be equipped to learn further *in any vocational field*. The separateness of this critical, non-vocational and generic learning is apparent in the thinking of the newly formed QCTO, which has consciously set the Foundational Learning Programmes outside of their own Occupational Qualifications Framework.

1.3 Comparing the *fundamentals* in the NC(V) and the NSC: the background to the present research

From 1994, the new democratic dispensation in South Africa started to introduce changes in the schooling system. The old system, with many different education systems for different population groups, was replaced by a common national examination for all learners, and so, the NATED 550 curriculum for the *Senior Certificate* was replaced by the *National Curriculum Statement (NCS)* as the underpinning curriculum for the new *National Senior Certificate (NSC)*, which is the culmination of twelve years of schooling. In 2008, all learners in Grade 12 wrote common national examinations for the first time. This was a significant educational milestone in our history.

As a sister qualification to the NSC on Level 4 of the NQF, the *National Certificate (Vocational)* was designed to prepare learners of the same age group for a vocational field and, more generally, for the workplace at large. Besides creating a viable alternative route for adolescents still of school-going age, the NC(V) is intended to help alleviate the acute shortage of skilled workers in South Africa, a most pressing need if the country is to grow economically. Furthermore, the NC(V) was conceptualised as an alternative route into Higher Education, even if the access were to be restricted to programmes and qualifications related to the learner's vocational choice within the NC(V).

The purpose of the vocational qualification is to provide a suite of subjects that equips learners with the necessary theoretical background knowledge as well as practical competence for the mastery of a particular trade or technical skill needed in the employment market.

During 2008, Umalusi conducted research into the new South African *National Curriculum Statement (NCS)*, which underpins the NSC, in order to gain an understanding of the quality and levels of cognitive demand of the new curricula in Mathematics, English FAL, Physical Science, Life Science, Geography and Mathematical Literacy. The research, extended in 2009 to four more subjects, compared the NSC curriculum documents and exams (exemplars, and the 2008 and 2009 question papers) to those of the NATED 550 curricula for both Higher and Standard Grades in the old *Senior Certificate*. The primary purpose for this *Maintaining Standards* research was to ensure continuity of standard between the old and new qualifications, but the research has found additional uses, including being able to provide detailed and constructive feedback regarding the subject curricula and the examinations.

In addition, also in 2009, Umalusi undertook similar research on four of the *National Certificate (Vocational)* subjects, English First Additional Language (EFAL), Mathematics, Mathematical Literacy and Physical Science. The research, using the same instruments and methodology, aimed to examine the comparability of the NSC and the NC(V) in terms of their curricula

and the standards set through the quality of the examinations in the individual subjects. Furthermore, the research was aimed at finding out how progression is taking place across NC(V) Levels 2, 3 and 4, as well as sequencing, pacing and the ways in which the NC(V) adheres as a qualification to vocational demands.

Before moving on to the main body of findings, it is important to make a few critical provisos. The first is that while the 2008 *Maintaining Standards* was predicated on comparing the NSC to the older and better known qualification, the *Senior Certificate*, this was because a bridge needed to be built from the one assessment system to the other. It certainly did not mean that the SC was seen as representing some form of ideal standard. Similarly, the comparison of the curricula of the NSC and the NC(V) does not presuppose that because the NSC is the more researched of the two qualifications, it is somehow 'better' and is therefore necessarily the key to standards in the system. Umalusi is of the opinion that both qualifications are critically required in Further Education and Training to serve related, but far from identical needs.

The findings from this preliminary work *must* be seen as provisional. Both qualifications and their related assessment processes are in the very first stages of development. The present findings are offered with the intention of helping to strengthen processes, amend possible shortcomings and understand better the relationship between the NSC and NC(V) as they are currently offered.

Finally, it is worth noting in passing that, while Physical Science has never formally been included in the definition of the *fundamental* component, Umalusi has always included it in its research because of the critical, gate-keeping role it plays in respect of access to further learning in technical fields.

2. An overview of the NSC and NC(V) qualifications

Both the *National Senior Certificate* and the *National Certificate (Vocational)* are new, and have replaced older qualifications. Both are designed for a specific group of learners (primarily 16 - 19 year olds) for related but slightly different purposes.

T he NC(V) is a vocational qualification for those leaving school with a minimum of Grade 9, and, in practice, for those who are out of school but who wish to achieve a NQF Level 4 qualification. The qualification was introduced in 2007, and was first examined at NQF Level 4 in 2009.

The new *National Senior Certificate* replaces the old *Senior Certificate*, which was underpinned by the NATED 550 curriculum. The old certificate was the culmination of 12 years of education. The new NSC includes Grades 0 to 9, which are compulsory (the General Education phase), and Grades 10 to 12 (the Further Education phase). In these final three years, learners study for the *National Senior Certificate (NSC)*. The qualification was introduced in 2006, and was first examined in 2008.

2.1 The National Certificate (Vocational)

2.1.1 The structure and purpose of the qualification

The *National Certificate (Vocational)* (NC(V)) is registered on the National Qualifications Framework (NQF) at Level 4. At present, the qualification consists of three separate, but closely related one-year exit-level qualifications, which nevertheless function primarily as a 3-year qualification. The exit-levels were intended to align the qualification with the structure proposed for learnerships. While Levels 2 and 3 are registered as exit points, Umalusi currently partially quality-assures these levels but doesn't yet certify them as exit-level qualifications since they are not being treated as stand-alone qualifications.

The NC(V) is not a unit standards–based qualification, but is described in terms of a policy that explains the qualification design and structure, its rules of combination and its assessment requirements. Individual curricula for the subjects flesh out the nature of the learning for the qualification. It is registered as a 130-credit qualification at NQF Level 4. The *fundamental* component consists of three subjects (50 credits) and the 'vocational' component consists of a minimum of four subjects, providing 80 credits towards the qualification. All subjects have a value of 20 credits, except for Life Orientation, which is externally assessed and is worth 10 credits. For the NC(V), the Vocational component 'defines the qualification type'. So, for example, learners specialising in Early Childhood Development (ECD) are awarded a National Certificate Vocational: Early Childhood Development.

The qualification is described in the Government Gazette number 28677 of March 2006 and as amended in Government Gazette number 30266 of September 2007. The admission requirements for the NC(V) to Higher Education are reflected in Government Gazette number 32743 of November 2009.

The main purpose of the qualification is to give learners the necessary theoretical and practical competence to enter the technical and trades fields of employment. The qualification enables learners to acquire the necessary knowledge, practical skills, applied competence and understanding required for employment in a particular occupation or trade or class of occupations or trades, or entrance into Higher Education. The qualification is offered at public colleges, private colleges and other institutions offering FET vocational programmes.

At present, for learners who have done the NSC and who wish to transfer to the NC(V), there is no recognition of NSC subjects, and learners are placed on Level 2.

2.1.2 Rules of combination

Candidates are required to study at least seven subjects at Level 4. The seven comprise:

1. one official language, which also may be the language of learning and teaching (LOLT) at the institution, or at least English First Additional Language (FAL)

2. Mathematics or Mathematical Literacy

3. Life Orientation

4. three subjects from one vocational field

5. one subject from a related sub-field or organising field.

The first three subjects, which comprise compulsory component, are described as *fundamental* subjects and are assessed differently to the four remaining vocational subjects.

2.1.3 Assessment

In the NC(V), *Internal Continuous Assessment* contributes 25% towards the final mark for the *fundamental* subjects, which are evaluated by means of a learner portfolio. The portfolio is a combination of theory and practical work. *External assessment* of *fundamental* subjects contributes 75% towards the final mark. Except for the fundamentals, the *external assessment* mark is a combination of theory and practical components. For the vocational subjects, the *internal* and *external assessment* each contribute 50% toward the final marks, since the focus in the vocational learning is intended to be on the acquisition of practical skills as well as on the related theory.

A seven-point rating scale is used to rate assessment for the fundamental subjects, namely Mathematics or Mathematical Literacy, English FAL (or alternative language of teaching) and Life Orientation.

Outstanding achievement	(80–100%)	7
Meritorious achievement	(70–79%)	6
Substantial achievement	(60–69%)	5
Moderate achievement	(50–59%)	4
Adequate achievement	(40–49%)	3
Elementary achievement	(30–39%)	2
Not achieved	(0–29%)	1

For vocational subjects a five-level scale is used:

Outstanding	(80–100%)	5
Highly competent	(70–79%)	4
Competent	(50–69%)	3
Not yet competent	(40–49%)	2
Not achieved	(0–39%)	1

2.1.4 Awarding of the certificate and progression

In order to obtain a *National Certificate (Vocational)*, the following minimum promotion requirements must be fulfilled. The candidate must have:

1. offered and written examinations in not fewer than seven subjects

2. achieved *40%* in an official language on either First Additional level or Home Language level, provided that the language chosen is a language of learning and teaching (LOLT) of the institution (as listed in 'Table B1' of 'Annexure B' of the *policy document for the National Certificate (Vocational)*

3. achieved *30%* in either Mathematics or Mathematical Literacy(as listed in 'Table B2' of 'Annexure B' of the *policy document for National Certificate (Vocational)*

4. achieved *40%* in Life Orientation(as listed in 'Table B3' of 'Annexure B' of the *policy document for National Certificate (Vocational)*

5. achieved *50%* in four Vocational subjects (sub-fields, as listed in 'Annexure A' of the '*Policy document for National Certificate (Vocational)*.

In addition, a record of evidence must be submitted for any subject failed, for certification to be considered.

2.2 The National Senior Certificate (NSC)

2.2.1 The structure and purpose of the qualification

In South Africa, learners normally undergo 13 years of schooling, from Grade 0, otherwise known as Grade R (*reception year*), through to Grade 12 (*matric*). Grades 0 to 9 are known as General Education and Grades 10 to 12 constitute Further Education. Grades 0 to 9 are compulsory for all children. During the final three years of senior secondary schooling, learners study for the *National Senior Certificate*, a three-year qualification. Successful candidates are awarded the NSC, which allows for three levels of admission to Higher Education: at higher certificate, diploma, and bachelor's degree entry levels. It is possible that a candidate could achieve the NSC without any form of entry to Higher Education, but this would account for a miniscule number of NSC passes.

The NSC is registered on the National Qualifications Framework (NQF) at Level 4, bearing 130 credits. It is a curriculum-based, as opposed to a unit standards-based, qualification. All subjects count for 20 credits except for Life Orientation, which is internally assessed and is worth 10 credits. The NSC is underpinned on a subject-by-subject basis by the *National Curriculum Statement (NCS)*.

For the NSC, candidates are required to study seven subjects, of which one official home language, an official first additional language, Mathematics or Mathematical Literacy and Life Orientation are compulsory. The three remaining subjects are to be chosen from Group B subjects as specified in the NSC policy documents.

Certain combinations of subjects are disallowed, particularly where there is significant overlap between the subjects.

The teaching time is stipulated in the *Learning Programme Guidelines* for the various subjects. Additional anecdotal evidence from teachers in various contexts suggests that actual teaching time per subject ranges from 280 to 400 hours over the three years of schooling.

2.2.2 Rules of combination

For the NSC, candidates are required to study at least seven subjects, which comprise:

1. a first language, generally one of the 11 official languages

2. an additional South African language

3. either Mathematics or Mathematical Literacy

4. Life Orientation (which is a non-examinable subject)

5. three subjects from the other learning fields.

Two languages, one of the mathematical subjects, and Life Orientation are compulsory. However, for candidates with learning disabilities, certain concessions are made regarding the compulsory subjects.

2.2.3 Assessment

Internal assessment for the NSC, evaluated by means of a student portfolio, contributes 25% towards the final mark. The *external assessment* consists of a number of examination papers that are set at a national level. The examination contributes 75% towards the final mark.

The same seven-point rating scale used for the NC(V) is also used for *internal* and *external assessment* for the NSC. However, achievement at Level 2 is regarded as sufficient for the candidate to pass a subject, except for a pass in the first language, where an achievement at Level 3 is required.

2.2.4 Awarding the certificate and progression

A *National Senior Certificate* is awarded according to the following criteria:

A candidate must offer a minimum of 7 subjects, of which the learner must pass:

- with at least 40% for the Home Language
- with at least 40% for two other subjects
- with at least 30% for 3 subjects.

The remaining subject may be failed provided that there is evidence of Site-based Assessment (SBA) for this particular subject.

Most candidates who are enrolled for the *National Senior Certificate* intend to progress to higher education. Different criteria are set by Higher Education for entry into degree, diploma and higher certificate study.

For Qualification, Entry to:	Minimum Entry Requirement
Higher Certificate	Pass NSC with at least a 2 for the Language of Learning and Teaching (LOLT) at the Higher Educational Institution (HEI)
Diploma	Pass NSC with: • An achievement rating of 3 (40–49%) or better in four subjects • At least 2 for the LOLT at the HEI
Bachelor Degree	Pass NSC with: • An achievement rating of 4 (50–59%) or better in four subjects from the designated list • At least 2 for the LOLT at the HEI

Universities may add requirements for entry into certain faculties or programmes.

3. The research purpose, process and methodology

3.1 Background

Umalusi has an extended history of research, which has had as its primary purpose the establishment and understanding of the standard of the South African *matric* – first the *Senior Certificate*, and more recently, its successor, the *National Senior Certificate*. This research, conducted in 2008, compared the NSC curriculum and exams (exemplars and the first 2008 papers) to those of the *Senior Certificate*, both Higher and Standard Grades. The primary purpose for this research was to ensure continuity of standard between the old and new qualifications. To facilitate this process, an evaluation instrument, based on previous Umalusi research (2006-2008), was developed that addressed key areas in both curriculum and examination analyses. While the research provided welcome and necessary input into Umalusi's standardisation processes, the findings also became useful in a variety of ways, including providing insight into ways to enhance the curricula and improve the standard of the examinations.

3.2 Purpose

In 2009, Umalusi extended the research to evaluate and compare the National Certificate (Vocational) (NC(V)) with the National Senior Certificate (NSC). As the new Quality Council, Umalusi has taken a great interest in the two major qualifications it quality assures and certifies. The present research was commissioned in order to ensure a more detailed and sophisticated understanding of the two Level 4 qualifications. It is important to know:

1. In what respects the two qualifications are similar;

2. How they differ (Is the one more vocationally oriented while the other provides a more academic form of learning?);

3. How the NC(V) Levels 2 and 3 map against Grades 10 and 11 to allow for the possibility of exemptions at those levels;

4. Whether there is sufficient overlap in terms of the curricula and shared standards to allow for subject exemption between the qualifications for certification purposes;

5. How both qualifications allow for a richer understanding of Level 4 qualifications on the General and Further Education and Training Qualifications Framework; and

6. Whether the various NC(V) qualifications are correctly placed on the NQF levels.

In order to answer these questions, the research comprised two elements, namely, (i) an instrument that facilitated comparison of the NC(V) subject curriculum with the NSC equivalent and (ii) a second evaluation tool used to analyse the level of cognitive demand of the NC(V) Level 4 examination. The findings of the exam analysis of the NSC (DoBE) Grade

12 examination that was done previously served as measure of what can be expected in examinations for an NQF Level 4, although the exams were not compared on a one-on-one basis. This latter part of the research needs to be regarded as tentative as both qualifications have a very short history of examinations. Nevertheless, it was felt that to venture a preliminary comparison, for example, might provide insights that could help to inform or question the decisions made regarding access to higher education.

3.3 The curriculum evaluation instrument

The instrument used for the *curriculum evaluation and comparison* is one that has been refined by Umalusi to allow for both qualitative and qualitative reporting on the similarities and differences between curricula. It was adapted to compare curricula for the *National Senior Certificate* with those of the National Certificate (Vocational) for four critical subjects: English First Additional Language, Mathematics, Mathematical Literacy and Physical Science. The reasons for the choice of these four subjects are that two are valued as high-stakes subjects (Physical Science and Mathematics), one is a new subject still under scrutiny (Mathematical Literacy) and the remaining one (English FAL) is most frequently the language of instruction.

A full background to and description of the Umalusi evaluation instrument that was used in the 2008 *Maintaining Standards* project is available in that report (Umalusi, 2008). Consequently, only a brief overview of this instrument, as it was adapted for the present study is provided here.

The evaluation instrument requires the Umalusi evaluators to compare and report on a number of significant curriculum elements. These elements, which are itemised below, became the headings for each Umalusi subject team's report. (The numbers in brackets below refer to the sections and sub-sections of the curriculum evaluation reports.)

(1) Content and skills specification and coverage

In the first section of the report, Umalusi evaluators were asked to consider the content and skills of the curricula in light of the depth and breadth of specification, topic weighting, and focus.

(1.1) Content specification (breadth and depth)

The Umalusi evaluation teams were asked to draw up a table with a full list of content topics for their subject. Separate columns for each qualification allowed teams to indicate which of the content topics were specified in that particular qualification, and whether or not these were examinable. The teams also provided an indication of the depth in which the topics were dealt with in the various curricula, recorded as *superficial, medium or deep*. From this data, the teams drew conclusions as to the breadth and depth of content included and the content examinable in each of the respective curricula.

Table for recording analysis of content

SUBJECT	
Full bibliographical details of curriculum documents	**#**
	1
	2

1. Content required	CONTENT DETAILS			NSC		NCV	
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)	**Document #**	**Page**	**Level**	**Specified**	**Examinable**	**Specified**	**Examinable**
(add as many rows as are needed)	1		E				
	8		M				
	3		D				
Total							
% Discipline-specific curriculum content							
% Curriculum content that is general information							

(1.2) Content weighting

Umalusi evaluators were to determine, where possible, the amount of time specified in the respective curriculum documents to be spent on different content areas. This was used to provide additional information on the comparability of the various curricula.

(1.3) Content focus

The Umalusi evaluators were asked to comment on the overall content focus in the respective curricula. To do this, they categorised each content topic as *discipline-specific, generic*, or *everyday applicable*. A content topic is considered *discipline-specific* when it is specifically applicable to the further study of the subject under evaluation. It is considered *generic* when it is relevant for school subjects outside of the subject in question. A topic would be classified as *everyday* when it is relevant for everyday life outside of the classroom context and could well be picked up in the course of everyday living.

(1.4) Skills specification

The Umalusi evaluation teams compiled tables that listed the skills for their subjects, with separate columns for each qualification indicating which of the particular skills were specified in that qualification, and whether or not these were examinable.

(1.5) Skills weighting

Umalusi evaluators were then required to determine the weighting of the skills in the various curricula, in terms of the amount of specified time in the curriculum documentation.

(1.6) Skills focus

The *skills focus* in the respective curricula was determined by categorising each *skill* as *discipline-specific, generic*, or *everyday applicable*. As for the content topics, skills are considered *discipline-specific* when they are specifically applicable to the further study of the particular subject. Skills are described as *generic* when they are relevant for school subjects other than the subject being evaluated. They are considered *everyday applicable* when they are directly relevant for life outside of the classroom, and need not necessarily be learned in the classroom.

(1.7) Text specification

This task, which was performed by the Umalusi language team only, required the team to record the numbers and types of texts (recommended and compulsory) in the respective curricula. This information would contribute to the assessment of the breadth and depth of work to be covered in the curricula.

(2) Organising principle and coherence

Umalusi evaluators were asked to determine whether there are organising principles underlying the various curricula. The teams were asked to provide descriptions of these principles, and to comment on the clarity with which they are elaborated on in the documentation.

(3) Sequence, progression and pacing

Umalusi evaluators were asked to find evidence of progression in the content and skills covered within a curriculum in any given year, and from one school year to the next. Progression should be evident in the conceptual development of content and skill areas, as well as in increasing levels of cognitive complexity.

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

Umalusi evaluation teams were required to assess the clarity of the aims of each curriculum being evaluated, and the link with the content, skills, sequencing, progression, and pacing of the curricula. The teams were requested to describe the aims, as well as the guidance given for achieving these aims. They were also requested to comment on how the possible contexts within which the curricula were to be implemented were taken into account, and whether articulation with other parts of the system was outlined in the documents.

(5) Teaching approach and subject methodology

Umalusi evaluators were requested to assess the general and subject-specific teaching methodologies that are outlined in the various curriculum documents. The teams were asked to describe the approaches, and to comment on their suitability for the learning contexts, the content and skill included in the curricula, and the interests and capacities of candidates for whom the curricula were intended.

(6) Assessment guidance

Umalusi evaluation teams were requested to assess the quality of guidance given in the various curricula for *internal* and *external assessment*. They were asked to describe the numbers and types of tasks, the weightings for the various tasks, and the evaluation criteria to be used in assessment.

(7) Availability and user-friendliness of the curricula

Umalusi evaluators were requested to comment on the overall accessibility and user-friendliness of the documentation for the respective curricula.

(8) Concluding tasks

The Umalusi evaluation teams were asked to provide clear concluding statements that addressed the research questions described in Section 3.5 below. The conclusions were to be justified using the various findings in the report.

3.4 Umalusi evaluation teams and processes

Umalusi evaluation teams were selected for each of the four subjects based on their knowledge and experience of the subject area and the education system. Each team comprised subject specialists, including the following:

- an Umalusi moderator
- a subject methodology expert from a university school of education or equivalent
- a subject advisor, and
- a teacher who is considered by subject advisors to be an excellent teacher.

The subject methodology expert acted as the team leader and took responsibility for compiling the final report on behalf of the subject evaluation team.

In addition to the teams, in depth interviews were held with NC(V) lecturers in the four subjects to learn more about the practical NC(V) teaching-learning situation. The lecturers attended the second workshop when classroom time, subject and teaching methodology, interpretation and application of the curricula as well as weighing and focus were all part of the discussion.

As also described in subsection 5.2, the evaluation teams met at workshops at which they were trained in the use of the instruments, followed by another working session at which they worked on refining the evaluation and analysis of the curriculum. During the first workshop, each team received information about the research, an MS Word version of the evaluation instrument, as well as an example of the Excel data spreadsheet into which the data collected would be entered. The workshop served a variety of purposes, namely, to form a shared understanding of the interpretation and application of the instrument, to share subject and methodology knowledge, and for the team members to identify the strengths within the team. This first workshop provided the opportunity for the team to work together on the curriculum analysis, but also allowed the teams to divide tasks and responsibilities, especially with regard to the comparison between the assessments in the NC(V) Level 2 and 3 and assessments in NSC Grades 10 and 11.

The evaluation teams finalised their data collection and concluding tasks regarding the curriculum analysis during Workshop 2 and it also provided the evaluation teams with time to share findings on the different NC(V) Level 2 and 3 examination papers and to come to conclusions regarding the level of demand and the difficulty and progression from NC(V) Level 2 to 3.

A third workshop was focused on the exam analysis which is described in detail in section 5.

3.5 The research questions

The Umalusi evaluation teams were requested to research the *comparability of the NC(V) curriculum with the NSC curriculum* in terms of a number of criteria that are described in subsection 3.3 above. The teams were required to provide an opinion as to whether the NC(V) curriculum was comparable with the NSC curriculum for the same subject. For example, is an NC(V) curriculum to be accorded the same value, or greater or less value, than the NSC, particularly in relation to the breadth, depth and cognitive complexity of the learning embodied in the respective curricula?

The evaluators used the instrument to carefully examine the curriculum of each subject in order to answer the following questions:

1. Is the exit point for the NC(V) Level 4 and the NSC curriculum of a comparable standard?

2. Are the exit points for the NC(V) Levels 2 and 3 comparable to the levels of achievement intended in Grades 10 and 11?

3. Could you find reliable evidence in the curricula of
   a. tools to guide classroom practice
   b. guidance for examiners and moderators, and
   c. guidelines for materials developers and others who may have an interest in the curriculum?

4. Are there indicators in the documentation regarding content specification, the organising principle, pacing, etc. that may advantage, or disadvantage, teaching and learning in the classroom?

5. Are the NC(V) curricula sufficiently vocational in their content, context and application?

In order to answer these questions, the Umalusi evaluation teams were required to analyse the curricula in detail in order to provide the necessary motivations for the answers they provided to the research questions.

4. General trends across the curricula

The four Umalusi subject evaluation teams used the curriculum evaluation instrument in slightly different ways, determined by the fit between every feature of the instrument and the nature of their particular discipline.

Separately printed individual subject reports allow readers to see for themselves how the teams analysed their subjects and came to their findings. These subject reports provide detailed information regarding the strengths and weaknesses of the two curricula and the related examinations, and point to ways in which the subject curricula and assessments can be strengthened and improved. Finally, it is worth noting that, though the Umalusi teams began with the same instrument, each team had to grapple with the data at its disposal. Each team consequently worked slightly differently to the others, and reported on their findings in ways suited to their subject.

The reports can also be viewed on the Umalusi website.

4.1 Content and skills

In discussing the curriculum of any subject, the primary objective was to examine the content and skills covered by the curriculum, with special reference to its breadth and depth. To do this, all the Umalusi evaluation teams constructed a matrix that compared the content and skills of the NC(V) with the content and skills of the NSC curricula. With the exception of Physical Science, the subject teams did not separate content from skills, as separate entities, but treated them as inextricably bound together within the curricula. The Mathematics and Mathematical Literacy teams made this explicit, while the English (FAL) evaluation team analysed the content and skills as though they were one and the same.

4.1.1 Breadth of content covered in the two curricula

Using the matrix of content and skills as a means of comparison between the two curricula allowed the Umalusi teams to see the overlaps and the differences in the *breadth* of the curricula. It also allowed them to compare the volume of content and skills, a factor that affects the level of learning possible by learners.

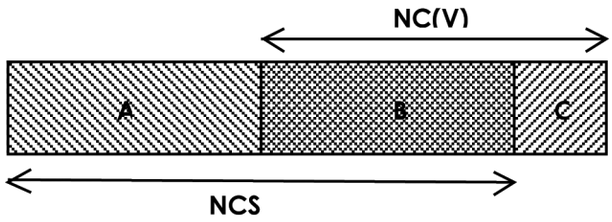
The **Mathematics** evaluation team found that the NC(V) at Levels 2, 3 and 4 covers *more* content that is at a higher level than the NSC curricula for Grades 10, 11 and 12. In three of the topic areas (probability and data handling, geometry and trigonometry, and calculus,) the NC(V), curriculum essentially covers all of the NSC core as well as additional work that is either found in the NSC optional paper or is drawn from more advanced topics than those in the NSC. In one area (functions and algebra), the NC(V) and NCS are similar. In the topic area of number, the NC(V) curricula does not cover sequences and series as broadly as the NSC curricula, but instead focuses on the more advanced topic complex numbers. It is only in the area of financial mathematics that the NC(V) curriculum is not as extensive as the NSC. The team thus considers that, in terms of content specified in the curriculum, the NC(V) covers almost all of the content specified in the NSC core curriculum and most of the work

specified in the NSC optional curriculum, as well as some more advanced topics (further differential calculus, integral calculus and complex numbers). On paper, it would thus appear that learners with NC(V) Mathematics at Levels 2, 3 or 4 could be viewed as equivalent to, or more advanced than, learners qualifying with NCS Grades 10, 11 or 12 (respectively). However, the volume of content in the NC(V) curriculum at each level is, in the opinion of the evaluation team, unrealistically high. The team expressed concern that the volume would result in the curriculum being taught at a superficial level.

The Umalusi evaluation team argued strongly that **Mathematical Literacy** is an entirely new subject – not another sort of Mathematics, and therefore, the team took into consideration that this subject is context-driven and skills-based, using mathematical concepts and techniques, but with an emphasis on the ability to interpret, analyse and critically evaluate. According to the team, the subject could be better referred to as 'Quantitative Literacy'. It is for this reason that the evaluation team found it impossible to separate mathematical content from skills. Therefore, the team created a new entity called a 'content-skill' that expresses the combined, integrated relationship of mathematical content to the skills of application and reflection.

The Umalusi Mathematical Literacy evaluation team found that there was considerable difference between the NC(V) and NSC curricula in terms of breadth.

The diagram below illustrates the overlap of the 47 broad content-skills in the NC(V) and NSC curricula.



Area A represents the content-skills found only in the NSC curricula.
Area B represents the content-skills found in both the NSC and NC(V).
Area C represents the content-skills found only in the NC(V).

Area A represents 50 % of the NSC curriculum.
Area B represents 69% of the NC(V) curriculum and 50% of the NSC curriculum.
Area C represents 31% of the NC(V) curriculum.

Closer inspection of the detailed content-skills reveals that the more cognitively demanding content-skills fall *outside* of the NC(V) (in Area A). These content-skills include aspects of functional relationships and trigonometry (not all examinable) as well as the more complex aspects of data handling (which are examinable). These latter content-skills are central to that Learning Outcome. The content-skills that fall outside of the NSC curricula (in Area C) are mainly to do with sequencing and pattern recognition, and the use of financial documents. Taken as a whole, the specified NC(V) curriculum does not match well with the specified NSC curriculum in terms of breadth and depth.

Learners who have completed Levels 2 to 4 of the NC(V) cannot thus be considered to have covered sufficiently similar content to learners who have completed Grades 10 to 12 of the NSC.

The **Physical Science** evaluation team found that about 90% of the topics in the NSC curriculum and NC(V) curriculum are common to both curricula. Therefore, in terms of breadth of content coverage, the NC(V) and NSC curricula are very similar to one another. The evaluation team found that none of the content that is not common to the respective curricula is sufficiently core as to be detrimental to a learner who wishes to transfer between the NC(V) and NSC streams.

The **English First Additional Language** evaluation team found it extremely difficult to compare the exit levels of the two curricula because the NC(V) lacks consistent continuity and sequencing of content and skills across the three levels. It was therefore very difficult to draw a conclusion about the comparability of the NSC and NC(V) in terms of breadth of content and skills. The NC(V) curricula across the three levels do not appear to form a unified, cohesive learning programme. For instance, introducing new content and skills at Level 4 has implications for attainment of the skills, especially in terms of the pacing of the Level 4 curriculum. It also means that, because these items are often omitted at Level 3 and 4, these levels will not be comparable to the NSC Grades 10 and 11.

4.1.2 The depth of content covered in the two curricula

The analysis of depth in which the content is covered in the curricula is a more complex task, because the *depth of content* is considered to be how advanced the topics/ content in the curricula are, and depend on an estimate of the depth in which the content is dealt.

In **Mathematics**, **Physical Science** and **Mathematical Literacy**, the content and skills vary in terms of degree of difficulty according to either the context or the application. On face value, therefore, it was not easy to classify the content and skills in the curriculum documents. The **English FAL** evaluation team could say with more certainty which of the content and skills are easy, moderate or difficult. For example, writing a descriptive essay is an easier task than writing an argumentative essay.

The **Mathematics** evaluation team found that the NC(V) curriculum includes more advanced topics than the NCS core, and in some cases, even the optional part of the NSC curriculum. However, the structure and terminology of the NC(V) curriculum also makes it very difficult to judge the intended scope of the content. Because Mathematics content can be difficult or easy depending on the type of question asked, the Umalusi evaluation teams argued that it would be necessary to look at the level at which the specified content is examined, in order to make judgements on curriculum depth.

In terms of the levels of difficulty of the content and skills, the NSC and NC(V) curricula in **Mathematical Literacy** compare well with each other, given the differences in the volume of content and skills. Over all three years of the NC(V) and NSC, nearly 50% of the content and skills are moderately difficult, while the remainder is slightly skewed towards the difficult level of cognitive demand. However, in Levels 3 and 4/Grades 11 and 12, the NSC curricula contains more difficult content and skills than the NC(V) does. Again, as was the case for Mathematics, the evaluation team found that they struggled to judge the degree of difficulty of much of the content and skills without seeing how they are examined.

The **Physical Science** evaluation team found that the main difference in the curricula is at the level of sub-topics, where the NC(V) leaves out certain advanced sub-topics and includes more vocationally oriented sub-topics, although the NC(V) Level 3 was considered more difficult than the NSC curriculum for Grade 11. In terms of examinable topics, the NC(V) and NSC are comparable in terms of breadth of content and skills at the final level (Level 4 and

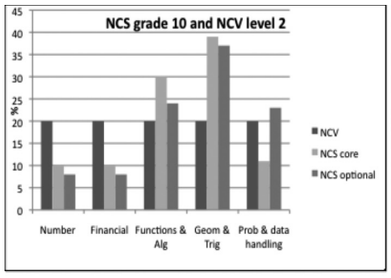
Grade 12).The evaluation team also found that the NC(V) curriculum does not appear to have been specifically designed as a *vocational* curriculum. The high volume of academic content is combined with some additional focus on practical and vocational work, which suggests that the NC(V) curriculum does not accord particularly well with the intent of the qualification.

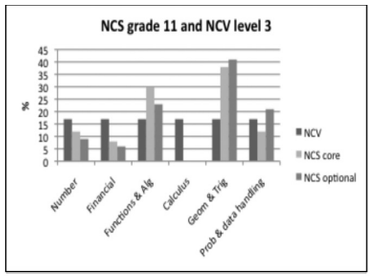
The **English (FAL)** evaluation team found that the cognitive levels of the specified content items, where they appear across the two curricula, are generally dealt with at the same level or depth.

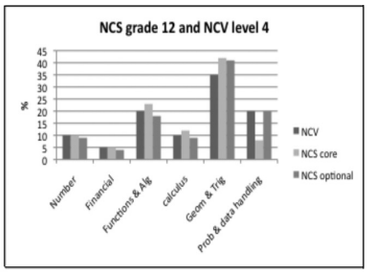
4.1.3 Weighting of content/skills

The Umalusi evaluation teams reported on the time allocated to classroom teaching of the specified content and skills as well as to the specified allocation of marks in the examination as means to determine the weighting accorded to skills and/or content within the curriculum.

The **Mathematics** evaluation team compared the specified weighting (percentage of total marks in the examination as given in the NSC *Examination Guidelines* with those given in the NC(V) *Subject Guidelines* for each of the levels. The evaluation team found that the specified examinable weighting differed markedly between NC(V) Level 2 and NSC curriculum for Grade 10, and between NC(V) Level 3 and the NSC curriculum for Grade 11. At NC(V) Level 4 and the NSC curriculum for Grade 12, however, the weighting of the specified examinable content is very similar in both curricula. It is of additional concern that the weighting of examinable content differs so widely from NC(V) Levels 2/3 to NC(V) Level 4, as illustrated below:







For example, financial mathematics is weighted more heavily in the NC(V) Level 3 examinations than in the NSC Grade 11 examinations, but the Umalusi team felt that the financial mathematics specified in the NC(V) was less extensive than in the NSC curriculum. In contrast, geometry and trigonometry in the NC(V) at Levels 2 and 3 is more extensive than it is in the NSC Grades 10 and 11 core, and yet the examination weighting in the NSC core is far heavier. These differences are not continued at NSC Grade 12, nor at NC(V) Level 4. It was also apparent that the weighting of topics in the NC(V) Levels 2 and 3 differed from those at Level 4. These differences in weighting, combined with the Umalusi team's concerns about the extent and lack of clarity of the NC(V) curriculum, lead the Umalusi team members to take a closer look at the examination papers.

The NC(V) documentation provides a guide to the number of notional study hours to be spent on each level of the **Mathematical Literacy** curriculum, but gives no indication of the number of hours of teaching allocated, or the distribution of that teaching time. This is in stark contrast to the NSC documentation, which spells out the number of hours to be spent in the classroom on each Learning Outcome. The Mathematical Literacy evaluation team found that the three FET colleges that they consulted varied widely in terms of the amount of

actual teaching time allocated. It was therefore not possible to draw a conclusion about the comparability of curricula based on the weighting of time spent teaching the same topics.

In terms of weighting of the teaching time of the two curricula, the **Physical Science** comparison showed that there are insignificant differences between the two curricula. With respect to the allocation of the marks in the examination for the various Learning Outcomes, the NSC curriculum stipulates clear percentages, but the NC(V) curriculum gives no indication of which content and skills are examinable. The evaluation team thus assumed that all the content is potentially examinable.

The **English FAL** evaluation team found that, while the NC(V) curriculum specifies 200 hours of notional study time per level, there is no further guidance on the distribution of that time. The NSC curriculum specifies exactly how the time spent in the classroom should be used to cover the Learning Outcomes of every grade.

4.1.4 The focus of the NC(V) and NSC curricula

In this section of the evaluation instrument, the Umalusi evaluation teams were asked to rate the content and skills as:

- discipline-specific (required for their subject only)
- useful for more than one school subject or for general academic study (generic)
- general knowledge, useful for *everyday* life.

The **Mathematics** evaluation team concluded that there was no sensible way to categorise topics as *discipline-specific, generic* or useful for *everyday life*. The team argued that this is because Mathematics is both a discipline in its own right as well as a tool for many other subjects, and is often applied in everyday life. They did note, however, that the NC(V) curriculum does not provide comment on the relationship between Mathematics and vocational learning, and makes no attempt to contextualise the mathematics learnt in vocational settings. In other words, the subject is treated as an induction to the discipline without due regard for the fact that learners entering the NC(V) have chosen it in the hope of finding a meaningful alternative to the general-academic tenor of the *National Senior Certificate*.

The **Mathematical Literacy** evaluation team had the same difficulties in determining the focus of their subject, for much the same reasons as cited by the Mathematics team. They also argued that, because Mathematics Literacy is still in its infancy, there is no shared understanding of the nature of the subject.

The **Physical Science** evaluation team found that at Level 2 and Level 3, the NC(V) content is somewhat less discipline-specific than that in the NSC curricula (Grades 10 and 11). This is to be expected, as there is an emphasis in the NC(V) on identifying the links with industry (this would be classified as generic content). The NSC curriculum content has a somewhat lower percentage of everyday content than the NC(V) curriculum. This is because more high-level theoretical content has been included in the NSC than in the NC(V) curricula – for example, the photoelectric effect, nucleosynthesis, semiconductors. This is appropriate for the intended foci of these qualifications.

The **Physical Science** evaluation team further found that in the NC(V), where the theoretical content of the NSC curriculum has been replaced with vocational or industry-related content, this content is of a highly specialised technical nature, for example properties and

movement of fluids, and resonance in structures. One can hence not conclude that a more applied emphasis in the content makes the course any more or less difficult.

The **English FAL** evaluation team struggled to reach consensus with this part of the evaluation. In line with principle that language is an integral part of every subject, most team members found that the *everyday knowledge* category applied to *all* learning outcomes in both curricula, with the exception of the Literature Study.

4.1.5 Text specification

The **English FAL** evaluation team reported that the specification of texts to be used in the Literature Study outcome of the two curricula differs. The NSC curriculum states the *number* of texts in each genre at Grades 10 and 11, and the range of choices of texts for the final examination is given. Although learners have to answer on two texts and poetry in the NSC final exam, the department of education gives provinces a range of choices from which they may make their selections. At Grades 10 and 11, advice is given regarding the number of texts in each genre.

The choice of literary texts in the NC(V) is limited to South African short stories and poems for Level 2, but not for Levels 3 and 4. However, no documents were available which showed evidence of recommended texts.

In conclusion, it should be clear from this section that Umalusi regards a detailed analysis of the breadth, depth, focus and weighting of the content and skills identified in a curriculum as worthy of detailed scrutiny. There are nevertheless other features discussed in the sections below that provide important information related to other aspects of curriculum structure.

4.2 Organising principles and coherence

It is important that a curriculum has a clear organising principle to enable learners to construct their knowledge meaningfully. Absence of an organising principle can contribute to the level of difficulty of a curriculum if it is not apparent to teachers and learners what big idea(s) cause the subject to cohere. Umalusi evaluators were asked to determine whether there is an organising principle that underlies the curricula. The teams were asked to provide descriptions of these principles, and to comment on the clarity with which they are elaborated on in the documentation

The **Mathematics** evaluation team found that the NC(V) curriculum arranges the curriculum into topics, which are not consistent across the three levels in terms of organisation, nomenclature or mathematical coherence. On the other hand, the NSC is clearly organised along outcomes-based principles into Learning Outcomes and Assessment Standards, which describe exactly what a learner must be able to do.

The **Mathematical Literacy** evaluation team found that the NC(V) curriculum has very little evidence of an organising principle. The only underlying structure is the division of the curriculum into five topics, which do not relate to one another, except for *numbers*, which is used in all the others. The NSC curriculum is clearly defined by Learning Outcomes and Assessment Standards and underpinned by the principles and values of Outcomes-Based Education, in which the content and skills are conceptually bound together.

For **Physical Science**, the NC(V) curriculum is largely based on the NSC, and hence the structures and organising principles of the courses are similar. However, whereas the organising principle is clearly stated in the NSC documentation, it is not explicitly stated in the NC(V) documentation. Its absence could result in a situation where teachers, not perceiving the internal coherence do not teach in ways that would reinforce the internal logic of the subject.

For **English FAL**, the evaluation team found that no explicit or implied mention is made in the NC(V) curriculum of an organising principle, nor is there much evidence of internal coherence. The NSC, in contrast, is based on the principle of Outcomes-Based Education, striving to allow learners to reach their maximum potential through the setting of Learning Outcomes and Assessment Standards to be achieved at the end of each grade.

In conclusion, it was found that the curricula for the NSC have strong explicit organising principles. These principles are clearly described in the NSC documents. Moreover, the NSC curricula are all organised according to learning outcomes and knowledge areas, rather than traditional topic clusters. Furthermore, the NSC organising principles are integrally linked to the assessment standards. Finally, the *Learning Programme Guidelines* for NSC subjects explain *how* the learning outcomes relate to both the critical and developmental outcomes, which form an intrinsic part of many qualifications lodged on the NQF.

4.3 Sequence, progression and pacing

Progression is evident when the content and skills in a course increase in cognitive demand within a given grade or level, and from one level to the next. The sequencing and pacing of material in the course therefore needs to be appropriately structured to allow for this development. The curricula of the four subjects were evaluated in this light.

The Umalusi evaluation team found that neither of the **Mathematics** curricula specifies clearly how the content and skills should be sequenced within a year of study. The NC(V) curriculum seems to imply an increase in cognitive demand from Level 2 to 3 but not from Level 3 to 4. The NSC curriculum implies an increase in cognitive complexity through the hierarchical structure of topics across the years.

The **Mathematical Literacy** evaluation team found that the inconsistent terminology of the NC(V) documents makes it difficult to find evidence of progression and sequencing within the levels and across all three levels. Level 3 and Level 4, for example, are almost identical. In contrast, the NSC documents explicitly spell out the sequencing and progression both within a grade and across all three grades. The only indication of a progression in cognitive demand in the NC(V) curriculum lies in the different contexts in which the content should be situated, namely, personal and familiar (Level 2), workplace (Level 3) and other areas of responsibility (Level 4). The assumption made is that teachers are able to find actual problems or situations that fit those contexts.

The **Physical Science** evaluation team found that in both the NC(V) and NSC curricula there is very clear evidence of progression of content over the three years. The same is not true of the progression of skills, which is absent from the NC(V) curriculum. At all levels in both curricula, physics topics precede chemistry topics, perhaps implying that physics is conceptually easier than chemistry, which is not necessarily true.

The **English FAL** evaluation team found that the NSC documentation is specific about the skills over the three years of FET. Each Learning Outcome has specific Assessment Standards with skills necessary for the attainment of those standards in each grade. Looking across the phase, the progression in skills is evident through the use of verbs, adjectives and concepts that illustrate a progressive conceptual understanding as illustrated below.

LO2	ASS. STD	Grade 10 skill	Grade 11 skill	Grade 12 skill
	The learner is able to:	**Recognise** how word choices, imagery and sound devices affect mood, meaning and theme	**Explain** how word choices, imagery and sound devices shape mood, meaning and theme	**Interpret** how word choices, imagery and sound devices shape mood, meaning and theme

The **English FAL** evaluation team found that although the NC(V) is explicit about the skills that learners should have attained by the end of each level, it is difficult to perform a quantitative analysis of the skills pattern across the NC(V). In Topic 1, there appears to be a pattern between Levels 2 and 4 in terms of progression and continuity of skills as illustrated below.

Topic 1	L2	L3	L4
Examine and respond appropriately to questions	Y	Y	Y
Express appreciation and encouragement	Y	N	Y

In Topic 2, it was found that there is no pattern to the progression – at times it appears at a certain level, at other times progression does not exist at all, and in some instances, a skill is allocated to a level almost without due thought to how learning is progressively scaffolded. For example, in the second row below, *explore* is a higher cognitive skill attached to Level 2, yet *identify* (lower skill) is attached to Levels 3 and 4. However, the skill in the first row is cognitively scaffolded:

Topic 2	L2	L3	L4
Identify (analyse the effect of) stylistic devices such as metaphor, simile, etc. on meaning	N	Y	Y
Explore (*identify*) stylist devices such as punctuation, slang, diction, etc. on meaning	Y	Y	Y

Topic 3	L2	L3	L4
Note(examine)and plan the requirements of the writing tasks for audience and purpose	Y	Y	Y
Plan and write for meetings	N	N	Y
Plan and write letters from a work-related perspective	N	N	Y

The same observations are applicable to Topic 3 in the NC(V) curriculum. It is noted that a lower cognitive skill is associated with Levels 2 and 4, yet Level 3 has the higher cognitive skills regarding examining (analysis). It also seems that *planning and writing for meetings* and *writing letters* is not applicable to Level 2, which undercuts the principles of progression and consistency.

4.4 Aims, purpose, vision, general outcomes and articulation

The Umalusi evaluation teams were required to assess the clarity of the aims of each curriculum, and the link between the aims and the content, skills, sequencing, progression, and pacing of the curricula. The teams were asked to describe the aims, as well as the guidance given for achieving these aims. They were also asked to comment on how the possible contexts within which the curricula were to be implemented were taken into account, and whether articulation with other parts of the system was outlined in the documents.

Both **Mathematics** curricula list their aims and purposes clearly. The Umalusi team noted that the NC(V) did not, however, make links between the aims of Mathematics and vocational learning. Neither of the curricula dealt explicitly with how the aims should be achieved. The curricula are both fairly broadly described in a way that would suit many contexts, but the team felt that the role of the NC(V) Mathematics curriculum in a vocational qualification was not made sufficiently clear, and wondered whether it is at an appropriate level for the intake into FET colleges.

The **Mathematical Literacy** evaluation team found that the aims and purpose of the subject were very clearly spelled out in both the NC(V) and NSC curricula. The NSC documentation provides clear aims for Mathematical Literacy, namely:

- to contribute towards the critical and developmental outcomes
- to use real-life examples as described in the assessment standards
- to foreground authentic contexts as the basis for the subject.

However, while the NSC curriculum gives good guidance on how to achieve these aims, the NC(V) unfortunately does not. The contexts of learners are not taken into account in the NC(V) curriculum. No actual vocational situations are described. As subject statements, the NC(V) curriculum documents could have been written in any country of the world, and are therefore not specifically aimed at the South African context.

On the other hand, the NSC documents highlight contexts that are related to human rights, inclusivity, health, and indigenous knowledge systems as well. In both curricula, mention is made of portability and articulation without any guidance as to how this will take place.

The NC(V) curriculum for **Physical Science** describes factors that contribute to Physical Science outcomes, which may be construed to be the aims of the curriculum. However, no guidance is given as to how to achieve these aims. The contexts of learners are not taken into account – it is assumed that all learning will take place in a well-equipped laboratory. Articulation and portability are referred to, but no guidance is given about how they take place. By contrast, the NSC documents refer to principles that clearly establish the purpose and vision of the curriculum with an explanation of how these are to be achieved. It is clear that the social contexts of learners are recognised and acknowledged. Articulation and portability are referred to, but no guidance is given about how they are to take place.

For **English First Additional Language**, the aims of the curriculum are not clearly indicated in the NC(V) curriculum, other than a summary of the subject and learning outcomes at the beginning of each level, and a list of reasons why English should be taught as a *fundamental* subject. The aim of the curriculum is clearly expressed in the NSC curriculum, and is linked to

Learning Outcomes and Assessment Standards. Clear and extensive guidance is given for the achievement of these aims. With regard to contexts that might affect the teaching of English, the NC(V) curriculum gives no specific contexts (other than to mention students with special needs), in contrast with the NSC curriculum, which describes a wide range of actual contexts and interventions.

4.5 Teaching approach and subject method

The Umalusi evaluators were asked to comment on the general and subject-specific teaching methodologies that are outlined in the various curriculum documents.

(a) General teaching and learning approach

Although the NSC in general bases the teaching and learning approach on Outcomes-Based Education, the **Mathematics** evaluation team reported that no detailed information about the approach is provided, nor is there an attempt to describe subject-specific teaching approaches. No detailed description or information was found in the NC(V) curriculum either.

The **Mathematical Literacy** evaluation team found that the NC(V) curriculum does not explicitly state its teaching and learning approach, but it can be assumed that the approach is based on Outcomes-Based Education. The inferred teaching and learning approaches are aligned to a fair degree with the curriculum aims. However, very few specific contexts are stipulated or suggested, and the curriculum does not provide guidance on which particular approach should be used to develop particular content and skills.

In contrast with the NC(V) curriculum, the NSC curriculum explicitly states that its teaching and learning approaches are based on Outcomes-Based Education, and clear guidance is given for the use of different approaches. These approaches are closely aligned with the curriculum's stated aims. The NSC documents emphasise that content should be context-sensitive. However, the success of this OBE principle relies on resourceful and well-trained teachers, which is not the case in most South African classrooms. The curriculum explicitly promotes a learner-centred approach, which is well suited to the subject.

In both the NC(V) and NSC **Physical Science** curricula, the general teaching and learning approach is based on Outcomes-Based Education. In the NSC curriculum, the guidance to teachers is clear, which is not the case in the NC(V) curriculum. Similarly, in the case of alignment of the teaching approach with the aims of the curricula, in the NSC documents this is clearly stated, while the NC(V) lacks an explicit description of the teaching and learning approach. For both curricula, the teaching and learning approach is not really well suited to the context of most learners, if one considers that OBE relies on resourceful, innovative and well-trained teachers, which are in short supply in South African schools. Another factor that affects the teaching and learning approach of both curricula is the large volume of content. Despite aiming for a learner-centred, discovery-based learning approach, most learners would be able to cover the content only by superficial rote-style learning, which is in complete contradiction to the approach of Outcomes-Based Education.

In the NSC curriculum for **English First Additional Language**, the evaluation team found that the teaching and learning approach is underpinned by Outcomes-Based Education principles. In the NC(V) curriculum, there is no overt reference to the underlying principle of Outcomes-Based Education; however, the evaluation team deduced that this was the case.

Both curricula endorse the text-based and communicative approaches where the learning of skills is natural and informal. In both curricula, these approaches are well aligned with the stated aims of the courses and are well suited to the contexts in which the curricula might be enacted. The teaching and learning approaches are also well suited to the content and skills of both curricula.

(b) Subject specific methodology

As mentioned regarding the teaching methodology, the **Mathematics** evaluation team reported that in terms of a subject-specific methodology, neither of the curricula provided detailed information about subject-specific teaching approaches.

The NC(V) **Mathematical Literacy** curriculum does not explicitly stipulate any teaching and learning approaches, and therefore, it is not aligned to its aims. The specific contexts are not stipulated in most cases, and there is silence on the linked methodologies. Neither does the NC(V) curriculum provide specific guidance on which subject-specific methodology should be used to develop particular content and skills. For all these reasons, the Umalusi team could not find evidence that the curriculum provides a teaching and learning approach that is suitable for learners at any level.

The NSC Mathematical Literacy curriculum does provide explicit guidance on teaching and learning, which is closely aligned to its aims. The mathematical process skills and understanding of concepts are built up progressively from grade to grade. Appropriate methodologies are used within a wealth of contexts to achieve the assessment standards and these are suited to the types and levels of content and skills.

The **Physical Science** evaluation team found that, both in the NSC and NC(V) curricula, a discovery-based enquiry approach is stated as the subject-specific teaching and learning methodology. The NC(V) curriculum unfortunately did not follow this through in the documentation. Nowhere in the documentation were teachers given guidance as to how to structure a discovery-based learning programme. Alignment with the curriculum aims were strong in the NSC curricula and only partially so in the NC(V). The team expressed the same concerns as above (for general teaching and learning approaches) about the suitability of the teaching methodologies to the learners' contexts and the large volume of content to be covered. Finally, while both curricula encourage a practical approach, the team felt that the under-resourced nature of many South African classrooms would result in this practical approach not being followed in most classrooms.

The findings of the **English First Additional Language** evaluation team for the subject specific methodology were the same as for the general teaching and learning approach, namely, that the teaching and learning approach is underpinned by Outcomes-Based Education principles. .

The NSC documentation prescribes an outcomes-based approach to teaching, where the outcomes are the focus of the teaching. These are assessed through assessment standards, which provide descriptors of achievement of learning outcomes at various levels in the senior secondary phase. The desired pedagogical approach, namely a learner-centred, activity-based approach, is more clearly specified in the NSC documents than in the other documents.

4.6 Assessment guidance

(a) Guidance for internal assessment

The **Mathematics** team found that in the NC(V) curriculum, while the relative weighting of *internal* and *external assessment* is clear and consistent, the nature of *internal assessment* is not. They found contradictions within the documentation and felt that there is no intention to relate *internal assessment* to the learners' vocational interests. The NSC curriculum also provides information about the *internal* and *external assessments* in detail but fails to give clear guidance as to what is meant by the different types of *internal assessment* task.

The **Mathematical Literacy team** found that the NC(V) curriculum gave unclear and only general guidelines for *internal assessment*. It gave no specific examples of the types of assessment nor the relative weighting attached to them. By contrast, the NSC documentation gives detailed guidance regarding *internal assessment*: meaning and weighting of tasks, structure and allocation of marks in assessments and explanations of the taxonomy levels of questions. Both curricula stipulate the same relative allocation of marks to *internal* and *external assessment* at all three levels (grades).

The **Physical Science** team noted that the NC(V) curriculum documents give comprehensive guidance for *internal assessment*, including suggested tasks for the theoretical component and practical component, the structure of the practical report, rubrics, and weighting of the various *internal assessment* tasks. The NSC documentation, on the other hand, only spelled out how the *internal assessment* should be conducted, but did not provide actual guidance on the design of assessment tasks, rubrics or checklists, and gave no guidance on the practical investigations.

The **English First Additional Language** team found that the NC(V) and NSC curricula both describe clearly the nature of the *internal assessment* required and the relative weighting of marks for different aspects of the assessment.

(b) Guidance for external assessment

The **Mathematics** team found that in both curricula there is information regarding *external assessment* related to topic weighting, weighting of cognitive demand and allocation of marks.

The **Mathematical Literacy** team found that both the NC(V) and NSC curricula provide information regarding the structure, mark allocation, taxonomy levels, and number of papers of the *external assessment*, although the NC(V) guidelines are not as detailed as the NSC. It should be noted that the team found a discrepancy in the NC(V) documentation regarding the moderation of the Level 4 external examination. Both curricula have the same 7-point rating scale, which potentially allows for a comparable grade transfer between the qualifications.

For **Physical Science**, the NC(V) curriculum gives a clear breakdown of the weighting of the two external examinations, together with the relative weighting of the internal to the external mark. No *Examination Guidelines* exist for the NC(V), so the Umalusi team assumed that all the specified content is examinable. The depth to which this is examined is not made clear. Linked to the NSC curriculum, an *Examination Guidelines* document describes the structure of the external examination as well as the depth and breadth of the content to be examined.

The Umalusi evaluation team noted that the rating scales of the NC(V) and NSC are different (5-point and 7-point respectively). Therefore, the grade transfer between the qualifications is not comparable.

The **English First Additional Language** team found that both the NC(V) and NSC curricula have clearly described explanations of the allocation of marks to the topics/learning outcomes in the *external assessment*. The allocation of marks was difficult to compare because of the differences in terminology of the two curricula.

4.7 Availability and user-friendliness of the curricula

The **Mathematics** evaluation team found that the overall format and structure in which the NC(V) curriculum is presented made it difficult to follow. It was not clear to them exactly what the purpose was of the two documents per level or how they differ. In addition, there were mathematical errors, inaccurate mathematical expressions and confusing use of language that made the curriculum difficult to interpret. The evaluation team also found the Learning Outcomes and Assessment Standards muddled in some instances. According to the evaluation team, the NSC documentation is readily available, although the team did not make any direct comment on the NSC documentation's user-friendliness.

The **Mathematical Literacy** evaluation team found that the NC(V) curriculum documents were fairly readily available to teachers, examiners and moderators. The documents themselves are not consistent with each other. Terminology is used differently at different levels, and the absence of numbering of assessment standards would make the documents confusing to use on a day-to-day basis. The NSC curriculum for the entire phase appears in one document, as do the *Subject Assessment Guidelines, Learning Programmes* and *Examination Guidelines*. All four documents are coherent, user-friendly and internally consistent. How widely used these documents are, was difficult to ascertain.

The **Physical Science** team found that both the NC(V) curriculum and NSC documents are in a format that is difficult to access. The NC(V) has two separate documents per level. In addition, the *internal assessment* requirements were changed in 2009, but the Subject Assessment documents were not, and there are therefore inconsistencies between the two documents. The NSC documents also contain inconsistencies across different versions, confusing language and too many acronyms which make is hard for teachers to use.

The **English First Additional Language** evaluation team found that the user-friendliness of the curriculum documents is complicated by having to refer to two documents per level. The NSC documents were easily available, but the team could not ascertain how widely used they are at the school level. Similar to the NC(V), the user-friendliness is reduced by having to consult three documents.

4.8 Concluding comments

It is difficult to sum up meaningful general findings in terms of breadth and depth of the curricula across all four subjects, as well as in terms of breadth and depth across the three years for each of the qualifications.

The first finding is that, for a range of reasons, the NSC and NC(V) curricula are not readily comparable. So, for example, while the Mathematical Literacy in the two curricula seem to be pitched at similar levels of cognitive difficulty, the overlap between the two curricula indicates that they do not share a significant amount of content and skills. When considering the Physical Science curricula, as a second example, the NC(V) appears to be even more ambitious than the already overloaded NSC curriculum, which in all likelihood, means that both curricula will either be taught very superficially or that certain topics and skills will not be touched upon at all. Similarly, the NC(V) Mathematics curriculum appears to specify more difficult content for all three years than does the NSC curricula for Grades 10 -12. Yet, in terms of the examinable curriculum specified for NC(V) Level 4, it doesn't look so different from the NSC curriculum after all. The English FAL findings indicate that the NC(V) curriculum lacks internal consistency, which makes it difficult to track a coherent trajectory in the subject, with topics inexplicably present or absent at the various levels. That said, the team is of the opinion that, where content is in common, it would seem to be dealt with at much the same level of cognitive demand. Overall, the different challenges identified by the four teams, suggest that it is not possible to make straightforward comparisons between the curricula and/or between the corresponding levels of the NSC and the NC(V) qualifications. Nevertheless, there does appear to be a concern that, the prescribed achievement ratings aside, some of the NC(V) curricula are even more demanding than the NSC ones are.

The second finding is that, for some of the NC(V) subjects at least – English FAL and Mathematical Literacy are cases in point – attending to internal consistency is a high priority. Even though the policy descriptions of the three NC(V) qualifications emphasise their stand-alone nature, they do in reality form a single learning progression, and should therefore be conceptualised in that way. Ensuring that content and skills are systematically introduced and strengthened across the three years will not only make the teaching of these subjects easier, it will also provide more coherent learning opportunities for NC(V) learners. Creating more coherent curricula for the NC(V) will also mean that mapping between the NSC and the NC(V) would become more meaningful, and would allow for informed decisions regarding subject exemptions between the qualifications at all three levels.

The third finding seems to relate to the challenge faced by the curriculum developers tasked with constructing the NC(V). The NC(V) is, by intention, a qualification that should provide learners with sufficient theoretical knowledge to underpin their vocational learning without unduly jeopardising their prospects for access to Higher Education. On the other hand, the NC(V) is also tasked with creating young adults who would be readily employable in the economy (an aim that it actually shares with the NSC). In general, it seems as if, in the attempt to improve the status of vocational learning, the curriculum developers have erred on the side of making the subjects too academic in terms of content, without sufficient attention having been paid to how the knowledge might usefully be applied. The research thus suggests that the NC(V) curricula be evaluated both in terms of what is included and excluded, as well as in terms of approaching how this knowledge could best be taught to and learned by a group who will have left formal schooling because it has a preference for alternative forms of learning. It is also important to bear in mind that the NC(V) is a very new qualification with a novel purpose in the education system: informal feedback has provided both extremely positive and concerned feedback regarding the learners emerging from the programme. It seems important, therefore, to provide support to enhance the qualification in its infant stages rather than to dismiss it out of hand. This strengthening can happen if the insights provided here – and the insights derived from implementation – serve to guide future revision of the curriculum and its assessment.

The fourth finding is that, in order to facilitate comparability of the curricula belonging to different qualifications, it may be desirable to encourage the use of a common template, which describes the critical minimum of information curriculum description requires, but which nevertheless allows developers to go beyond those critical minima if they so choose. In a sense, Umalusi's curriculum and examination evaluation instruments could be thought of as providing the draft for such a template.

Finally, the achievement ratings for the NSC and NC(V) qualifications have been pegged at different levels in policy, which in turn, have influenced the admission requirements determined by higher education for entry into universities. This observation is not a call to apply identical requirements to obtain to both qualifications, but it does highlight the fact that, at some level at least, the expectations of performance are higher for NC(V) learners. In due course, similar expectations should be instituted for the NSC, even if these new levels of performance are phased in gradually over the next five years.

5. Examination analysis

5.1 Introduction

An exam analysis allows for an evaluation process that enables teams to understand the evaluation instrument, to provide team members with the opportunity to work together, to come to a shared understanding regarding the research purpose, tasks and requirements, as well as to negotiate conclusions. This part of the overview report summarises how the assessment instrument was adapted and extended to suit the research questions in the investigation. This section also makes reference to how the Umalusi teams grappled with the instrument to make it applicable to the particular subject field in order to be able to substantiate their findings.

The findings from the analysis include information about the progression between levels in the NC(V), compliance with the Subject Assessment Guidelines and Exam Guidelines in both the NC(V) and the NSC, the levels of cognitive demand and difficulty, and comments on whether these papers provide a good model for the future. The reporting on the exam analysis also includes the Umalusi teams' opinions about the appropriateness of the language usage in the papers.

This section on the exams must be read in the light that a full item-by-item analysis of the NC(V) Level 4 exam papers was done, but that a one-on-one comparison with the NSC papers was not undertaken. The findings from the exam analysis of the NSC Grade 12 examination papers have nevertheless been used as a point of reference for evaluating the NC(V) exam findings.

5.2 The evaluation process

The individual members of the four Umalusi evaluation teams were selected based on their knowledge of and experience in the subject area and the education system. The subject methodology experts were selected in order that they could take on the role of the team leader and writer of the final report.

During the first workshop, each team received information about the research, an MS Word version of the evaluation instrument, as well as an example of the Excel data spreadsheet into which the data collected would be entered. The workshop served a variety of purposes, namely, to form a shared understanding of the interpretation and application of the instrument, to share subject and methodology knowledge, and for the team members to identify the strengths within the team. This first workshop provided the opportunity for the team to work together on the curriculum analysis, but also allowed the teams to divide tasks and responsibilities, especially with regard to the comparison between the assessments in the NC(V) Level 2 and 3 and assessments in NSC Grades 10 and 11. Although the teams did not analyse NSC Grades10 and 11 question papers in detail, team members made contact with teachers in practice to get a good sense of as well as examples of the level of assessment in these grades. The knowledge gathered in this regard was part of the preparation for the second workshop.

The team members came prepared for the second workshop with individual analysis of some NC(V) Level 2 and 3 question papers and whatever knowledge they had been able to gather about question papers for NSC Grades 10 and 11, which are set and marked internally in schools and which therefore will differ from school to school. This second workshop provided the evaluation teams with time to share findings on the different question papers and to come to conclusions regarding the level of demand and the difficulty and progression from NC(V) Level 2 to 3. This important preparatory step provided information on how assessment has taken place at these levels since 2007 and helped to lay the foundation for the item-by-item analysis of the NC(V) Level 4 examination papers, which were written for the very first time in 2009.

The third workshop focused on the analysis of NC(V) Level 4 papers. The findings of this analysis appear in subsection 5.5, below. The exam analysis of NC(V) Level 4 was done separately from an analysis of the NSC Grade 12 papers for the following reasons:

1. The focus of this investigation was especially on progression between NC(V) Levels 2, 3 and 4;

2. Compliance with NC(V) Subject Assessment Guidelines (SAGs) and Exam Guidelines in the NC(V) was being investigated;

3. The levels of difficulty and whether the NC(V) papers reflect any special vocational focus were established;

4. The NC(V) Level 4 findings had to feed into the very first standardisation process for the qualification;

5. A comparative study between NC(V) Level 4 and NSC Grade 12 exam papers will be the focus of future research.

The use of the findings of the analysis of NSC Grade 12 exam papers (Umalusi, 2008 and 2009) must be seen as a tentative first step toward creating cross-references between the two qualifications, as this is critical to better understanding the relationships between the two qualifications. This aspect of the project will be strengthened by the 2010 exam analyses.

5.3 The research tasks

As explained in subsection 5.2, the Umalusi evaluation teams were requested to give an overview of the levels of and types of cognitive demand in NC(V) Levels 2 and 3 in comparison with NSC Grades 10 and 11, with special reference to the progression from level to level. Using the item-by-item analysis of the NC(V) Level 4 examination in order to ascertain its standard, the evaluators used the instrument (as described in 5.4) to carefully examine the examination papers of each subject, in order to answer the following questions:

1. Is there evidence of progression from the Level 2 and Level 3 papers to the 2009 Level 4 papers?

2. Do the 2009 papers comply with the Subject Assessment Guidelines?

3. Are the papers at a suitable level of cognitive demand and difficulty, and how vocationally oriented are the questions in the NC(V) papers?

4. Is the format of the papers a good model for future papers?

5. How appropriate are the language levels in the 2009 papers?

To answer these questions, the Umalusi evaluation teams analysed every question and sub-part of a question, using the following subheadings contained in the evaluation instrument:

(a) Number of marks
(b) Type of cognitive demand
(c) Level of difficulty
(d) Content and/or skill
(e) The suitability for use in further examination papers
(f) Learning Outcome and Assessment Standard for which this item could be used
(g) In which paper it could be used

5.4 The instrument

The instrument used for the NC(V) Level 4 item-by-item examination analysis in **English First Additional Language, Mathematics, Mathematical Literacy and Physical Science** is one that has been refined by Umalusi over the past few years. The evaluators were required to use a table to note the *cognitive type* and *level of difficulty* of every question and sub-part of every question in the examination paper. They then had to use the sum of these judgements to describe the overall level of difficulty of each paper. The analysis was focused on the NC(V) Level 4 examination, the only one currently certified by Umalusi.

Table 5.1: Extended 2009 typology based on the Revised Bloom's Taxonomy (2001)

Type of Cognitive Demand	Level of Difficulty
Basic factual/conceptual knowledge - Recall and recite knowledge - Define and describe - Identify, label, select, locate informa	**Easy** **Moderate** **Difficult**
Comprehension - Understanding of previously acquired information in a familiar context - Regarding information gathering: change or match information - Regarding use of knowledge: distinguish between aspects, compare and predict, defend and explain	**Easy** **Moderate** **Difficult**
Application - Interpret and apply knowledge - Choose, collect and do basic classification of information - Modify existing information by making use of comprehended knowledge	**Easy** **Moderate** **Difficult**
Analysis and problem-solving - Analysis of information in a new or unfamiliar context - Examine and differentiate - Research and investigate information - Distinguish to find the most appropriate solution	**Easy** **Moderate** **Difficult**
Evaluation and synthesis - Making judgment (evaluate), critique, and recommend by considering all material available - Weigh possibilities and do recommendations - Synthesise or create an innovative solution - Construct or formulate new ideas	**Easy** **Moderate** **Difficult**

The typology used in the instrument in 2009 to determine the types of cognitive demand is a taxonomy closely related to the revised Bloom's Taxonomy (2001), which gives a general understanding of the task-orientated nature of the question's construction, and relative levels of demand. In the 2008 project, most of the evaluators felt it was necessary to extend the three-category taxonomy used because it conflates higher order cognitive demands like comprehending-and-applying and analysis-and-synthesis into one level each, thereby losing the finer grained evaluation of the questions. However, in this research project, the extended five-type taxonomy below was finally used only by the English First Additional Language team.

The Mathematics, Mathematical Literacy and Physical Science subject evaluation teams did not think the proposed typology fitted their subject's cognitive demands accurately enough and therefore constructed different typologies to analyse the questions. A brief summary of the various typologies follows.

Table 5.2: Summary of typologies used for comparisons by Mathematics, Mathematical Literacy and Physical Science

	Mathematics	Mathematical Literacy	Physical Science
Types of cognitive demand	Knowledge	Knowing	Remember factual knowledge
	Routine procedures	Applying routine procedures	Understand factual knowledge
	Complex procedures	Applying multi-step procedures in a variety of contexts	Problem solving
	Solving problems	Reasoning and reflecting	
Reason for choice	Same as subject assessment guidelines	Same as examination guidelines	Same as one used in 2008 & 2009 Umalusi benchmarking research projects

For the evaluation of the NSC examination papers, the **Mathematics** evaluation team used the taxonomy from the Subject Assessment Guidelines for Mathematics. The categories are knowledge (K), performing routine procedures (R), performing complex procedures (C), and solving problems (P). In addition, the team made finer distinctions within each of these categories by using a level of difficulty (*easy, moderate* or *difficult*). The team also decided to look at an alternative scenario where the *difficult* routine questions (RD) were included in the complex procedure, as the team felt this might better reflect the level of difficulty learners might experience. The team therefore decided to report using *both* scenarios (the one where the taxonomy is used as is and the one using this alternative scenario) in the report. These scenarios are summarised below:

Table 5.3: Two scenarios used for the evaluation of NSC Mathematics papers

Scenario 1	Lower level cognitive demand	Knowledge (K)
		Performing routine procedures (R)
	Higher level cognitive demand	Performing complex procedures (C)
		Solving problems (P)

Scenario 2	Lower level cognitive demand	Knowledge (K)
		Easy and medium routine procedures (R-RD)
	Higher level cognitive demand	Complex and difficult routine procedures (C+RD)
		Solving problems (P)

Table 5.4: Results of analysis of examinations for NSC Mathematics

		Nov 09	Nov 08	Exam guidelines (EG) stipulate
Scenario 1	Lower level cognitive demand	65	72	55
	Higher level cognitive demand	35	28	45
Scenario 2	Lower level cognitive demand	54	64	55
	Higher level cognitive demand	46	36	45

Unsurprisingly, altering the parameters affects the balance of the ratio of the lower to the higher levels of cognitive demand, but the alternative analysis was undertaken because the initial results did not accord entirely with how the team might have expected the balance in the examination paper to be represented, from their experience of the subject. It must be borne in mind that neither analysis is seen as 'right' but as a means of shedding light on the ratios of *perceived* levels of cognitive demand. Only a post-examination analysis of learners' performance would be able to support or disconfirm the merit of the two alternative readings of the examination papers. However, the research findings based on the Scenario 2 analysis reflects the exam guidelines more closely than the findings in the Scenario 1 analysis.

The **Mathematical Literacy** evaluation team worked as a group to evaluate every question with regard to:

- type of question (*Knowing, Routine procedures, Multi-step procedures* or *Reasoning and reflecting*)
- level of difficulty (*Easy, Moderate* or *Difficult*), and
- allocation to Learning Outcome (1: Numbers, 2: Functional Relationships, 3: Space, Shape and Measurement and 4: Data Handling)

To provide a guide for decisions made about type of cognitive demand and level of difficulty, the **Physical Science** evaluation team used a table that has been developed and used in previous Umalusi benchmarking research projects (Umalusi, 2008). This tool was used because it has proved to be appropriate and useful in the analysis of Physical Science examinations papers, and provides meaningful data. This tool was used in the analyses of the 2008 and 2009 NSC Physical Science examination papers as well as in the 2009 IEB Physical Science examination papers and the Physics and Chemistry examinations for various international qualifications.

Table 5.5: Types and levels of cognitive demand for Physical Science

Category	Level	Descriptions	Examples
Remember Factual knowledge (F)	**Easy**	Very simple recall; State a simple law or equation; Recognise content in MCQ	State term/simple definition, e.g. velocity is rate of change of position; naming homologous series (simple); structural formula for simple (1 or 2 carbon) organic compounds, e.g. ethane, methane etc; labelling diagrams
	Medium	Medium content; learnt diagrams	State Newton's laws, Boyle's law, draw electric field patterns etc.; general formula for homologous series (containing functional groups); state Le Chatelier's principle
	Difficult	Recall complex content	Process for lab preparation of chemical compounds; testing for presence of chemicals; inorganic chemical interactions
Understand Conceptual knowledge (C)	**Easy**	Simple relationships; simple explanations; 1-step answers; derivation of units	Relationship between resultant and equilibrant; explain what is meant by …
	Medium	Counter-intuitive relationships; qualitative proportional reasoning; more complex relationships or explanations; 2-steps to arrive at answer, simple applications; interpretation of realistic diagrams	Direction of acceleration for free-fall; effects of changes in circuits; identifying acid-base conjugates, redox pairs/reactions, etc; simple influences on dynamic equilibrium; diagrams of AC/DC generators; naming type of reaction, etc; formulate a hypothesis; identify dependent and independent variables and controlled variables; writing conclusions
	Difficult	Identify principles which apply in a novel context; explaining complex reasoning involving synthesis, critical argument; novel or abstract contexts, etc.	Identify all influences on realistic motion; identify isomers of organic compounds; complex influences on dynamic equilibrium
Problem solving (P)	**Easy**	Simple procedure; plug into formula with only one unknown; no extraneous information; known or practiced context; simple chemical equation	Given current and resistance, calculate voltage; simple conservation of momentum; reading values off a given graph
	Medium	Sketch graphs; construction or interpretation of schematic diagrams; problems with 2 or more steps; basic logic leaps; proportional reasoning; interpretation of table of data; acid-base or redox equation	Sketch graph of motion or interpret a given graph; force or vector diagrams; diagrams of drip patterns; circuits diagrams; concentration or molar calculations; naming of organic compounds; writing and balancing equations for reactions; using redox table; writing structural formulae
	Difficult	Complex abstract representation; combination of concepts across sub-fields; complex problems involving insight and logic-leaps; formulating new equations (using all unknowns); problem solving in novel context	Interpret complex graphs; translate between various graphs of motion; combine equations for mechanical energy and motion; combine gravitational and electrostatic forces; complex circuit calculations; combination of various factors influencing equilibrium

Whichever typology was used, the evaluators had to determine the level of difficulty (*Easy, Moderate* or *Difficult*) – not always a straightforward task – within the type of cognitive demand. In most subjects, this was done using the content and skills list which had been devised in the curriculum analysis. This meant that the evaluators had a pre-established sense of the level of difficulty of a particular topic and skill before analysing the examination papers. Of course, in any particular question of the examination paper, other factors (context, language, familiarity, etc.) had a role to play in the level of difficulty.

The full explanation of the reasons for the selection of each subject's typology is given in the subject reports, which can be viewed on the Umalusi website or in the separately printed subject reports.

5.5 Findings in the exam analysis

5.5.1 Is there evidence of progression from the Level 2 and Level 3 papers to the NC(V) 2009 Level 4 papers?

The **Mathematics** evaluation team felt that the lack of coherence and too large a volume of content across the three levels of the NC(V) curriculum would have an impact on the examinations, and that this should be noted at the outset. That said, the evaluation team found that there was a definite progression from Level 2 to Level 3, but minimal progression from Level 3 to Level 4. The team's analysis of the NC(V) Level 2 examination papers gave evidence of content assessed that was at a more basic level than at Level 3 and Level 4. A comparison of the Level 3 examinations and Level 4 examinations reflected evidence of minimal progression between these levels. Table 5.6, below, summarises the findings regarding progression from the Level 3 to Level 4 papers in terms of the broad topic areas specified in the curriculum:

Table 5.6: Progression in NC(V) Level 3 and 4 papers

Topic area	Comment
Complex numbers	Level and content similar in L3 and L4
Functions and algebra	Similar linear programming question (about 7% weight). Different content, but similar level for rest.
Calculus	Similar level, but L4 contains questions on integration.
Geometry and trigonometry	More geometry and trigonometry in L4, but L3 trigonometry seems more complex.
Financial Maths	Different content, but similar level.
Data and Statistics	Some identical content at same level. Some different content, but at similar level.

It is, however, important to note that these inferences are on the basis of a comparison of *one* set of examination papers for Level 3 and one set of examination papers for Level 4 and thus need to be understood with caution in that context. It is perhaps worth noting again that the paucity of examination materials gave rise to the decision not to formally compare the NSC and NC(V) examinations at this point. That said, the analysis of the curriculum, which is reported separately, also suggests that progression between Level 3 and Level 4 in the curriculum itself is unclear.

The **Mathematical Literacy** evaluation team thought the progression across the three levels for this qualification was uneven and could not be termed good at all. In NC(V) Level 4, Paper 1, the evaluation team found a fair progression from Level 2 to Level 3 to Level 4 in that most of the topics were covered at all three levels. However, the team was of the opinion that in some areas, the NC(V) Level 4 questions did not seem to be more difficult than the questions in Level 2 or 3, for example, in Lengths, Areas and Volumes, as seen in Question 5 on the area of a semi-circle, and in Financial Documents, as seen in Question 4 about a bank statement. On the other hand, because of the inclusion of concepts *not* in the curriculum, some of the Level 4 questions were much too difficult. This is not just because the questions were from outside the curriculum and would have been untaught, but because these questions contained difficult concepts in and of themselves, for example, the questions on compound bar graphs and break-even points. Some omissions included the concept of probability, which should have been examined at both Level 3 and Level 4.

In NC(V) Level 4, Paper 2, the team found more notable omissions; for instance, Topic 2 (Patterns and relationships) was not examined at Level 3 or 4, and there were no formulaic calculations to do with Finance. There was no progression from Level 2 to Level 4 in complexity in the Topic 4 concept of surface area. The concept of probability in Topic 5 (Information Communicated) had no progression from Level 3 to Level 4. Again, the whole area of calculations using financial formulae was omitted from Level 4. Using financial records for interpretation was examined only at Level 4.

The **Physical Science** team found that there seemed to be a haphazard selection of questions in Levels 2 and 3, with little regard for overall standard, coverage and quality. Given the superficial standard of the questions in the Level 4 examination, some of the questions in the Level 2 and Level 3 examinations were more demanding than those in the Level 4 examination. Examples of some of the more demanding questions from the 2009 Supplementary Level 2 examination are Questions 11.4 to 11.6. Examples of more demanding questions from the 2008 Level 3 examination are Questions 4.3, 4.5 and 6.3.

A large number of serious mistakes occurred in the examination papers, including scientifically incorrect information (for example, 29 mistakes were discovered in the Level 2 Supplementary Examination of 2009). This would have meant that these examinations were made more difficult for learners in terms of answering questions meaningfully and scoring marks.

The team was consequently of the opinion that there was insufficient evidence of progression from the Level 2 and Level 3 examination papers towards the 2009 Level 4 papers.

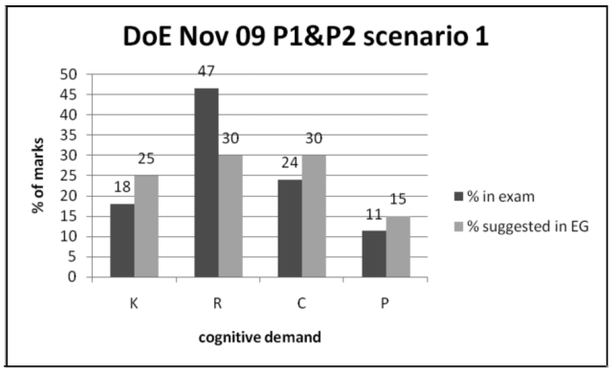
The **English First Additional Language** evaluation team mentioned that the content specification in the examinations appeared dissimilar across the levels, with Levels 2 and 4 often showing continuity, but with Level 3 appearing to be a stand-alone level. At other times, Levels 3 and 4 showed continuity, with Level 2 standing alone. For this reason, the levels seemed uneven and could not be termed 'good' in the sense of there being progression.

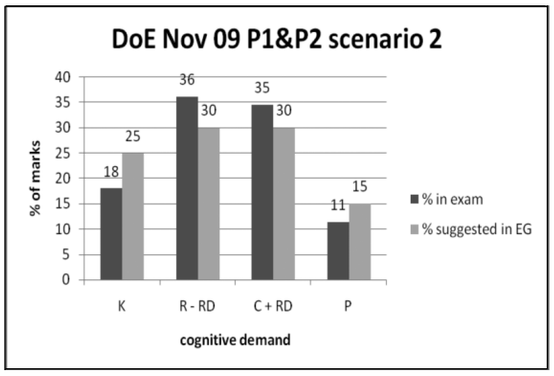
5.5.2 Did the 2009 NSC and NC(V) papers comply with the Subject Assessment Guidelines?

The 2009 **NC(V) Mathematics** examination papers contained many instances of non-compliance with the Subject and Assessment Guidelines. Topics were examined in the

'wrong' paper. Level 3 content was examined despite no indication given in the documents that this would be so, and weighting for content topics did not comply with the specified weighting.

Regarding the **NSC examination papers**, the team investigated whether the percentage of marks allocated to each category in the NSC examinations complied with the suggested weighting from the Examination Guidelines. The investigation was done in terms of the two scenarios: in the first scenario, the categories are used as is; in the second scenario, the difficult routine procedures questions were removed from the routine category and placed in the complex procedures category.





Using Scenario 1, the team would suggest that the examination contained more marks for routine procedures than the suggested weighting in the Exam Guidelines, and fewer marks for each of the other categories.

Using Scenario 2, the team would suggest that the weighting in the examination and in the Exam Guidelines were reasonably aligned, although the emphasis on routine and complex procedures in the examination was a little too heavy, and on problem-solving and particularly knowledge, the questions were a little too light.

Given that the team felt that Scenario 2 was perhaps a preferable categorisation, the team was of opinion that the examination achieved a reasonable degree of compliance with the suggested weighting in the examination guidelines.

Compliance with the Subject Assessment Guidelines in **NC(V) Mathematical Literacy** was sketchy. The evaluation team found that while the coverage of topics was roughly as it should have been, the types of cognitive demand were not as they were specified in the Assessment Guidelines.

Table 5.7: A comparison of the specified and examined types of cognitive demand.

Cognitive demand	Specified Distribution of Marks (%)			Examined Distribution of Marks (%) 2009		
	P 1	P 2	Avg P1 P2	P 1	P 2	Avg P1 P2
Knowing	60	0	30	46	17	32
Routine procedures	40	20	30	38	7	23
Multi-step procedures	0	40	20	12	59	35
Reasoning and reflecting	0	40	20	4	17	10

The analysis of the NC(V) examination papers showed that, in fact, Paper 1 made too high a cognitive demand on the learners and did not provide enough questions of a *Knowing* type. By contrast, Paper 2 made too little cognitive demand at the highest level of *Reasoning and reflecting*, while offering too many questions of the lowest level, i.e. *Knowing*. The overall effect of combining the papers was that there were too many questions at Level 3 (*Multi-step* procedures) and too few at Levels 2 (*Routine procedures*) and level 4 (*Reasoning and reflecting*). This would have made it difficult to differentiate the high achievers in this examination, and may have resulted in a bunching of results in the lower mark categories.

It is worth noting that the **NSC examination papers** that supposedly covered Learning Outcome 3 (*Shape, Space* and *Measurement*) did not do so at the minimum required level, and did not meet the minimum required level of coverage of Learning Outcome 4 (Data Handling) either.

The 2009 **Physical Science NC(V)** examinations compare favourably with the Assessment Guidelines in that all the subject outcomes were sufficiently covered and none of the broad topics were neglected. In the **NSC examination papers**, a few mismatches were found between the 2009 examinations and the Subject Assessment Guidelines: only 2% of Paper 1 (Physics), and 0% of Paper 2 (Chemistry) were set according to Learning Outcome 3 (The Nature of Science and its Relationships to Technology, Society and the Environment). According to the Subject Assessment Guidelines, 15% of Paper 1 and 25% of Paper 2 should have been set on this learning outcome. The Umalusi evaluation team acknowledged that it was particularly difficult to set meaningful questions of this type for subjects that are inherently technical, such as Physics and Chemistry. The team was therefore of the opinion that the Assessment Guidelines should be reviewed to lower the percentage of inclusion of LO3 to 5-10% and thereby to adhere to this requirement in both papers, especially because Learning Outcome 3 involves a different kind of thinking and it is actually not realistic to assess it in an *external assessment*. The team felt that Learning Outcome 3 should rather mostly be included in *internal assessment* by means of projects that would lend more opportunities to the kind of thinking required, especially regarding relationships in technology, society and the environment.

In Paper 2 (Chemistry), a disproportionate representation of electrochemistry (38%) and organic chemistry (33%) occurred. This was not necessarily a fault of the exam, but an indicator of the bias of the examinable material in the curriculum. Several topics that occurred in the 'Chemical Systems' section, in fact, required knowledge of electrochemistry and organic chemistry, which are dealt with separately elsewhere in the curriculum. The Umalusi evaluation team found that notable omissions in the examinable content, which are deemed important aspects of the discipline, are the following:

- Quantitative aspects of chemistry e.g. molar and stoichiometric calculations and volumetric analysis
- Acids and bases
- Gas laws
- Periodic table and trends
- Inorganic chemistry (more broadly than just fertilizers).

Although these topics may have been dealt with in Grades 10 and 11, their exclusion from the Grade 12 examinable content means that they will be given less priority in the classroom, and may even be overlooked entirely.

Form the analysis of the **English First Additional Language** examination, it is clear that the 2009 **NC(V) examination papers** adhere to the Assessment Guidelines in terms of format, but *not* in the allocation of marks to content topics. The **NSC examination papers**, on the other hand, adhered to the suggested format and mark allocation as presented in the *Subject Assessment Guidelines for Languages (SAG)* (2008:21).

5.5.3 Are the NSC and NC(V) papers at a suitable level of cognitive demand and difficulty, and is there a vocational focus in the NC(V) exams?

The **Mathematics** evaluation team found that the distribution of cognitive demand in the NC(V) papers was not as it should have been. While only 25% of the cognitive demand should have been at the lowest level of knowledge and comprehension, the team found that between 70 and 80% of the examination papers were at that level. The papers had no problem-solving questions. The examination was consequently less demanding than the curriculum suggests it should be. There was also nothing in the examination papers that suggested that the curriculum was directed towards supporting vocational learning. Applications are largely absent or contrived.

In the **NSC examination papers**, on the other hand, using either Scenario 1 or 2, the 2009 examination was more challenging than the 2008 examination. The Umalusi evaluation team noted that the 2009 NSC examination papers appeared to contain more problem-solving questions than before. Using Scenario 2, which the team felt gave a more realistic picture of the level of difficulty of the examination, the 2009 examination appeared to align reasonably well with the suggested allocation to categories of cognitive demand stipulated in the examination guidelines (EG).

Table 5.8 and Chart 1: Summary of results using Scenario 1

Chart 1: NSC Scenario 1

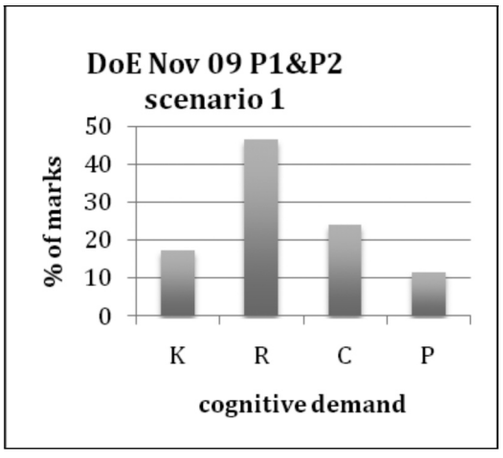


Table 5.8: NSC Scenario 1

NSC Nov 09 P1 & P2	
TOTALS	%
Lower cognitive demand: K&R	65
Higher cognitive demand: C&P	35

Table 5.9 and Chart 2: Summary of results using Scenario 2

Chart 2: NSC Scenario 2

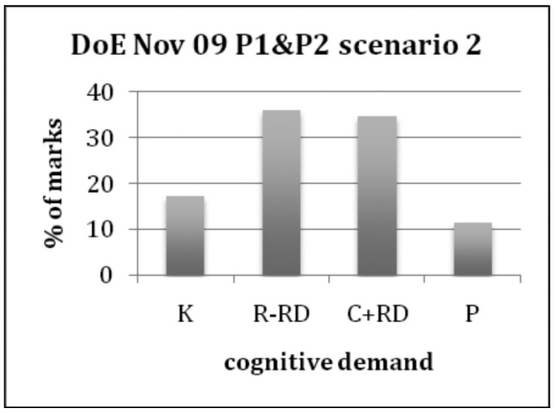


Table 5.9: NSC Scenario 2

DoE Nov 09 P1 & P2	
TOTALS	%
Lower cognitive demand: K&(R-RD)	54
Higher cognitive demand: (C+RD)&P	46

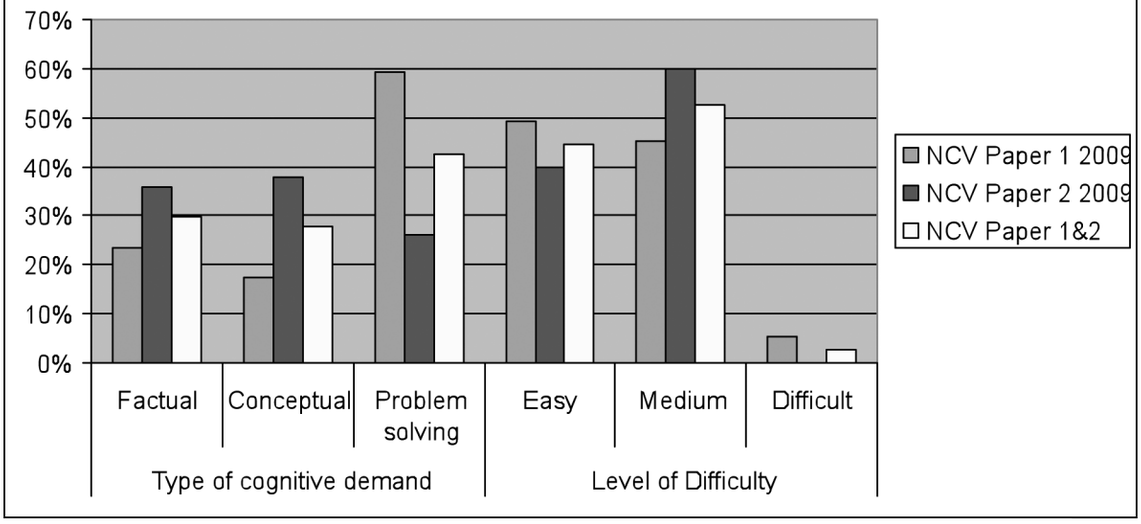
If the two sets of examination findings are set side-by-side, it is clear that the level at which the subjects were assessed in the two qualifications were significantly different. It seems likely that the cognitive demand and the level of difficulty in the NC(V) needs to be adjusted upwards by the inclusion of a more representative sample of moderate and difficult questions. The 2009 NSC examinations appeared to conform to the current examination guidelines, which require just over 40% of marks to belong to higher levels of cognitive demand. What the present findings suggest, at least provisionally, is that a person registering for the NC(V) who has already passed mathematics in the NSC at the achievement level required by the NC(V) could be exempted from Mathematics, and have her/his NSC achievement recognised for NC(V) purposes. This is particularly the case since there appears to be little or no adaptation of the Mathematics curriculum towards more vocational ends.

The **Mathematical Literacy** evaluation team found that the overall distribution of level of difficulty in the NC(V) papers was weighted towards Easy questions, particularly in Paper 1. More Moderate and Difficult questions in Paper 2 would have created a more balanced and discriminating examination. The team also struggled to find questions that spoke to the vocational context of the learners. The few that were included were both contrived and unrealistic.

In the 2009 **NSC examination papers** for Mathematical Literacy, Paper 1 contained insufficient Knowing-type questions and more Multi-step Procedure-type questions than specified. This would have made it more demanding than it should have been. By contrast, Paper 2 contained too few questions at the two higher levels of cognitive demand, Multi-step Procedures and Reasoning and Reflecting. The overall effect was that the two papers were too routine and insufficiently demanding. In general, both the NSC examination papers complied with the *National Curriculum Statement*. A few concepts that were not examinable were included in the papers. Some concepts, that should have been examined, were not included in the examination. However, the team did not think that the standard of the papers was significantly compromised by these erroneous inclusions or omissions. The comparison of the standard of the 2008 and 2009 NSC papers showed that both Paper 1 and Paper 2 of 2009 contained more difficult questions and fewer easy questions than the 2008 papers. The fact that in 2009 17% of questions were difficult compared to 8% in 2008 meant that the 2009 papers would have resulted in a slightly better differentiating effect among higher achievers.

In the analysis of the **2009 NC(V) Physical Science paper**, the evaluation team found that in Paper 1 most of the questions were categorised as problem-solving, and were either easy or medium in difficulty. Only 5% of Paper 1 was set at the difficult level. As illustrated in the graph below, in Paper 2 there was a fairly even spread of factual, conceptual and problem- solving questions, and the questions were either easy or medium in difficulty. No questions were set at the difficult level. As a result, in the combined Physical Science examination, there were slightly more problem-solving questions than factual and conceptual ones, and 45% were classified as easy questions and 53% were classified as medium. Only 3% of the questions were regarded as difficult. This means that these examinations tested scientific concepts and skills at a superficial level, and were not comparable to the NSC Grade 12 examinations where roughly 22% were difficult questions and only 24% were easy (Umalusi 2009). However, the team was of opinion that as an examination for vocational learners, this standard was appropriate.

Graph 1 - Comparison of NCV Level 4 Paper 1, Paper 2 and combined



In terms of the **2009 Physical Science NSC** examination papers, the evaluation team found **Paper 1 (Physics)** to be of a less demanding standard, whereas **Paper 2 (Chemistry)** was more difficult. The NSC 2009 examination paper contained 22% of easy questions, 54% of medium questions and a higher percentage (22%) of difficult questions than the 12% of 2008. The team found that looking at previous research on the old *Senior Certificate*, the 2009 exam was more like the previous HG, especially when considering the higher percentage of difficult questions in the 2009 exam (22%) compared to the old HG (19%).

The evaluation of Paper 2 showed that 27% of the questions were identified as difficult – also a very high percentage of marks that was only achievable by A-grade learners. In 2008, a very large percentage of Paper 2 was assessed as medium in difficulty (75%), while in 2009 this had dropped to 55%. Hence, on the whole, the 2009 Paper 2 (Chemistry) was more difficult than even past HG papers, which had only 19% of marks at the most difficult level.

If these two sets of findings are set side-by-side, it is clear that, even if the curricula are regarded as being very similar, the levels at which the two subjects are assessed are presently significantly different. It seems likely that the cognitive demand and the level of difficulty in the NSC may need to be adjusted downward somewhat for the present – even if there is the intent to adjust standards upward over time. The NC(V) examinations, on the other hand,

appeared to be rather superficial, and, in time, may require a gradual strengthening of demand. What the present findings suggest, at least provisionally, is that a person registering for the NC(V) who already has a pass in Physical Science in the NSC at the level required for the NC(V) could be exempted and have her/his NSC achievement recognised for NC(V) purposes. This is particularly the case since there appears to be little or no adaptation of the curriculum towards more vocational ends.

The **English First Additional Language** evaluation team found that the cognitive demand of the two **NC(V) papers** differed widely. They were of the opinion that Paper 1 may have resulted in poor-to-average learners achieving average results while stronger candidates would have found the paper not at all challenging. Paper 2 was a more difficult paper as the candidates' writing ability would have determined their achievement in this paper. The team also felt that it would have been more appropriate to examine more than one poem, because the inclusion of only one poem in the paper, which carried 35% of the marks for Paper 1, might have disadvantaged learners.

The **English First Additional Language** evaluation team found that in the last five years, the level of difficulty of the questions in the *Senior Certificate* and the **NSC examination papers** had not changed dramatically. The number of easy questions remained between 54% and 60%, while the number of moderate questions varied between 20% and 30% – a difference of about 10% between the highest (2006–2007 SG, 2009 NSC) and lowest (2008 NSC) number of moderate questions. The evaluation team regarded the greatest difference as lying in the number of difficult questions in the various papers. There was a difference of about 15% between the lowest (2005–2007 SG) and highest (2008 NSC) number of difficult questions.

Compared to the 2008 NSC examination paper, the 2009 NSC examination paper contained more or less the same number of easy questions. The number of moderate questions was about 10% higher than in the 2008 paper, while the number of difficult questions was a little more than 10% lower.

From the available data on the level of difficulty, the following inferences could be made. All candidates would have been advantaged by the number of easy questions and the fewer difficult questions in the 2009 examination paper. One might argue that the greater number of moderate questions would have cancelled the effect of the fewer difficult questions. This might have been true in the case of academically poor learners, but given the number of easy questions, the team was of the opinion that even the below-average learners should not have achieved poorer results than in the 2009 paper. The Umalusi evaluation team was of opinion that due to the fewer difficult questions, average and stronger learners should have achieved even better results in the NSC 2009 papers than in the 2008 NSC papers.

It was not really possible, given the single exemplar of the NC(V) exam, which seemed to have differed significantly in terms of level of difficulty between the two papers, to determine whether NSC candidates with a pass in English could be exempted from repeating English. It would seem, however, that the Umalusi English FAL team's curriculum findings would suggest that the NSC coverage of similar outcomes is more consistent than for the NC(V) and that, where there is overlap, the level of difficulty and demand seems to be at much the same standard. These observations would suggest, although tentatively, that exemption for English could be given to candidates enrolling for the NC(V) should they have passed NSC English at the level of achievement stipulated in the NC(V).

5.5.4 Is the format of the papers a good model for future papers?

The **Mathematics** evaluation team thought that the 2009 NC(V) examination papers were not a good model for future examinations. Apart from the problems already stated above, the 2009 papers contained many errors and instances of poor expression or poor typography. The team believed that changes to the examination needed to be done *in conjunction with amendments to the curriculum*, as many of the examination problems arose from problems in the curriculum. The evaluation team was of the opinion that the curriculum needs to meet learners at a level appropriate to the mathematical skills they come in with, and provide depth and a solid basis in mathematics for where they are ultimately going (either to work in industry or for further study).

The **Mathematical Literacy** evaluation team was also of the opinion that the 2009 NC(V) examination papers were not a good model for future papers. According to the team, the papers had very few contextually authentic questions and contained too many errors and problematic questions. On a more positive note, the team found that the papers did pose different types of questions from across the whole curriculum with the spread of cognitive demand and level of difficulty being fairly well balanced and appropriate for vocational learners, but the team's analysis pointed to the fact that Paper 2 should have contained more questions of the Reasoning and Reflecting type. The team also recommended that more marks should have been awarded for more interesting and relevant questions on the topic of Shape, Space and Orientation. As this was the first NC(V) Mathematical Literacy examination, the team wondered whether the exam would differentiate among learners at the higher end.

The 2009 **NC(V) Physical Science** examination papers in general were thought to be a good model for future examinations. The papers questioned a variety of skills that are specific to Physical Science and posed a range of types of questions. The questions were generally well structured and tested a variety of skills and cognitive abilities.

A distinct improvement over previous vocational examinations (Engineering Science N3) was the inclusion of questions that tested conceptual understanding. In a previous study, these were found to be completely lacking in the N3 examinations (Umalusi, 2006), while in the 2009 NC(V) Physical Science examination, 28% of the marks assessed conceptual understanding.

One concern with the 2009 NC(V) Level 4 examinations was the lack of vocational emphasis in both Paper 1 and Paper 2 – these papers resembled a superficial version of the NSC examinations, rather than being assessments that were appropriate for a vocational course. However, given the extent of content overload in the NC(V) Level 4 curriculum, a superficial assessment was to be expected, as learners could not have been expected to grapple in any depth with such a wide spread of content topics.

The **English First Additional Language** evaluators thought that the **2009 NC(V) examinations papers** were a good model for future examinations. The texts and scenarios used in the papers were generally interesting, of appropriate length and appropriate in the required cognitive demand. The evaluators were of the opinion that the 2009 **NSC examination papers** were also a good model for future examinations. As substantiation, the Umalusi team found variety in the questions in the papers (basic comprehension, interpretation and opinion questions) which tested a range of cognitive skills. The team also referred to the texts, which were generally interesting, of an appropriate length and at the learners' level. The team mentioned that most candidates would be able to interpret the texts in the comprehension section.

The language questions set were a good test of the learners' language ability. Questions on a wide range of language issues tested learners' overall knowledge of most language structures. As the level of difficulty of most language questions was rated as easy or moderate (50 and 48% respectively), most learners ought to have reached a high level of achievement without answering the 3% difficult questions.

Regarding the poetry questions, the evaluators were of the opinion that more questions testing the candidates' knowledge of literary aspects should have been part of the exam papers, rather than including only comprehension-type questions.

5.5.5 How appropriate are the language levels in the 2009 papers?

The **Mathematics** team thought the language level in the **NC(V) examination papers** was appropriate, provided learners were familiar with mathematical terminology.

The **Mathematical Literacy** team felt that a lot more creativity is needed to set **NC(V) examination papers** that are equally accessible to learners, regardless of socio-economic backgrounds, geographic area or gender. There were also instances of contrived questions that did not reflect reality. In the team's opinion, when there were so many sources of real data on the Internet and in the media, this was inexcusable. Regarding the **NSC examination papers**, the evaluation team felt that despite a few ambiguities and language errors, the language level was appropriate and familiar enough for most learners. However, the evaluators were of opinion that examiners should take care not to include too many tables, which can induce 'table-fatigue'. It takes more concentration and skill to interpret tables than to read text. The team recommended that examiners and moderators should be assisted by language experts trained in the process of writing and evaluating examination papers for ambiguity and page 'density'.

Furthermore, the team felt that the evaluation tool used in this research project should be used in future, since it provides a very clear picture of the overall cognitive demand and level of difficulty of examination papers.

No issues were found in the **NC(V) Physical Science** examination papers regarding language level. The language was of an appropriate level, and the information provided was sufficient without being too wordy. Regarding the **NSC examination papers**, the Umalusi evaluation team found that the 2009 examination papers were a vast improvement on the 2008 papers in terms of language level. The written text was kept to a minimum and the words used were generally accessible.

The **English First Additional Language** team thought that in general the language level used in the NC(V) papers was suitable. They were, however, concerned that the language used in some of the questions seemed elevated, and that this would have been problematic for some learners.

6. Concluding ideas, recommendations and further research

6.1 Towards answering questions about the compulsory subjects in the NC(V) and NSC

In subsection 3.2, which detailed the purpose of the research, there is a list of questions, the answers to which are important to Umalusi. This research cannot answer all those questions, especially since the focus was very specifically on understanding the similarities and differences between the respective curricula and examinations for some of the most critical subjects in both qualifications. Mathematics or Mathematical Literacy is compulsory in both, and so is English First Additional Language which may also be the language of learning and teaching (LOLT). Physical Science has been included in the research, even though it is not compulsory for either qualification, because of its significance as an access subject for study in professional fields such as engineering and medicine.

Because languages and Mathematics or Mathematical Literacy form the critical overlap between the qualifications, the evaluation of these subjects would provide the first indication of how similar – or different – these subjects are, and Physical Science, though not included in the *fundamental* category, has been used in much the same way. The chief criteria that have been examined have been the breadth and depth of the intended curriculum – as measured in a variety of ways – as well as the nature of the cognitive demand and the level of difficulty of the examined curriculum. Other factors such as sequencing, progression and coherence resulting from the use of an organising principle have also been taken into account. Unsurprisingly, the comparisons do not provide a single picture, but have resulted in a variety of 'snapshots', which have begun to suggest answers to some of the questions posed. So while the NSC and the NC(V) have the compulsory, or *fundamental* subjects, in common, the similarities and differences have started to be teased out in this first comparative report. The insights have begun to suggest answers to questions that the implementation of the new qualifications pose – how do the two relate to one another for a number of practical purposes, such as, the recognition of achievement in a subject for transfer from the one qualification to the other. Some attempt has been made, where possible to give preliminary indications based on the findings, with the proviso that both qualifications will take a little time yet to settle. The hope is that the findings here will provide data that will help make decisions that will strengthen the curricula, the quality of exams and the standing of both qualifications.

6.2 Regarding the nature of the *fundamental curricula* in the NC(V)

All four subject teams were asked to determine whether the curricula for the compulsory subjects had been given a distinctive vocational bias. The consensus was that the subjects had not, in any way but the most superficial, been 'cut to size' or 'dyed' for vocational

purposes. Indeed, in the case of the Physical Science curriculum, such vocational application as there was only served to add to the size of the curriculum. This finding, which is counter to the trend in the learning associated with the vocational/occupational qualifications registered on the NQF, is a very positive finding as the possibility of a relatively straightforward comparison between the two subject curricula was immediately present.

In addition, the analysis of the examination papers indicated they did not have a particularly noticeable vocational slant to them, but where this had been attempted, the resultant question felt forced and inauthentic.

Having NC(V) curricula examinations that are not narrowly vocationally described is important if one considers that these curricula will be common to all NC(V)s, regardless of the learning field for which the programme has been developed. This does not preclude the possibility of a more specialised application being implemented at the programme level. Furthermore, the general educational nature of the curricula does not simply allow for the commonality within the NC(V), it also allows for the possibility of exemptions for the *fundamentals*, at least from the NSC to the NC(V) for now. That said, none of the evaluations found that the exit points at the three levels of the NC(V) were exactly comparable with the three grades of the NSC.

6.3 Findings and recommendations regarding the NC(V) curricula

All four subject evaluations found that, compared to the NSC curricula, the NC(V) curricula were not particularly well constructed. This was evidenced by inconsistent use of terminology, lack of progression and coherence across the levels, and inconsistency among different documents. In addition, three of the Umalusi evaluation teams, the ones for Mathematics, Physical Science and English FAL, found that the NC(V) curricula were overloaded with content, and each team made specific suggestions regarding reducing the breadth of the curriculum to allow for greater in-depth study. An awareness of developmental learning across the three levels was also recommended. These recommendations for consideration are presented in greater detail in the subject reports.

The NSC curricula provide a model for unifying the development of curricula for a whole qualification: they all have strong explicit organising principles, are organised according to learning outcomes and knowledge areas, and these are linked to assessment standards. The Learning Programme Guidelines explain *how* the learning outcomes relate to both the critical and developmental outcomes. The NSC curricula are also more systematic regarding sequencing of skills and knowledge than their NC(V) counterparts are. The same consistency of approach to curriculum development is not evident in the NC(V) curricula. Where the NC(V) curricula approximate the same structural coherence, they have been modelled on the NSC curriculum for that particular subject. One of the consistent strengths of the NSC, therefore, is the fact that the subjects have been developed along common lines, and NSC developers were tasked to provide guidance in a common format. Revision occurring in the NC(V) curricula would do well to encourage a standardising formulation for its subjects. The recommendation offered for the NSC curriculum of a single, unified, user-friendly document should also be adopted for the NC(V).

6.4 Findings and recommendations regarding the NC(V) examinations

When considering the evaluation undertaken of the 2009 NC(V) examinations, it must be borne in mind that the NC(V), unlike the NSC, had no real historical precedent, and that this first exam evaluation was undertaken in the spirit of establishing a baseline. It was for this reason that the teams were not formally asked to do a NC(V)-NSC comparison. Such comparative findings as there are have been drawn from the respective reports to provide a general sense of how the standards might differ. For that reason, as has been stated before, both the information provided and the conclusions based on the information, will need to be subject to repeated scrutiny while the qualifications stabilise.

All the examination evaluation teams found that the 2009 NC(V) examination papers did not comply entirely with the Assessment Guidelines in the mark allocation, specified content omitted, unspecified content included and levels of difficulty of the questions. In addition, all the examination evaluation teams found that the 2009 NC(V) papers contained many errors of a conceptual nature, poor expression and of a typographical sort. While the former sets of difficulties can be ascribed to inexperience with the new format for the examination, the latter difficulties are not so easy to explain away. In this area, both Umalusi and the Department of Basic Education must be required to strengthen the capacity of examiners and moderators through structured training. Because the Umalusi exam analysis instrument had yielded helpful results, it was felt that its use in such training could help to establish a common understanding for the setting and moderating process.

In addition, procedures to prevent a repeat of the extent of errors in the 2009 NC(V) Level 4 papers, both typographical errors and factual, need to be put in place for future examinations. The final proof reader who signs the papers off for printing should be a qualified subject specialist.

The Umalusi subject evaluation teams were asked to step back from the papers to consider whether, at a general level, the 2009 examination provided an acceptable model for future exams. The Mathematics and Mathematical Literacy evaluation teams found that the 2009 NC(V) examination papers were *not* a good model for future use. The Physical Science and English FAL evaluation teams found that they were. These recommendations need to be reflected in amended examination guidelines as well as in the 2010 papers.

6.5 Regarding the differing levels of achievement for the NC(V) and the NSC

It has been noted that the difference in the required pass mark between comparable subjects in the NC(V) and NSC curricula needs to be addressed lest this discourages learners from taking vocational courses.

In the NC(V), for all vocational subjects, satisfactory achievement is pegged at 50%, and so is performance in the language, which must be taken at least at First Additional Language level. The remaining *fundamental* subjects are passed if the candidate achieves at least 30%. These levels of achievement are required in a context where, for the vocational subjects, 75% of the final mark is assessed internally, while the final 25% is derived from a public, national, external exam. For the *fundamental* subjects in the NC(V), the assessment requirements correspond with those in the NSC, where 75% of the final mark is externally assessed.

On the other hand, candidates are awarded the NSC based on having passed all compulsory subjects with 40% or more in the Home language, and a minimum of 30% in the language of learning and teaching. Overall, the candidate needs at least three subjects at 30% or more, and two more at 40% or more to pass.

Concern has been expressed about the apparently more stringent requirements for certification for the NC(V), the argument being that it is more difficult to pass the NC(V) than the NSC, and more difficult to achieve the necessary requirements for admission into Higher Education. Taking into account that the *internal-external assessment* ratios differ between the two qualifications, the allegation that it is more difficult to pass the NC(V) cannot simply be taken at face value, especially since many other factors would need to be taken into consideration (exam difficulty, for one) when researching whether the pass requirements of the two qualifications ought to be aligned. It may be that, bearing in mind that the qualifications serve related but not identical purposes, the achievement requirements cannot simply be made the same. However, ongoing monitoring of improvements to the curricula and the quality of exams will continue to keep this question in mind.

6.6 Regarding the level of the NC(V) on the NQF

In certain quarters, the opinion has been expressed that the NC(V) Level 4 is actually wrongly located and that it would be better and more appropriately placed at NQF Level 5. While the findings do suggest that the NC(V), like the NSC, currently attempts to cover too much – and that some of the content is more appropriate for Higher Education, nothing substantive in the research suggests that there is a mismatch between the qualification and the NQF Level at which it has been pegged. Indeed, some of the exam findings suggest that, in terms of cognitive demand and level of difficulty, the subjects are *not* being examined at a level of difficulty that is comparable with that of the NSC. This finding would suggest that the qualification is currently not placed at too low a level on the NQF.

It may, however, be that the greater general educational focus, which requires a stronger theoretical grounding for the vocational learning than before, has given rise to the perception that it is difficult. The newness of the theory may have made it seem more difficult, especially if college staff have not previously offered theory to the same degree before. This perception is likely to wane as staff and learners alike adapt to the new expectations.

While this final section of the overview report strives to sketch in bold strokes the state of the NC(V) as it emerged after its first year of implementation, it must be borne in mind that these findings are largely confined to documentary research. Such research needs the support of fieldwork that tackles issues of implementation of the NC(V) curriculum, and the challenges it poses. Nevertheless, the information in this report, as well as in the more detailed and textured subject reports, is offered in the spirit of strengthening the NC(V) as a qualification necessary to the South African education system.

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