UMALUSI

Council for Quality Assurance in
General and Further Education and Training

Report on the

2011 National Senior Certificate Examination

Post-Examination Analysis Independent

Examination Board

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INTRODUCTION

Background

Umalusi has conducted the analysis of the National Senior Certificate (NSC) examination question papers for the past three years as part of the Maintaining Standards research project. The 2009 exam analysis was an attempt at benchmarking the second year of the NSC examinations. For 2009, the previous (Maintaining Standards 2008) analyses of the 2005 to 2007 NATED and the 2008 NSC examination papers were used, and compared with the 2009 NSC Department of Basic Education (DBE) examinations. In the same way the 2010 question papers were analysed and compared with the 2008 and 2009 question papers. The Independent Examination Board (IEB) and ERCO (Eksamenraad vir Christelike Onderwys) question papers have been included in the analysis since 2009 and 2010 respectively.

To date, question papers for the following examinations have been analysed:

- 2008 NSC Final Paper 1 and 2 (or P1 only in applicable subjects)
- 2009 NSC Final Paper 1 and 2 (or P1 only in applicable subjects)
- 2010 NSC Final Paper 1 and 2 (or P1 only in applicable subjects)

For the 2011 project question papers the following subjects were analysed: English First Additional Language (EFAL), Mathematics, Mathematical Literacy, Physical Sciences, Life Sciences, Geography, Accounting, Business Studies, Economics and History.

The question papers were analysed with regard to the following:

- coverage of the Learning Outcomes (LOs)and Assessment Standards (ASs)
- the cognitive demand of the question papers and
- the level of difficulty of the questions.

The findings in this report are presented per subject in line with the three areas indicated above.

Purpose of the post-exam analysis

The purpose of the post-exam analysis project is primarily to inform the Umalusi standardisation process on the standard of the question papers with regard to the cognitive demand, level of difficulty and coverage of the LOs and ASs. The analysis also provides a comparison of the current year's examination paper with the past years' examination papers. It is for this reason that Umalusi has maintained the use of the same taxonomies through the years – to enable the horizontal comparison of the question papers. This report is one of the other qualitative reports that are used to inform the decisions taken when standardising the NSC results.

Method of analysis

Generally, the teams used the exam analysis instrument developed by Umalusi. The instrument has been used since 2008 when the first analysis was conducted. Using an MS Excel spreadsheet, each question was analysed according to type of cognitive demand, level of difficulty, content/skill/topic and LOs and ASs (as described in the relevant curricula).

The teams used different taxonomies to analyse the cognitive demand of the question papers. The different taxonomies were used because they have been proven to be appropriate and useful in the analysis of the specific subjects. In some subjects the taxonomies are exactly the same as those used in the IEB Subject Assessment Guidelines, whereas in other subjects there are slight variations.

ENGLISH FIRST ADDITIONAL LANGUAGE (EFAL)

1.1 Evaluators

Mr MJ de Jager (Team leader), Ms N Nonkwelo and Ms P Voller

1.2 Introduction

As part of Umalusi's Post-Exam Analysis Project, the above evaluators were tasked with analysing the final 2011 National Senior Certificate (NSC) examination papers for English First Additional Language (EFAL).

In the post-exam analysis the following examination papers were considered:

- English First Additional Language papers 1 and 2 of the Independent Examinations Board (IEB)

The method used in the examination paper analysis is presented below.

1.3 Method of analysis

The examination papers mentioned above were analysed by using an exam analysis instrument developed by Umalusi (table 1). Using an MS Excel spreadsheet, each question was analysed according to type of cognitive demand, level of difficulty, content/skill/topic and learning outcomes (LOs) and assessment standards (ASs) (as described in the relevant curricula). This tool was used because it has been proven to be appropriate and useful in the analysis of language exam papers, and provides meaningful data.

Decisions about the type of cognitive demand and level of difficulty of the questions were made according to a typology closely linked to the revised version of Bloom's Taxonomy (2001). Questions were classified in one of five categories or types of cognitive demand. Within this category, each question was also classified according to level of difficulty, that is, easy, moderate or difficult. The typology according to which the questions were analysed is presented in table 1.

Table 1: Typology used for analysis of questions

Category	Level	Description
Basic factual or conceptual knowledge (CK) • Recall, recite and remember facts • Define and describe basic facts • Identify, label, select, locate information • Know and use appropriate vocabulary	Easy	Very simple recall; identify specific data; tell; recite; list For example, identify parts of speech; match known words with definitions
	Moderate	Medium content, read and locate, briefly define a term, name and match For example, identify answers to wh- (equivalent) questions from a text; explain what synonyms are, learnt diagrams
	Difficult	Recall complex content For example, correct spelling and use of vocabulary; dictation of unfamiliar text; find synonyms or antonyms for words used in a text
Comprehension (C) • Understanding of previously acquired information in a familiar context • Change or match information • Distinguish between aspects, compare and predict, defend and explain	Easy	Simple relationships; simple explanations For example, convert active to passive forms; identify main and supporting ideas; identify cause, result or reason from a text
	Moderate	More complex reasoning; motivate inferences For example, explain; briefly summarise; translate; interpret realistic visuals; draw inferences from a text; make a prediction
	Difficult	Identify principles which apply in a novel context; more complex reasoning; motivate inferences or predications For example, use information from the text to support a position
Application (A) • Interpret and apply knowledge • Choose, collect and do basic classification of information • Modify by using existing knowledge • Using well-known procedures (not immediately obvious) • Decide on most appropriate procedure to use • Select the most appropriate data • Decide on the best way to represent data	Easy	Perform well-known procedures in familiar contexts. All of the information required is immediately available. For example, write texts related to familiar contexts; draft a friendly letter, basic business letter, invitation; provide the necessary information; organise information in a presentable poster or table to promote comprehension
	Moderate	Draw information from a given text; illustrate in words; construct ideas; propose a course of action based on a straightforward case study
	Difficult	Collect information from available texts to support a particular position/opinion; re-present the position in own text; undertake guided research to collect the information needed for a task; organise information into suitable form (report, memo, visual presentation)

Analysis & problem solving (AP) • Analysis of information in a new or unfamiliar context • Examine and differentiate • Distinguish to find the most appropriate • Research and investigate information • Solve non-routine, unseen problems through higher level of understanding and cognitive processes • Use higher-level cognitive skills and reasoning to solve non-routine problems • Break down problems into constituent parts – then solve using appropriate method • Non-routine problems based on real contexts	Easy	Simple process in known or practised context; drafting an invitation; writing a letter of thanks or condolence – not simply formulaic
	Moderate	Investigate; classify; categorise; compare; contact; solve; relate; distinguish; write a persuasive essay; take minutes of a straightforward meeting; deal with more complex case studies; propose course of action, e.g. in report form
	Difficult	Interpret; report on; sort; debate; prepare a speech and/or presentation; use higher-level cognitive skills and reasoning, in developing, for example, proposal to solve a problem, use appropriate methods in problem solving
Evaluation & synthesis (ES) • Making judgements (evaluate), critique, and recommend by considering all material available • Weigh possibilities and make recommendations • Construct new • Synthesise, create or find innovative solutions • Formulate new ideas	Easy	Make judgements; critique on fairly straightforward topics; recommend by considering all available material; weigh possibilities and make recommendations; give opinion
	Moderate	Substantiate an opinion; critique statements about situations made by others; synthesis, critical argument; novel or abstract contexts; create poetry/a narrative
	Difficult	Generalise patterns observed in situations; work with complex problems involving insight and leaps of logic; create new solutions to problems; redesign; write or critique complex issues; rewrite for a new context and/or setting; construct or formulate new ideas

It is important to note that the analysis process was a subjective one and that decisions on type of cognitive demand and level of difficulty were reached through consensus among the evaluators. Furthermore, the descriptions and examples (see table 1) provided for types of cognitive demand and levels of difficulty were only regarded as guidelines. For example, all friendly letters would not necessarily be regarded as easy application questions – all aspects of questions such as topic, purpose and language level should be taken into consideration when categorising a question.

In the analysis of the examination papers, the following procedure was followed:

In the first instance, the papers were evaluated at face value. The team considered the general impression of each paper, layout, instructions, numbering of questions, mark allocation, and so on. Once this had been done, the team did an item-by-item analysis of each question in each paper.

The data collected from this item-by-item analysis was plotted on an MS Excel spreadsheet and then used to compile a report on each paper.

Once the reports on both papers had been completed, the results of the 2011 analysis were compared with the results of the 2009 and 2010 analyses.

The content assessed in both the papers is indicated in table 2 below.

Table 2: Content assessed – Papers 1 and 2

Paper 1	**Marks**	**Paper 2**	**Marks**
Comprehension	30	Literature (assessed in the form of a paragraph, a dialogue and essays)	60
Summary	10	Transactional writing (letter to the press, a poster and an email)	40
Poetry (seen and unseen)	30		
Visual interpretation and communicative language	30		
Total	100	Total	100
			Grand total: 200

1.4 Results of examination paper analysis

Accordingly, the report is presented in the sections that follow. Section 1.5 discusses the compliance of the IEB papers with the IEB Subject Assessment Guidelines, section 1.6 explains the cognitive demand and level of difficulty of the exam papers, section 1.7 discusses the weighting of cognitive demand, and sections 1.8 and 1.9 discuss a model for future use and the standard and quality of the papers respectively.

1.5 Compliance with the Subject Assessment Guidelines

The suggested format and mark allocation for the IEB papers was taken from the section of the *National Senior Certificate Handbook* (2011:13/1–13/47) at the team's disposal and the papers were found to adhere exactly to the requirements set out in this section of the *Handbook*.

Paper 1

The comprehension questions (question 1) were set on two magazine articles and assessed "interpretation of texts" and "language knowledge … in context" (2011:13/1) as suggested in the guidelines.

The summary question required a seven-point summary of 70 words presented in full sentences in point form, as suggested in the guidelines. The passage for this question was also taken from a magazine article, which was, as suggested in the guidelines, different from the passage used for the comprehension.

The poetry questions were set on two seen and one unseen poem and, as required by the guidelines, these questions were focused on negotiating meaning, rather than on personal response to text.

The language questions were set on texts suggested in the guidelines: a letter, a table containing statistics, an advertisement and a short article.

The mark allocation in Paper 1 agreed exactly with that suggested by the guidelines: comprehension (30 marks), summary (10 marks), seen poetry (20 marks), unseen poetry (10 marks) and language (30 marks).

Paper 2

As indicated in the *Handbook*, the questions on literature (questions 1–4) were set on the novel, *The Book Thief,* and the candidates were required to write a paragraph (10 marks), a dialogue (10 marks) and two essays (20 marks each) relating to the novel.

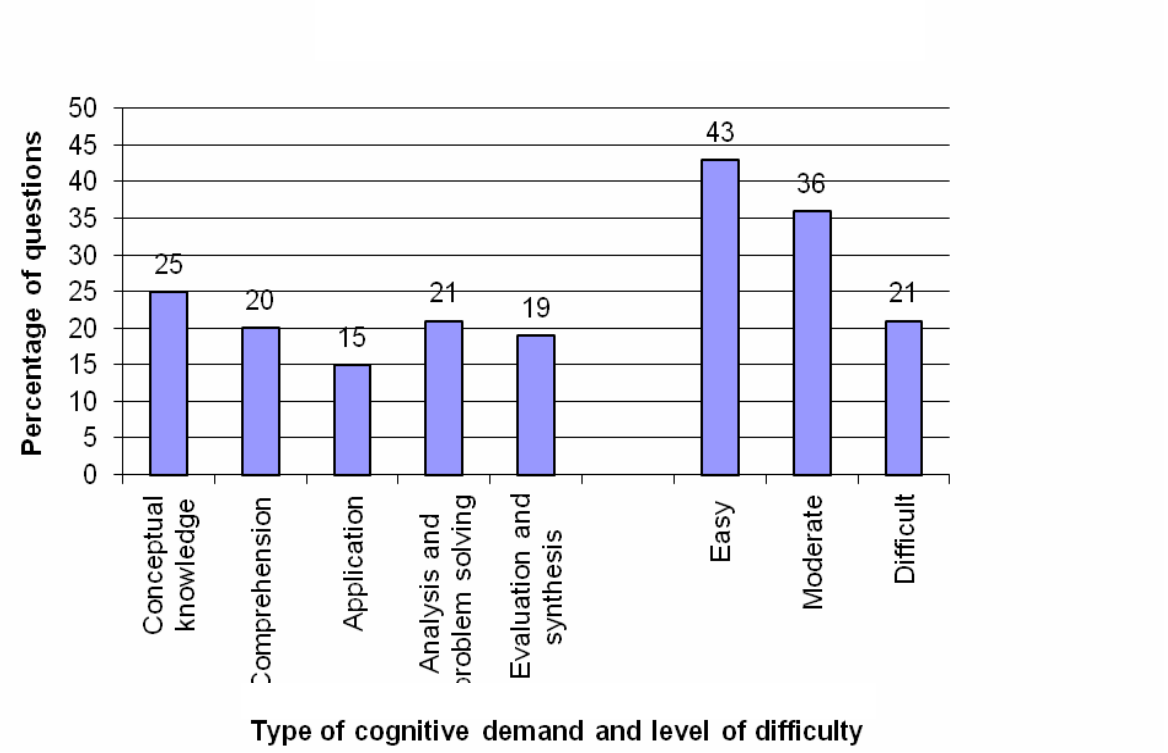
As suggested in the assessment guidelines, the questions on transactional writing included a letter to the press (20 marks), a poster (10 marks) and an email (10 marks).

The types of question, as well as the mark allocation, adhered exactly to the requirements set in the assessment guidelines.

1.6 Cognitive demand and level of difficulty

Paper 1

The type of cognitive demand and level of difficulty of the questions in Paper 1 are indicated in graph 1 below.



Graph 1: Type of cognitive demand and level of difficulty – Paper 1

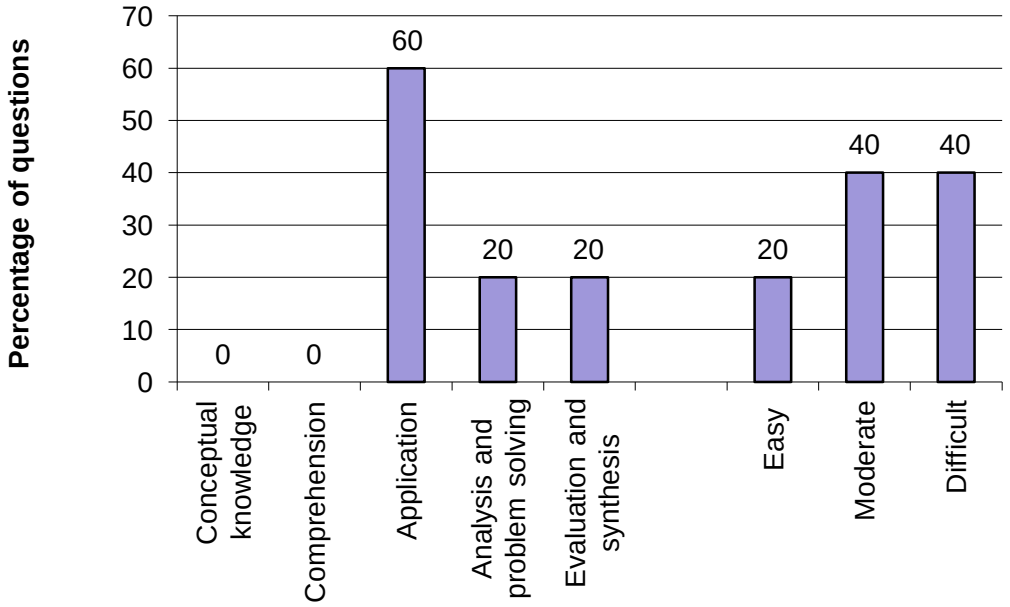
From graph 1 it is clear that the level of cognitive demand of the questions in IEB Paper 1 did not lean towards a specific type and, thus, were balanced. 25% of questions were regarded as conceptual knowledge question, 20% were regarded as comprehension questions and 15% were regarded as application questions. The remainder of the questions were regarded as analysis and problem-solving (21%) and evaluation and synthesis questions (19%).

With regard to the level of difficulty, most questions were regarded as easy (43%) while 36% of questions being moderate and 27% being regarded as difficult.

This division of type of cognitive demand and level of difficulty should have advantaged most learners as weak and strong learners should have been able to achieve average to good results.

Paper 2

As is clear from graph 2, most of the questions in Paper 2 were categorised as application questions, while 20% were regarded as analysis and problem-solving questions, and 20% as evaluation and synthesis questions.



Graph 2: Type of cognitive demand and level of difficulty – Paper 2

Only 20% of the questions in Paper 2 was analysed as easy, while 40% was regarded as moderate and 40% was regarded as difficult questions.

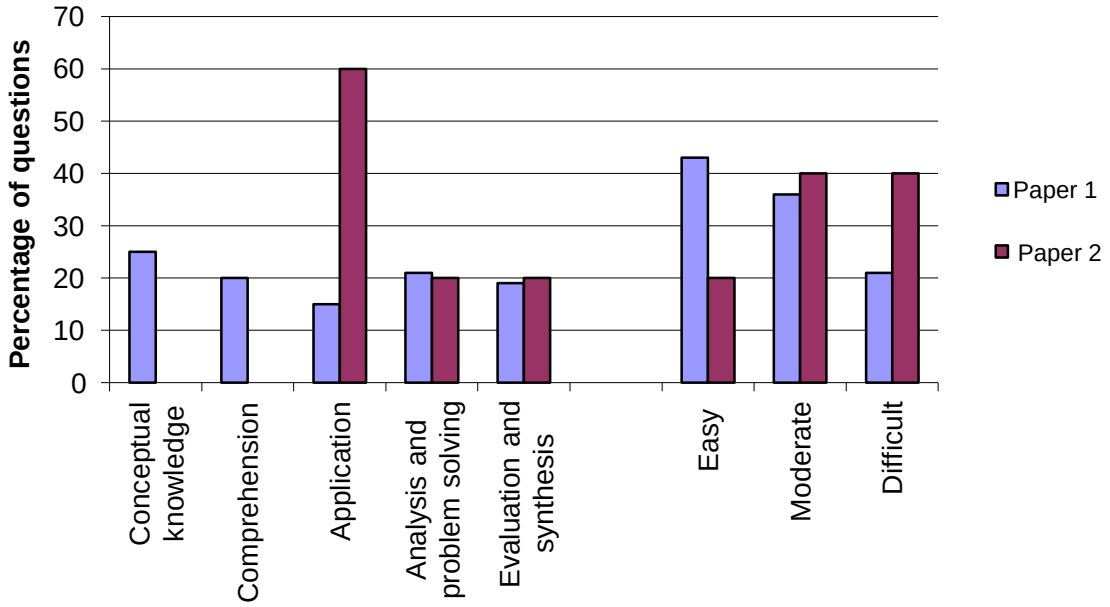
The team was of the opinion that writing and literature questions are generally more difficult than language and comprehension questions, as learners need to analyse and evaluate all texts before answering the questions set on those text.

1.7 Weighting of cognitive demand

In comparison with the 2010 paper, the team found the 2011 paper to be more balanced. In 2010, the team was of the opinion that the IEB Paper 2 was exceptionally difficult, as 90% of the questions were regarded as difficult and only 10% as easy. Although leaning towards moderate and difficult questions, the team

found the 2011 paper to be more balanced with regard to level of difficulty. It was clear to the team that the questions required the learners to have a sound knowledge of the prescribed literary works, as well as the ability to analyse and evaluate the questions in order to present logical, well-constructed answers to the questions. In 2010 the team was of the opinion that this was especially difficult, considering the fact that, apart from four other questions, two essay questions had to be answered in 2½ hours.

The combined cognitive demand type and level of difficulty of the questions in the IEB papers are presented in graph 3.



Graph 3: Type of cognitive demand and level of difficulty – combined papers

From graph 3 it is once again clear that the type of cognitive demand and level of difficulty of the questions in Paper 1 were more or less balanced, while there was a leaning towards application questions in Paper 2. In 2010, the team suggested that the level of difficulty of the questions in Paper 2 should not lean towards difficult questions, as the types of question set in this paper were more difficult in nature. In 2011, the level of difficulty of questions in both Papers 1 and 2 was much more balanced, which should have advantaged all learners.

1.8 Model for future use

The team was of the opinion that, in general, the 2011 IEB NSC final papers for EFAL were a good model for future examinations.

1.9 Standard and quality of papers

The team was of the opinion that the 2011 IEB NSC EFAL final examination papers were of a very good standard and quality. In addition, the language level in most of the papers seemed to have been appropriate.

The team also found the format of the papers and questions to be appropriate. Further, the questions were stated in a concise and to-the-point manner, avoiding long wordy introductions or instructions.

The instructions on the information pages to each paper were very clear. Learners who read and followed the instructions to the letter would have had no problems in answering correctly and answering the correct number of questions.

With regard to the contextualisation of questions, the team was of the opinion that the contexts in which the questions were set were appropriate for the South African learner.

With regard to the appropriateness of texts and stimulus material provided, the team was of the opinion that the texts and visual stimuli provided were clear (in most cases), appropriate and pitched at the correct level.

1.10 Closing remarks

The team was of the opinion that the IEB Paper 2 in 2011 was less demanding than in 2010 – to the extent that question 6 in this paper was regarded as rather trivial. However, as in 2010, the team was of the opinion that the model of the IEB writing paper prepared learners for writing critical analyses of texts – a skill needed in tertiary studies (irrespective of the field of study).

In closing the team was of the opinion that, apart from the issues mentioned above, the 2009, 2010 and 2011 IEB papers were, in general, of an acceptable standard.

MATHEMATICS

2.1 Evaluators

Ms Lynn Bowie (Team leader), Ms Alison Kitto and Mr Williams Ndlovu

2.2 Introduction

In order to benchmark the Independent Examinations Board (IEB), the examination papers from 2011 were analysed to assess the level of cognitive demand. In addition, for the IEB examinations we compared these analyses with the analyses done at the end of 2010, 2009 and 2008.

All learners taking the National Senior Certificate (NSC) are required to take and pass either Mathematics or Mathematical Literacy.

2.3 Method of analysis

In analysing the type of cognitive demand in the Mathematics examination papers for 2011, the team used the taxonomy of categories of mathematical demand set out on page 13 of the Department of Basic Education (*DBE*) *Subject Assessment Guidelines for Mathematics NCS*, Jan 2008. The team chose to use this taxonomy as it is tailored specifically for mathematics examinations. The description of the categories, as given in the Subject Assessment Guidelines (SAG), is shown in table 3. This taxonomy is also used by the IEB in the setting of its Mathematics papers.

Team members also used the examples of the types of question that can be set for each of the four categories of cognitive demand provided on pages 32 to 34 of the DBE SAG, Jan 2008, to help guide their analysis.

In addition to using these categories the team designated a subcategory (E = easy, M = moderate, D = difficult) to each task. This subcategory was used to make finer distinctions within categories. For this reason we have looked at them in conjunction with the category designation. For example, we look at the number of questions involving routine procedures (R) at differing levels of difficulty, to get an idea of how many were easy (RE), moderate (RM) or difficult (RD).

Table 3: Cognitive levels as described in the SAG

Cognitive levels	Explanation of skills to be demonstrated
Knowledge (K)	• Algorithms • Estimation; appropriate rounding of numbers • Theorems • Straight recall • Identifying from data sheet • Simple mathematical facts • Knowledge and use of appropriate vocabulary • Knowledge and use of formulae All of the above will be based on known knowledge.
Routine procedures (R)	• Problems are not necessarily unfamiliar and can involve the integration of different LOs • Perform well-known procedures • Simple applications and calculations which must have many steps and may require interpretation from given information • Identifying and manipulating of formulae All of the above will be based on known procedures.
Complex procedures (C)	• Problems are mainly unfamiliar and learners are expected to solve by integrating different LOs • Problems do not have a direct route to the solution but involve: ❖ using higher level calculation skills and reasoning to solve problems ❖ mathematical reasoning processes • These problems are not necessarily based on real-world contexts and may be abstract requiring fairly complex procedures in finding the solutions.
Solving problems (P)	• Solving non-routine, unseen problems by demonstrating higher level understanding and cognitive processes • Interpreting and extrapolating from solutions obtained by solving problems based in unfamiliar contexts • Using higher level cognitive skills and reasoning to solve non-routine problems • Being able to break down a problem into its constituent parts – identifying what is required to be solved and then using appropriate methods in solving the problem • Non-routine problems based on real contexts

The experience of the team in evaluating the 2008 and 2009 papers led us to produce a refined taxonomy which we used for the analysis in 2010 and which we feel provides a good reflection of the cognitive demand and, inherently, the level of difficulty of the paper. This categorisation is summarised in table 4 below.

Table 4: Categorisation of cognitive demand

	Level	Categories and subcategories included	Description (to be read in conjunction with the descriptions in table 3)
Lower cognitive demand	Level 1	Knowledge and routine procedure (easy)	Questions that require recall or the performance of a simple, well-known procedure. The well-known procedure will generally require only one or two steps.
	Level 2	Routine procedure (moderate)	Questions that require the performance of a straightforward well-known procedure.
Higher cognitive demand	Level 3	Routine procedure (difficult) and complex procedures	Questions that either require the performance of a well-known procedure that is difficult to execute/involve complicated manipulation or that require performance of complex procedures where there is no direct route to the solution.
	Level 4	Problem solving	As described in table 3.

Each team member initially worked through the examination papers individually and allocated each question[1] to one of the categories of cognitive demand. After the initial individual analysis, the team discussed the papers question by question to produce a single team evaluation of the examination. Clearly, the categorisation of questions into the various levels of cognitive demand relies on the judgement and experience of each of the individual evaluators and, thus, there were questions where our evaluations differed. In these cases the team discussed and debated the cognitive demand of the question to reach consensus. In addition, the team kept a record of all the questions placed into each category. If there was a debate about whether to categorise a question as *routine* or *complex*, for example, we could compare the question to other questions in these two categories to help us decide where to place the question and to ensure consistency in our evaluations. The team referred to records of our allocation of questions from the 2009 and 2010 Mathematics examination papers into the categories and subcategories to help guide our allocation of questions from the 2011 examination papers and ensure consistency across the years.

The levels given in our taxonomy do not correspond exactly to the taxonomy provided in the SAG, as shown in table 3. However, in making a comparison

[1] If question 2 was divided into 2a, 2b i, 2b ii and 2c, we analysed 2a, 2b i, 2b ii and 2c separately. For ease of reference we will refer to these sub-questions and sub-sub-questions simply as questions.

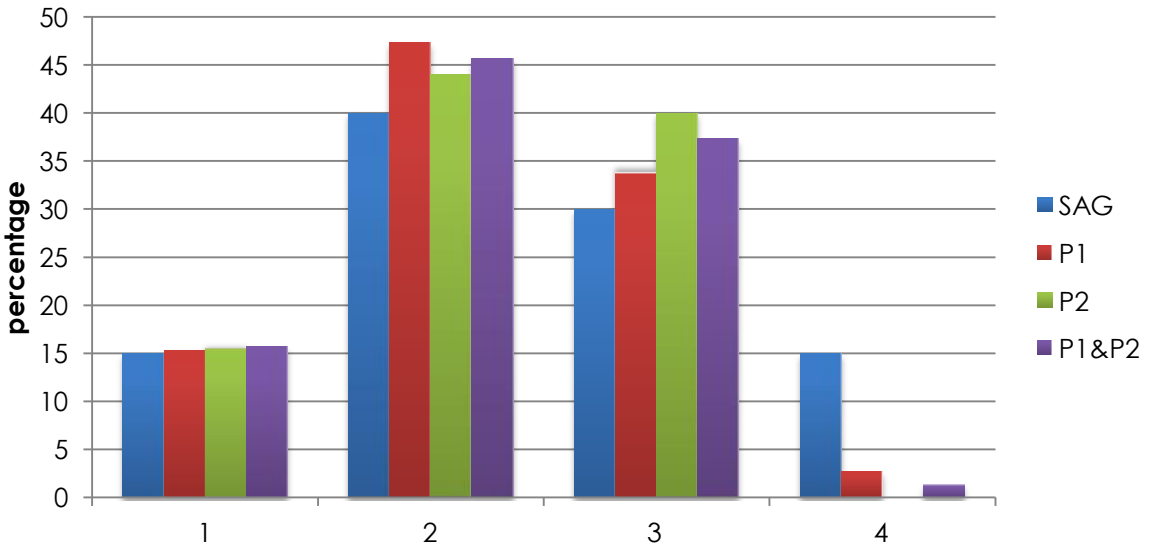
between our evaluation and the weighting suggested in the SAG we have equated our level 1 with the lowest level of cognitive demand in the taxonomy, and our level 2 with the second lowest level, and so on. Although this decision means that we are, for example, comparing our level 1 (which contains both Knowledge and Routine Easy questions) with the SAG level 1 (which is the Knowledge category), the team felt the understanding and use of the categories in the taxonomy has evolved to represent the levels we present in table 4 more strongly. We thus felt that making the comparison in this way was appropriate.

2.4 Cognitive demand and level of difficulty

Table 5 and graph 4 show the categorisation of the IEB core Mathematics papers. Paper 1 and Paper 2 are shown separately and a combined mark for both papers is given as well. The suggested allocation of marks, as presented in the IEB SAG document, is also provided.

Table 5: Categorisation of the papers

	SAG	P1	P2	P1&P2
Level 1 K+RE	15 ± 5	15	16	16
Level 2 RM	40 ± 5	47	44	46
Level 3 RD +C	30 ± 5	35	40	37
Level 4 P	15 ± 5	3	0	1



Graph 4: Cognitive demand of the papers

2.5 Weighting of cognitive demand

In comparing the allocation of marks to levels of difficulty with the suggested allocation in the SAG we note the following:

- Paper 1 and Paper 2 did not contain sufficient level 4 (problem solving) questions. However, both papers contained more marks at level 3 than the SAG recommends.
- Paper 1 and Paper 2 contain roughly the recommended proportion of level 1 questions.
- Paper 1 and Paper 2 contain more level 2 marks than the SAG recommends.

In table 6 we have combined levels 1 and 2 to give a picture of the weighting of lower cognitive demand to higher cognitive demand questions.

Table 6: Weighting of lower and higher cognitive demand

	SAG	P1	P2	P1&P2
Lower cognitive demand	55 ± 10	62	60	62
Higher cognitive demand	45 ± 10	38	40	38

Table 6 indicates that both Papers 1 and 2 were easier than the SAG recommends.

2.6 Model for future use

The 2011 Mathematics papers provide a reasonable model for future use. They cover the content of the curriculum in compliance with the recommendations of the SAG and provide a reasonable spread of cognitive demand as stipulated in the SAG. However, neither paper contained sufficient level 4 (problem-solving) questions.

2.7 Standard and quality of papers

The team felt the papers were generally clear and well laid out and that the language level was appropriate. However, we would like to comment on the following aspects:

- We queried the inclusion of contextual situations in some instances. For example, in Q7b of Paper 1, we felt the context was contrived and did not add to the question which could have been answered by ignoring the context and just working with the graphs and equations provided.
- We felt that the paper included some good data handling questions (eg Paper 2 Q5c, 6b3 and 6d) which tested the concepts involved.
- The diagram in Paper 2 Q1 was misleading and could have made learners doubt the value they calculated.
- Paper 1 Q3 seemed more appropriate for inclusion in Paper 2 and we did not like the notion of enlarging a point.

2.8 Comparability 2008–2011

Tables 7 and 8 below show the combined weightings of Paper 1 and Paper 2 for 2008, 2009, 2010 and 2011.

Table 7: Comparison of combined weighting for levels 1–4

	SAG	P1 & P2	P1 & P2	P1 & P2	P1 & P2
Level 1 K+RE	15 ± 5	16	18	21	28
Level 2 RM	40 ± 5	46	43	41	32
Level 3 RD +C	30 ± 5	37	32	32	32
Level 4 P	15 ± 5	1	7	6	8

Table 8: Comparison of combined weighting for lower and higher cognitive demand

	SAG	2011	2010	2009	2008
Lower cognitive demand	55±10	62	61	62	60
Higher cognitive demand	45±10	38	39	38	40

These tables indicate that the proportion of lower to higher cognitive demand marks in the 2008, 2009, 2010 and 2011 Mathematics examinations was similar.

Table 9, shown below, indicates that there is no pattern showing a consistent discrepancy between the level of difficulty of Paper 1 and Paper 2.

Table 9: Comparison of levels of cognitive demand for Papers 1 and 2

	SAG	P1				P2			
		2011	2010	2009	2008	2011	2010	2009	2008
Lower cognitive demand	55	62	59	67	55	60	64	58	65
Higher cognitive demand	45	38	41	33	45	40	36	42	35

2.9 Closing remarks

The team felt that both the IEB papers were appropriate and good models for future examinations.

MATHEMATICAL LITERACY

3.1 Evaluators

Mrs Joan Houston (team leader), Mr Phil Ntenza and Mrs Solante Hough

3.2 Introduction

Mathematical Literacy is a new subject in the suite of NSC examinations and it has a short history in South Africa. The 2011 examination is only the fourth time the subject has been examined and there is therefore very little with which to compare the examination. In order to attempt to benchmark the 2011 examination, the previous analyses of the 2008, 2009 and 2010 NSC examination papers were used, and compared with the 2011 IEB NSC examinations. Comparisons were made with respect to types and levels of cognitive demand.

The papers that are analysed here are the 2011 IEB Final Papers 1 and 2.

3.3 Method of analysis

To provide a guide for decisions made about the type of cognitive demand and level of difficulty of the examination questions, the Mathematical Literacy evaluation team used a table, which is discussed below. The three members of the evaluation team worked together to analyse every question in the 2011 IEB NSC papers. In cases where there was disagreement, we noted the differing views and returned to the question later once other similar questions had been reviewed. This enabled a consistency of analysis across all papers analysed. The team also analysed the papers with respect to the coverage of learning outcomes as assessed by each question.

The team used the same principles of analysis that it has used over the past three years to interpret and award marks at the different levels of cognitive demand and degrees of difficulty. Although some of our views may have changed slightly, we have agreed to the same "set of rules" for analysis as in the past to ensure the consistency and comparability of the evaluations from 2008 to the present.

The team has developed a working document which lists in detail the types of question that can be categorised under the four cognitive levels at three degrees of

difficulty. This has been done to establish comparability across the years and the examining boards. In addition to the table below, this working document provides a further detailed interpretation of the different taxonomy levels according to the four learning outcomes. These were used extensively by the team for specific questions. The taxonomy used to classify the cognitive demand of the Mathematical Literacy papers comes from the NSC Mathematical Literacy Grade 12 Examination Guidelines 2009.

Table 10: Classification of skills according to taxonomy of cognitive demand

Category	Descriptions
Knowing (K)	• Calculate using the basic operations including: ❖ algorithms for +, -, x and ÷ ❖ appropriate rounding of numbers ❖ estimation ❖ calculating a percentage of a given amount ❖ measurement • Know and use appropriate vocabulary such as equation, formula, bar graph, pie chart, Cartesian plane, table of values, mean, median and mode. • Know and use formulae such as the area of a rectangle, a triangle and a circle where each of the required dimensions is readily available. • Read information directly from a table (e.g. the time that bus number 1234 departs from the terminal).
Applying routine procedures (RP)	• Perform well-known procedures in familiar contexts. Learners know what procedure is required to solve the problem from the way the problem is posed. All of the information required is immediately available to the student. • Solve equations by means of trial and improvement or algebraic processes. • Draw data graphs for provided data. • Draw algebraic graphs for given equations. • Measure dimension such as length, time and weight using appropriate measuring instruments sensitive to levels of accuracy.
Applying multi-step procedures in a variety of contexts (MP)	• Solve problems using well-known procedures. The required procedure is, however, not immediately obvious from the way the problem is posed. Learners will have to decide on the most appropriate procedure to find the solution to the question and may have to perform one or more preliminary calculations before determining a solution. • Select the most appropriate data for solving a problem from options in a table of values. • Decide on the best way to represent data to create a particular impression.
Reasoning and reflecting (RR)	• Pose and answer questions about what mathematics is required to solve a problem and then select and use that mathematical content. • Interpret the solution to a problem in the context of the problem and where necessary adjust the mathematical solution to make sense in the context. • Critique solutions to problems and statements about situations made by others. • Generalise patterns observed in situations, make predictions based on these patterns and/or other evidence and determine conditions that will lead to the desired outcomes.

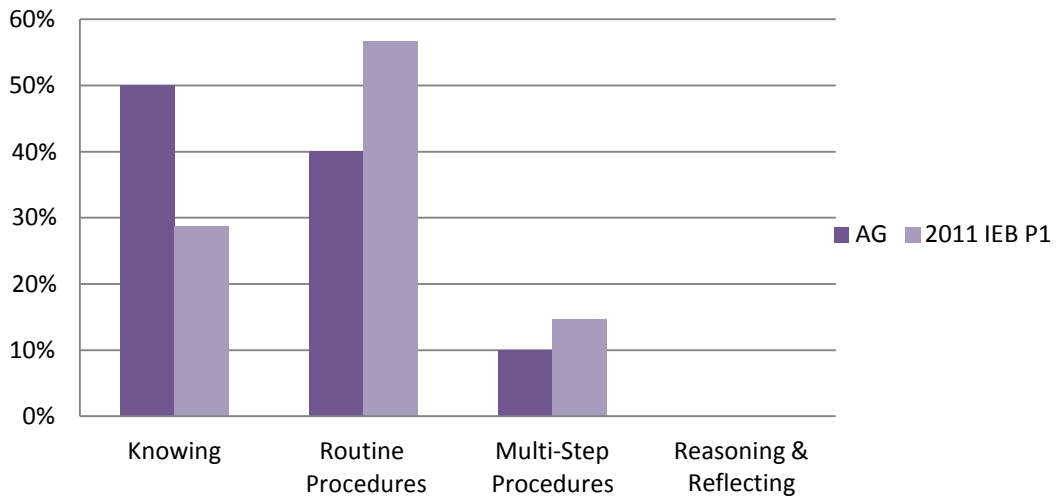
3.4 Results of examination paper analysis

Cognitive levels

The following graphs show the comparison of the percentage coverage of cognitive levels in the IEB Assessment Guidelines and the coverage in the 2011 IEB NSC Papers 1 and 2, as well as the 2011 IEB Average.

Paper 1

The 2011 IEB NSC Paper 1 was not well matched to the IEB Guidelines with respect to cognitive levels, as the paper contains too few marks for Knowing level questions. However, the team noted that there was some overlap between Knowing and Routine Procedure level questions. The fact that too many marks were awarded for Routine Procedures and Multi-step Procedures tends to skew the graph towards the higher level cognitive skills. Consequently, the implication is that this paper is at a higher level of cognitive demand than it should be (over 100 marks at the second and third levels instead of 75). This should not be the case for the first paper, where half the marks should be awarded for questions on the lowest cognitive level.

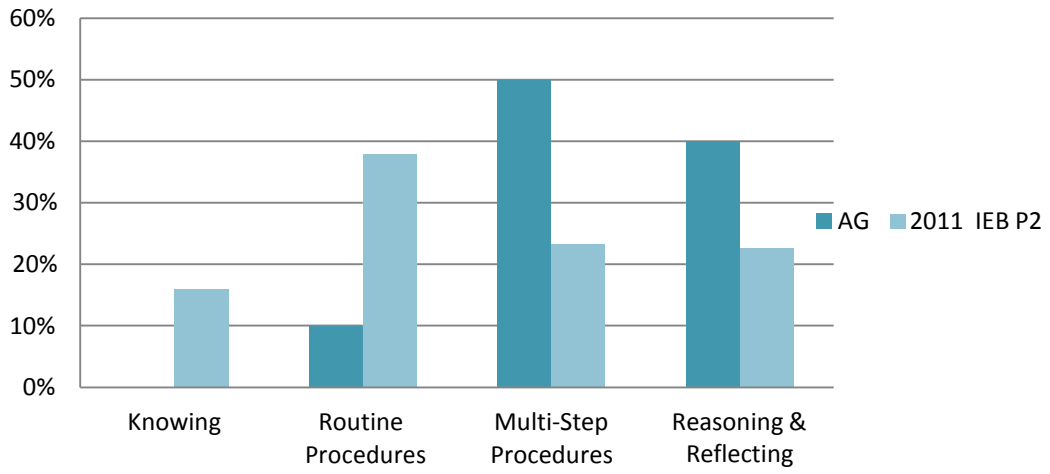


Graph 5: Comparison of cognitive levels – Paper 1

Paper 2

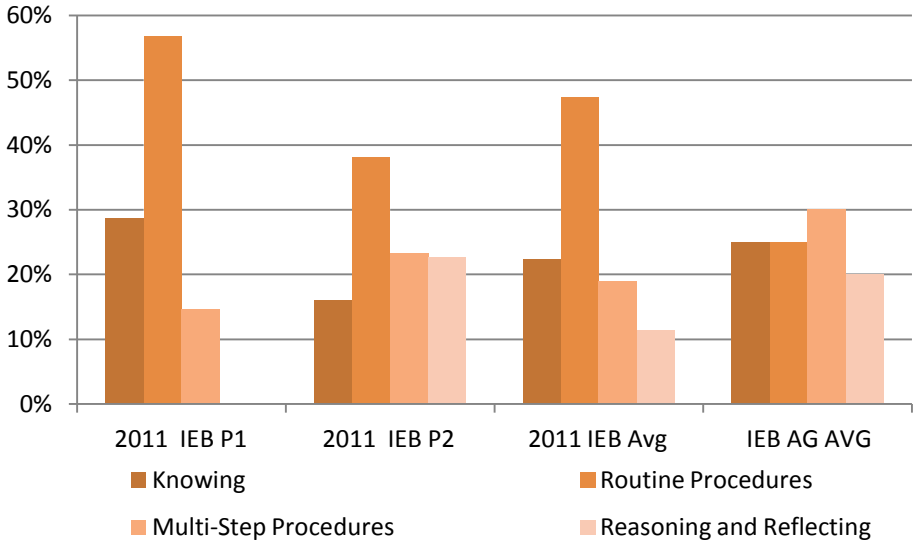
Here again, the match of the 2011 IEB Paper 2 with the IEB Assessment Guidelines is problematic. The Multi-step Procedures and Reasoning and Reflecting questions are

under-represented, while Routine Procedure questions are over-represented (by approximately 66 marks). This means that this paper is much easier than it should be.



Graph 6: Comparison of cognitive levels – Paper 2

Overall



Graph 7: Overall comparison of cognitive levels

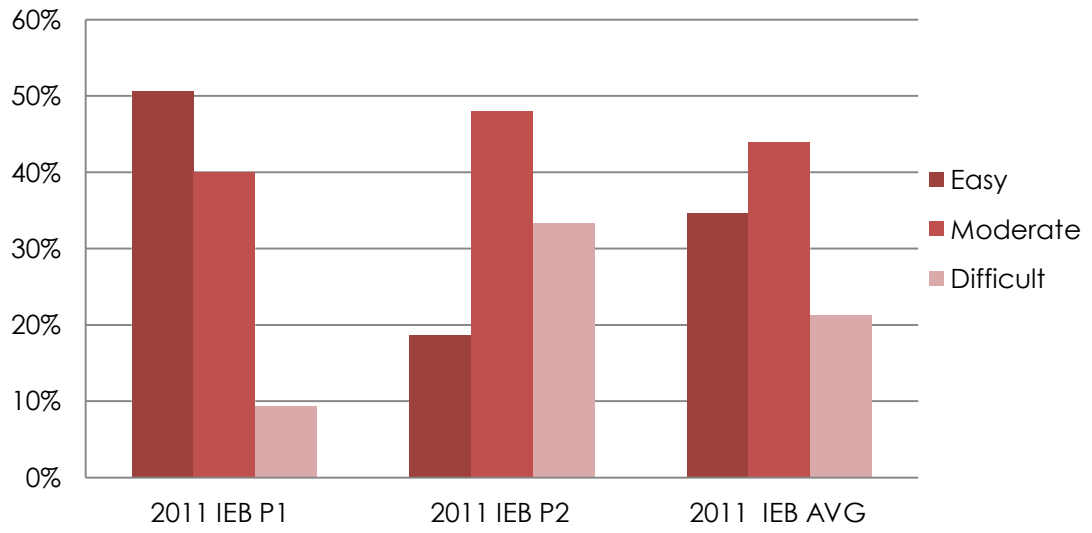
The 2011 IEB NSC paper does not comply with the IEB Assessment Guidelines with respect to type of cognitive demand. The biggest deviation is at the second lowest level, where 66 marks too many were allocated, and at the third and highest level, where far too few marks were allocated. Graph 6 shows clearly how the cognitive

demand is skewed towards the Routine Procedure type questions. This implies that the examination would be an easy examination for most candidates.

Degrees of difficulty

Questions could be classified as Easy, Moderate or Difficult within each of the four types of cognitive demand. The graph below shows the results of an analysis of the 2011 IEB NSC Paper 1 and Paper 2 and the average of the two papers with respect to the degree of difficulty of the questions.

The distribution of Easy, Moderate and Difficult questions across the two papers is skewed towards the Easy level. The team felt that there were too few challenging questions, which is reflected in the low score for the Difficult level. The overall result is that the 2011 IEB NSC exam was not well balanced with regard to the degree of difficulty of the questions. Paper 1 seems to be far too easy (135 marks were for either Easy or Moderate questions). However, Paper 2 was slightly more difficult, as 32 marks were awarded for questions on the difficult level.

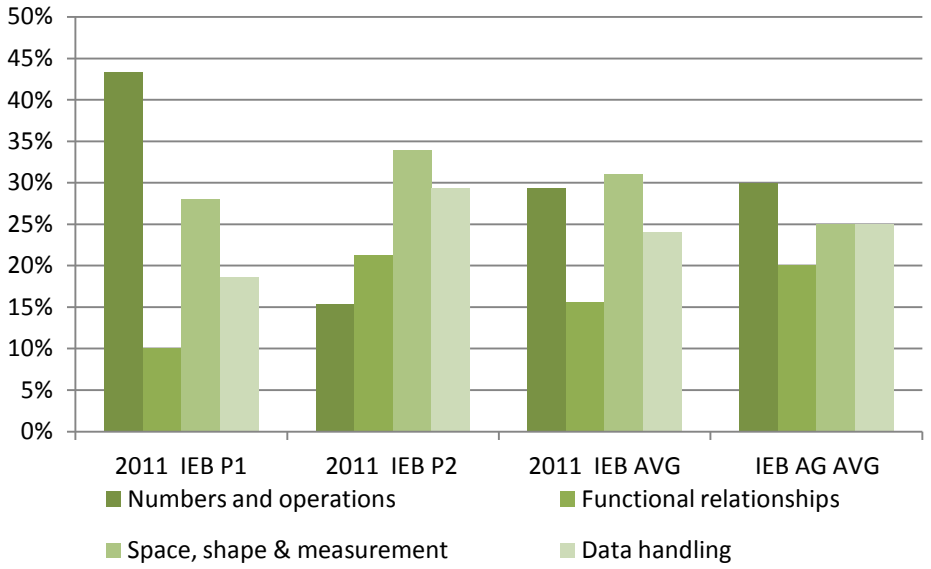


Graph 8: Comparison of levels of difficulty

3.5 Compliance with Subject Assessment Guidelines

Learning outcomes

Graph 9 shows the percentage coverage of LOs in the 2011 IEB NSC Papers 1 and 2 and the 2011 IEB NSC average in comparison with the recommendations of the IEB Assessment Guidelines.



Graph 9: Overall comparison of learning outcomes in exam papers with those in guidelines

Paper 1

The 2011 IEB NSC Paper 1 was not compliant with the guidelines in that too many marks were awarded to questions from LO1 and too few from LO2 and LO4.

Paper 2

The 2011 IEB NSC Paper 2 was also not compliant, as LO1 had too few marks and LO3 had too many marks.

Overall

However, overall the combined 2011 IEB NSC examination papers matched the Assessment Guidelines fairly well. The graph shows this clearly.

Assessment standards

With regard to the coverage of assessment standards across the curriculum, there were a few shortfalls.

The team noted the following omissions from the examination:

- LO3 "International time zones".
- LO4 AS 12.4.1 "investigate a problem on issues such as those related to social, environmental and political factors, people's opinions, human rights and inclusivity".
- LO4 AS 12.4.6 "Critique statistically based arguments, describe the use and misuse of statistics in society, and make well justified recommendations".

However, it should be noted that both the LO4 assessment standards are difficult topics to examine in a written paper.

Errors in the mark memo

The following error was found in the marking memorandum that the team was given at the start of the evaluation.

Paper 1:

- Q4.2.2 Number of possible outcomes for a total of 5 with two dice is 21, not 36. Order of throwing in this case is not relevant. Answer is 0,1% or 2 out of 21.

Problem questions

In the 2011 IEB NSC Papers there were few problematic questions.

Paper 1:

- Q4.1.3 This is a contrived context. Grass is never sold by half a square metre.

Paper 2:

- Q3.1.2 Why a multiple choice? This may have confused some learners.

- Q5.1 Apart from the photo and diagram considerations, the team felt this question should have been scaffolded (by breaking up the sub-question into smaller sub-questions), rather than allocating 14 marks for one sub-question.

Contextualisation of questions

The questions in the 2011 IEB NSC covered a good range of contexts. It was good to see that the examiner used mostly real data resources. Moreover, there was a spread of contexts, most of which would have been familiar to the learners. However, in Paper 2, Q4.2 the game described is not familiar to every learner (more familiar to middle-class white learners) and would have been an unfamiliar context for some students.

Language use

Only a few difficulties were apparent with regard to language use, with the following being found:

- Q3.2.3: Wording of Stage 4 is awkward and misleading. Suggest "Slowing down to look at animals ….".
- Q7.2: Formula is difficult to read. Suggest it should be "BMI = height/mass^2. Height is in m and mass is in kg."

Distinguishing highest level achievers and average passing candidates

To determine whether the IEB NSC 2011 exam reflects sufficient distinction of highest level of achievement, one should look at the percentage of marks for difficult questions (difficult Multistep Procedures and difficult Reasoning and Reflecting), since it would be those questions that differentiate highest achievement level learners. The questions which differentiate learners at the distinction level category (A grade) should be around 15% of the questions.

The percentage of marks for these difficult questions for the 2011 IEB NSC examination is 13%. This shows that it was quite easy for the high achieving learners to achieve the equivalent of an A grade in the 2011 exam. This supports the assertion above that the 2011 examination was too easy.

The questions that would be readily accessible to learners who just pass fall into the categories of easy and moderate Knowing questions and easy Routine Procedures questions. These are lower-order cognitive skills and could therefore enable the weaker passing learner to achieve sufficient marks to pass.

The total percentage of marks assigned to easy and moderate Knowing questions, together with easy Routine Procedures questions was ascertained from the examination analysis tables, and the results are shown in Table 11 below.

Table 11: Total percentage of marks assigned to the three cognitive levels

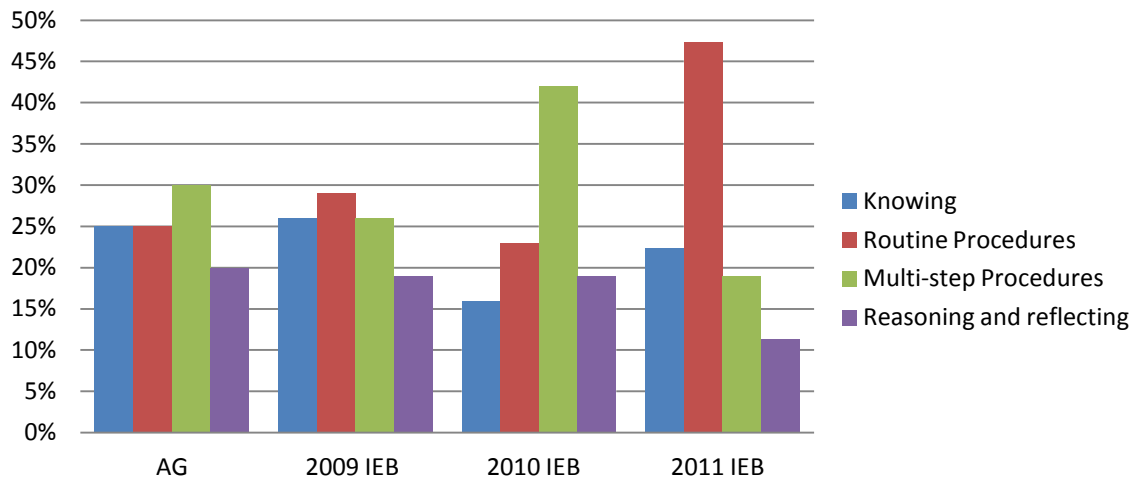
Easy knowing questions	Moderate knowing questions	Easy routine procedures questions	Total achievable % by average learner*
16%	5%	18%	40%

Since the total achievable percentage by an average learner in both 2011 IEB papers is 40%, it means that candidates who are weak and able to gain marks for only the easy and moderate questions in the lowest order cognitive skill and the easy questions in the second lowest cognitive skill would easily be able to achieve an F- grade. Although this percentage should be used merely as an indicator, the 2011 IEB NSC Mathematical Literacy papers may produce a higher pass rate than in previous years.

3.6 Cognitive demand and level of difficulty

Cognitive demand

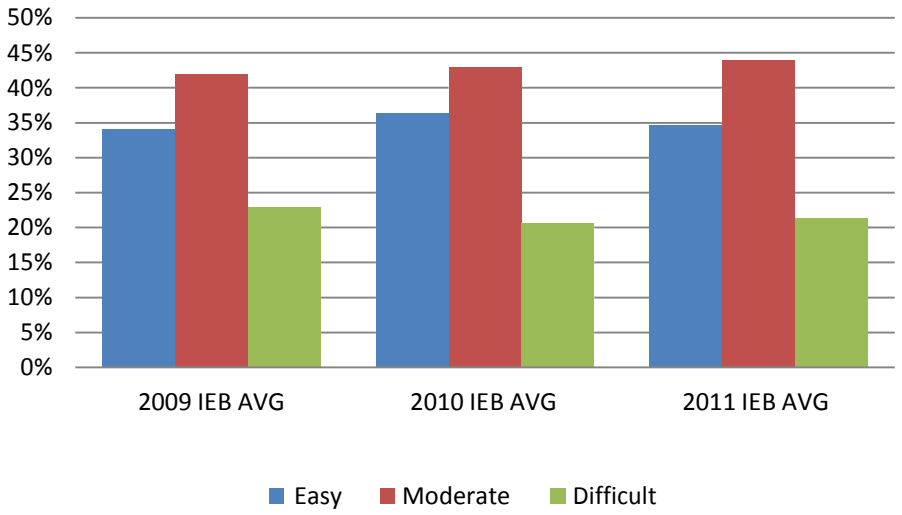
With regard to cognitive demand, the 2011 IEB NSC examination was less compliant with the IEB Guidelines than the 2009–2010 examinations. This can be clearly seen in Graph 10 below. The evaluation team found that far too many questions were at the level of Routine Procedures, which were familiar to the candidates. This was at the expense of more challenging multi-step procedures and Reasoning and Reflecting-type questions. Compared to the previous three years, the 2011 IEB NSC papers were the least demanding and would have been the easiest examination for candidates to achieve high marks.



Graph 10: Comparison of cognitive levels

Degrees of difficulty

The 2011 IEB examination was slightly easier than the past three years, which is clearly indicated by graph 11 below.



Graph 11: Comparison of degree of difficulty

3.7 Model for future use

Standard

The 2011 IEB NSC papers are not a good model for future use. Compared to the guidelines, the distribution of questions across the LOs, the weighting of cognitive demand across the papers and the degree of difficulty of the questions are not ideal. As a whole the paper contains too many questions of a Routine Procedure type and at an Easy level of difficulty. The examination as a whole is too easy.

Format

Both the 2011 IEB NSC papers are fairly good models for future use with respect to format. The layout was generally clear and easy to read. However, the team noted the following problems with the format:

Paper 1

- Q4: the diagram is misleading. The circular stone tiles are too big relative to the garden and the pond.

Paper 2

- The team suggests that the map include an example which explains that H7 is the road name and 27 is the distance between Orpen and the next intersection. Moreover, this is an unfamiliar context for many learners.
- There were unnecessarily large photos on pages 1 (advert), 9 (snakes and ladders game), and 10 and 11 (bridge and garden layout). Some of these photos were also irrelevant to the question and added more information to process than necessary (e.g. snakes and ladders board and garden and bridge photo).
- Q1: Advert should read R39 x 30 months and Deposit R50 – units omitted.
- Q5.1: Suggest that the question contain either just the diagram or just the photo, but dimensions should be included in the photo.
- Q6.2: Suggest that the question have either just the diagram or just the photo, but dimensions should be included in the photo.

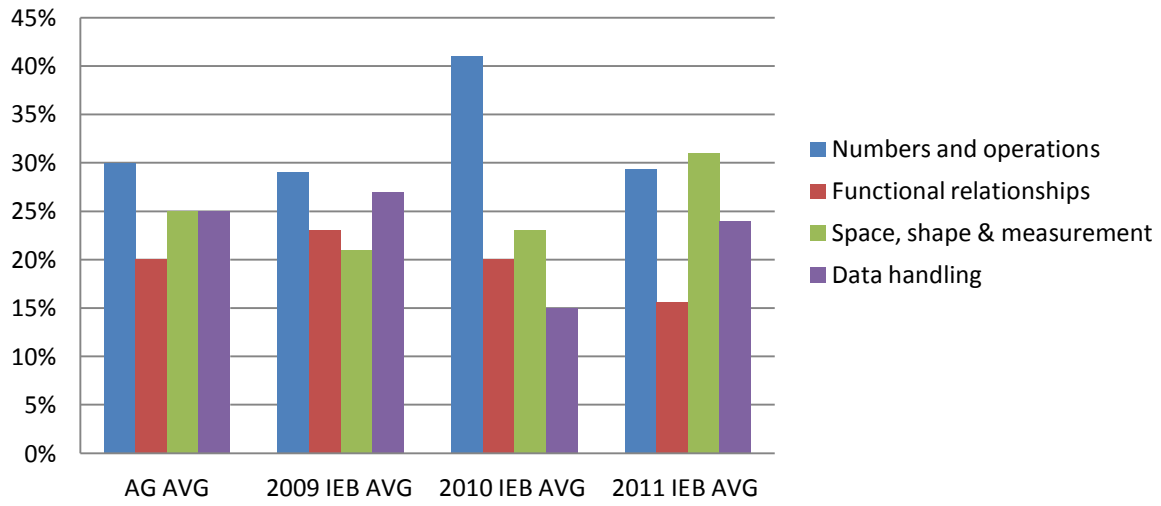
3.8 Standard and quality of papers

The Mathematical Literacy Evaluation team found that the 2011 IEB NSC papers were generally not a good model for future use, and not as good as the 2009 and 2010 papers. Because of the skewing towards Routine Procedure type questions, the examination lacked challenge and the power to differentiate high achievers.

3.9 Comparability 2009–2011

Learning outcomes

With regard to LOs, the 2011 IEB NSC examination was more compliant with the IEB Guidelines than the 2010 examination, and equally as compliant as the 2009 examination. This can be seen in Graph 12 below. In the 2009 papers the deviation from the Guidelines was less than 3% for any LO, whereas in 2010 both LO1 and LO4 deviated by 10% or more from the prescribed coverage. The 2011 IEB NSC papers had a good overall distribution of LOs and only one LO (LO3) deviated from the SAG by more than 5%.



Graph 12: Comparison of LO distribution 2009–2011

Language use

The 2011 papers contained few ambiguities and problematic words. The language appropriateness of the papers has improved over the past three years.

Distinguishing highest level achievers and average passing candidates

The 2011 IEB NSC examination is the least differentiating of high achievers of the 2009–2011 examinations, as it has the lowest number of marks awarded to the highest cognitive level (Reasoning and Reflecting) of the three years. In addition, 69% of the marks are awarded at the two lowest cognitive levels. This would also make this IEB NSC examination the easiest of the three years evaluated.

Format

The 2009–2011 IEB examination papers have remained a good model for future use with respect to format. Their layout was clear and easy to read.

Contextualisation of questions

The 2009–2011 papers covered a good range of contexts which were generally familiar and interesting to learners from a wide background.

Conclusion

The 2011 IEB NSC Mathematical Literacy examination was less challenging than the 2009 and 2010 papers. It lacked discriminating power at the top end of marks. However, in most other respects, like format, language and layout, the 2009-2011 IEB NSC papers were of a generally good and adequate standard.

3.10 Recommendations

- The instrument used in this evaluation process should be used in future, since it provides a very clear picture of the overall cognitive demand and level of difficulty of examination papers.
- Examiners would benefit from using a similar/same tool to design papers with better compliance to the guidelines, especially with respect to cognitive demand and level of difficulty.

PHYSICAL SCIENCES

4.1 Evaluators

Dr Sharon J Grussendorff (team leader), Ms Akeda Isaacs and Dr André van der Hoven.

Introduction

In order to make an attempt at benchmarking the NSC examinations held in 2011, the previous (Maintaining Standards 2008, 2009 and 2010) analyses of the 2008, 2009 and 2010 NSC examination papers were used.

In addition, the 2011 IEB examination papers were considered in terms of their overall quality.

The papers that were analysed are

- 2011 IEB Physical Sciences Final Paper 1 and 2

4.2 Method of analysis

To provide a guide for decisions made about type of cognitive demand and level of difficulty, the Physical Sciences 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 Sciences examinations papers, and provides meaningful data.

Table 12: Types and levels of cognitive demand

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 practised 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 get information from 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

4.3 Results of examination paper analysis

Overall impression of the exam papers

The Umalusi evaluation team found the 2011 IEB Paper 1 to be fairly wordy and contrived in the attempt to force every question into the context of outdoor Game Park-related activities. This made for a tiring paper which showed a bias towards people who enjoy these pursuits, and would have been disadvantageous to learners who have no interest or experience of these contexts. We caution about future attempts at this kind of excessive contextualisation of questions, as it leads to a loss of face value and unnecessary confusion for learners where questions could be stated much more clearly and directly. In addition, there were a few small issues with some of the questions. The following specific comments should be noted:

- In Q2.2.6 the term "displacement" is incorrectly used where "position" is the correct term.
- For Q6.3.3 the answer given in the memorandum is incorrect. The current would eventually go through diodes A and C after it has passed through the load resistance.
- For Q8.3.4 the answer given in the memorandum does not follow logically. The brightness of light bulbs is usually attributed to the amount of current through the light bulbs (which is the same), or to the power rating of the light bulbs (which is given), but also depends on other factors such as the material that the light bulb is made of. Since these are non-identical light bulbs this question is therefore unanswerable as too little information is given.
- Q9.1 is problematic, as learners will need to have prior knowledge of what the ammeter measures in an electric car. The answer provided in the memorandum is incorrect, since the current in an electric car determines the engine torque (and hence acceleration), not the flatness of the battery, which is determined by a voltage reading.

Paper 2 was a better paper, in that the language use and structure of the questions was very straightforward, and it was less wordy. There were, however, a few small issues with some of the questions. The following specific comments should be noted:

- Q2.4, Q2.5 and Q2.6 were unanswerable for learners who had not managed to answer Q2.3. This type of question structuring, where later questions rely

heavily on the answer from a previous question, results in a needless penalisation of learners.

- There is an error in the memorandum for Q2.9.2, where the answer relates to butene and not butane as in the question paper. (It is understood, however, that this memorandum will again be scrutinised by the IEB moderators and most likely corrected before the marking process begins.)
- Q7.2 is a weak question as it essentially asks the same thing as Q7.1.

Note on the language level in the papers

The 2011 Paper 1 was somewhat problematic in terms of language as it contained unnecessary and lengthy text which would prove arduous to the reader, and would particularly disadvantage second-language readers.

4.4 Compliance with Subject Assessment Guidelines

Compliance of knowledge areas

The IEB Paper 1 was found to be well in line with the IEB Handbook (2011); however, Paper 2 is a mismatch with the Handbook in terms of Chemical Change and Chemical Systems, where there is a difference in the percentage stipulated for Chemical Change and for Chemical Systems. However, this can be explained by the nature of the content included in Chemical Systems, which incorporates many of the foundational concepts from Chemical Change.

Compliance of learning outcomes

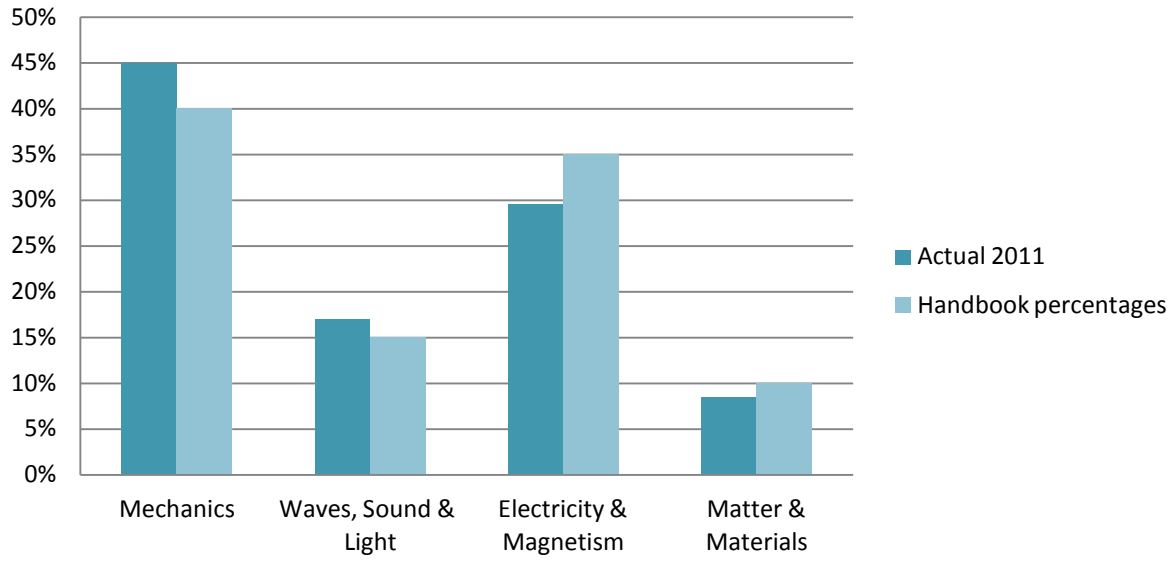
The IEB papers had a good representation of LO3-type questions (10% in Paper 1 and 6% in Paper 2). It should be noted that this is a difficult LO to assess, as these questions tend not to be robust or reliable as assessment tools, as they largely rely on opinion-based general-knowledge type responses.

Overall, there appeared to be an overweighting of LO1 in IEB Paper 1, but not Paper 2, owing to an increase in the percentage of problem-solving questions and a decrease in conceptual understanding questions.

Match with Knowledge Areas

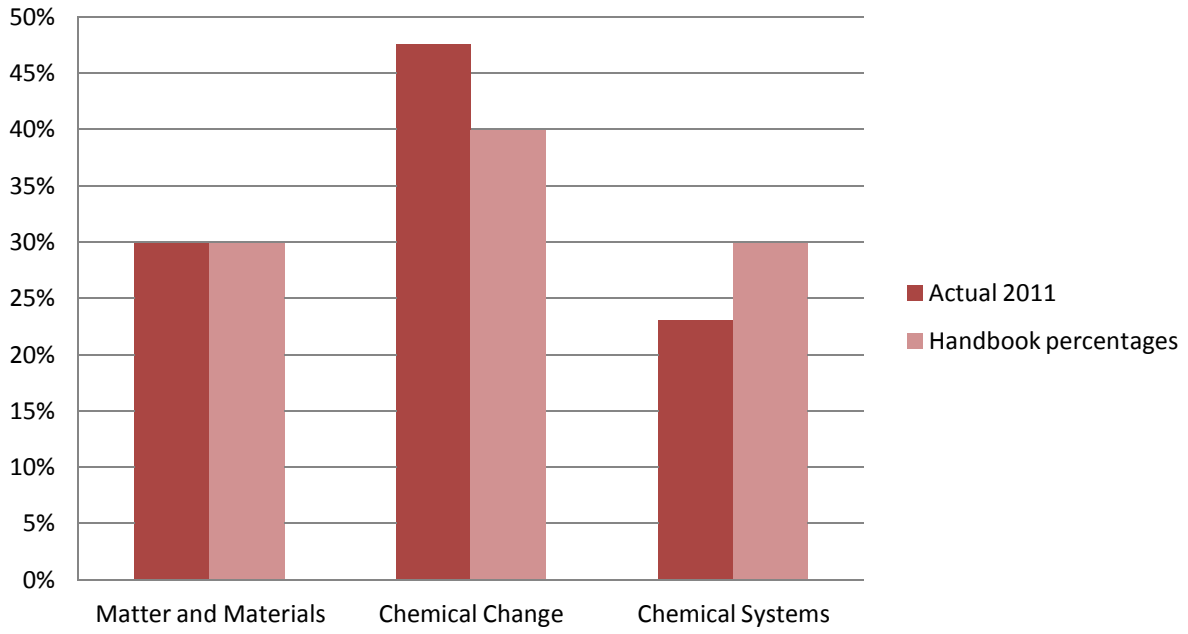
The following graph shows a comparison of the percentage coverage of Knowledge Areas in the IEB Handbook (2011) with the coverage in the IEB 2011 Paper 1.

The 2011 IEB Paper 1 is well in line with the Handbook (2011) in all areas within a 5% leeway.



Graph 13: Comparison of knowledge areas for Paper 1

The following graph shows a comparison of the percentage coverage of knowledge areas in the IEB Handbook (2011) with the coverage in the IEB 2011 Paper 2.

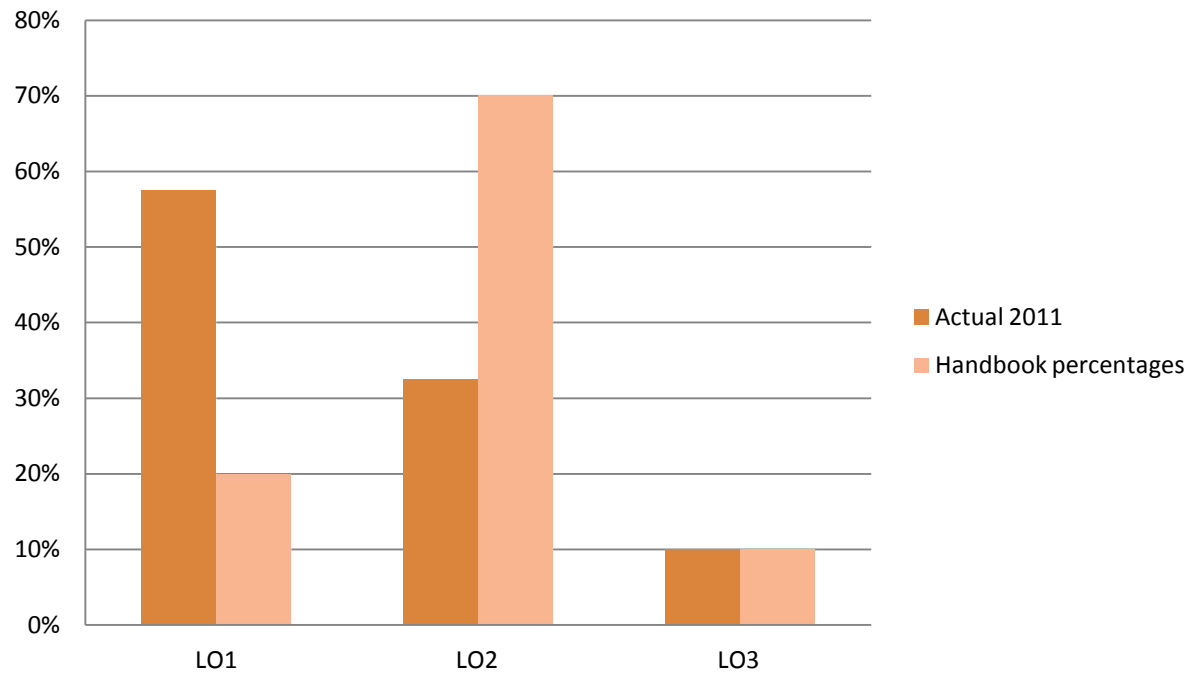


Graph 14: Comparison of knowledge areas for Paper 2

In the 2011 IEB Paper 2, the Matter & Materials content covered was as stipulated in the IEB Handbook. However, there is a slight departure from what was stipulated for the Chemical Change percentage, as well as for the Chemical Systems. This can be explained by the nature of the content included in Chemical Systems, which incorporates many of the concepts from Chemical Change, so some questions may be classified as either of these Knowledge Areas.

Match with learning outcomes

The following graph shows a comparison of the percentage coverage of LOs in the Handbook (2011) with the coverage in the IEB 2011 Paper 1.

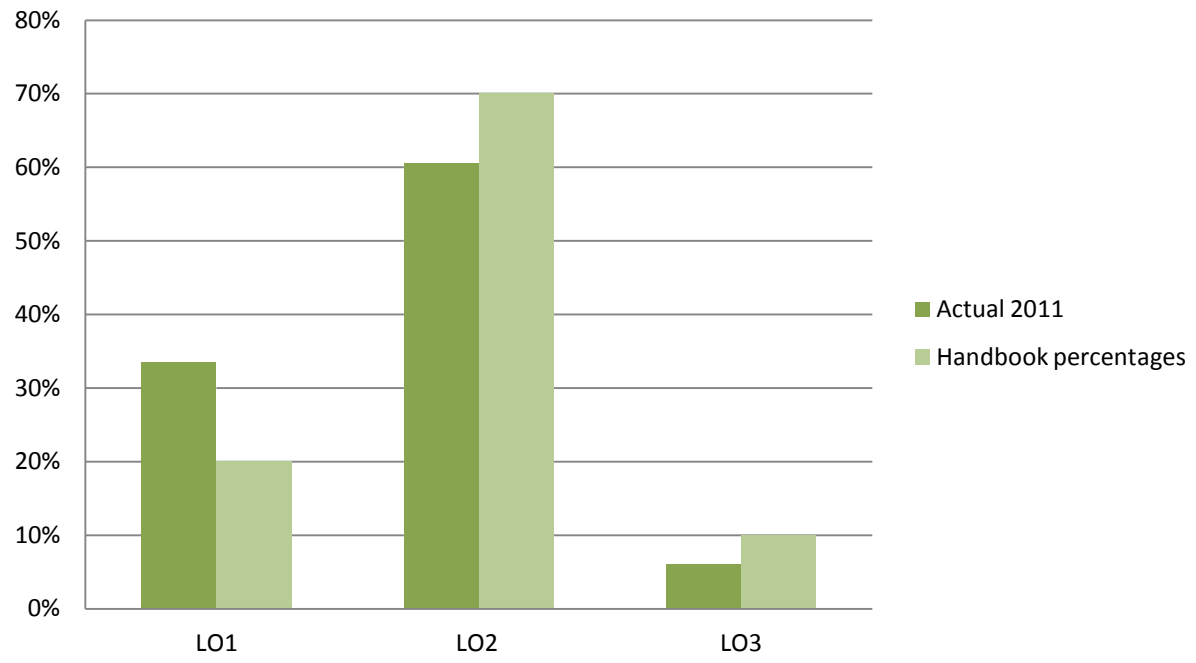


Graph 15: Comparison of learning outcomes for Paper 1

This graph shows a much higher percentage of LO1 questions than indicated in the Handbook, at the expense of LO2 questions. This is because of the large proportion of problem-solving questions in Paper 1. However, these problem-solving questions include a component of application, which is associated with LO2. This does, therefore, tend to balance out the representation of both of these LOs. In the IEB analysis grid many of the LO1 questions have been classified as LO2 if they have an application component.

It should be noted that the percentage of LO3-type questions does fall into the expected range as outlined in the Handbook. However, these questions are on the whole not robust or reliable as assessment tools as they are largely opinion-based general-knowledge type questions for unreasonably high numbers of marks.

The following graph shows a comparison of the percentage coverage of LOs in the Handbook (2011) with the coverage in the IEB 2011 Paper 2.



Graph 16: Comparison of learning outcomes for Paper 2

This graph shows that, on the whole, the LOs are well covered, although there is a higher percentage of LO1-type questions, and a lower percentage of LO2-type questions than the percentage stipulated in the Handbook.

4.5 Cognitive demand and level of difficulty

It should be noted that Paper 2 was distinctly less demanding than Paper 1. The analyses of these two papers are shown in Table 13 below.

Table 13: Comparison of cognitive demand and level of difficulty for Paper 1 and Paper 2

	Type of cognitive demand			Level of difficulty		
	Factual	**Conceptual**	**Problem solving**	**Easy**	**Medium**	**Difficult**
Paper 1	12%	39%	50%	22%	63%	16%
Paper 2	22%	52%	27%	20%	79%	2%

These results show that where Paper 1 had 16% of the marks at a difficult level, this was only 2% for Paper 2. Paper 1 also had a lower percentage of factual questions (12%) than Paper 2 (22%). Perhaps a more even standard could be achieved for these two papers in future.

4.6 Model for future use

Overall, the impression of Paper 1 was that it is not a good model for future exam papers because of its wordiness, and the bias towards a particular interest group.

Paper 2 is a fairer paper, although the standard of difficulty of this paper should perhaps be raised in future years.

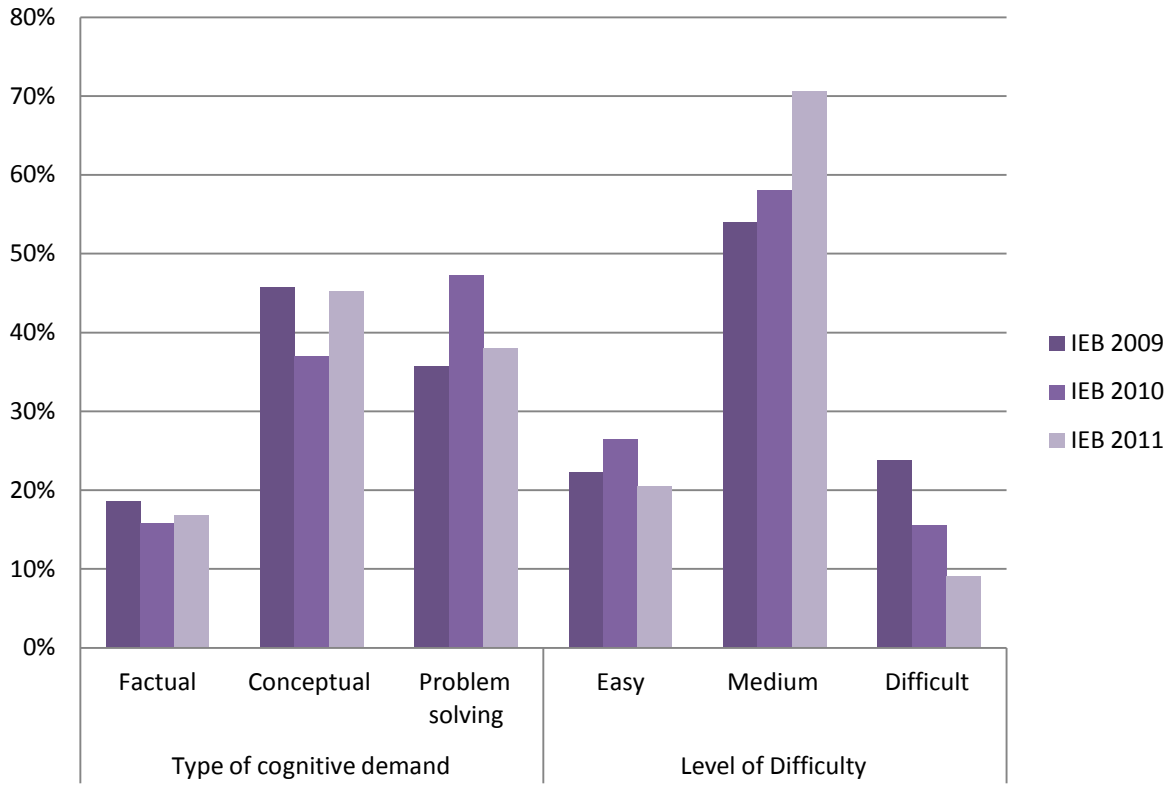
4.7 Comparability 2009–2011

The number of marks associated with the various types of cognitive demand and levels of difficulty were combined for each exam paper, and these were compared with the 2009 and 2010 IEB exams. The results of this analysis are presented in Table 14 below:

Table 14: Results of analysis of 2009–2011 examination papers

	Type of cognitive demand			Level of difficulty		
	Factual	**Conceptual**	**Problem solving**	**Easy**	**Medium**	**Difficult**
2009	19%	46%	36%	22%	54%	24%
2010	16%	37%	47%	27%	58%	16%
2011	17%	45%	38%	21%	71%	9%

A graph of these results is shown below:



Graph 17: Cognitive demand and level of difficulty 2009–2011

From this graph one can conclude that the overall standard of the 2011 IEB Physical Sciences examination was lower than the 2009 and 2010 exams. This can be seen in the reduced percentage of difficult questions (which dropped from 24% in 2009 and 16% in 2010 to 9% in 2011). This shows a trend in the lowering of the overall standard of the IEB exam as a whole at the top end of the scale. Consequently, it would be easier for learners to achieve a Level 7 pass than in previous years. However, at the lower end, there is a lower percentage of easy questions in 2011 (21%) than in 2010 (27%). In addition, the achievable percentage by an average learner (which is calculated as the percentage of easy questions together with additional factual questions) dropped from 35% in 2010 to 28% in 2011. It would, therefore, be more difficult for the candidates at the lower end of the scale to achieve a passing grade than in 2010.

Closing remarks

In the IEB Paper 2 the amount of text used was kept to the necessary minimum, in contrast to the IEB Paper 1, which was wordier.

The IEB Paper 2 used contexts appropriately without unnecessarily obscuring the question with the context. In IEB Paper 1 this was not the case. The context dominated and obscured the exam paper which is not advisable exam-setting practice. Moreover, having all the questions placed into a single context creates a bias against people who are not interested in that context.

Overall standard of exam papers

- An analysis of learner results in an Item Response Theory study (Umalusi, ongoing) has shown that learners find conceptual questions most difficult, even ones judged to be easy by the Umalusi evaluators. The higher percentage of conceptual questions in the IEB paper may make this a slightly more demanding paper than is suggested by the percentages for the levels of difficulty, particularly in the IEB Paper 2, which contains 52% of conceptual questions, which is the highest percentage of conceptual questions of all of the exam papers.
- It was found that generally the exams lacked questions which probe deep conceptual understanding. These are categorised as Conceptually Difficult questions using the Umalusi Physical Sciences tool. The following table shows the percentages of questions that fall into the Conceptually Difficult category in each paper.

Table 15: Percentages of questions falling into Conceptually Difficult category

Exam Paper	Percentage of conceptually difficult
Paper 1	3%
Paper 2	2%

4.8 References

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LIFE SCIENCES

5.1 Evaluators

Dr Edith Dempster (team leader), Susan Wiese and Lizette Cilliers

5.2 Summary

Curriculum change

A *New Content Framework for Life Sciences* was examined for the first time in 2011 by all examining bodies. A curriculum comparison showed that "Environmental issues" in the original NCS has been replaced by population and community ecology in the New Content Framework and several topics have been added to the curriculum. The overall effect is that cognitive demand has increased in the examined curriculum for 2011. It was noted that the IEB omitted some of the DBE topics from the examined curriculum, and added depth to the topics retained.

Knowledge areas have been moved between examination papers, with Heredity and Evolution now being examined in Paper 1, and Life Processes and Ecology in Paper 2. This is an improvement on the previous arrangement. Prescribed weighting on levels of cognitive challenge and LOs has also changed.

Analysis of examination papers

Examination papers for 2011 were analysed using a four-level measure of cognitive demand, and three levels of difficulty.

Cognitive demand:

- Remember factual or conceptual knowledge
- Understand facts or concepts
- Apply procedures, facts or concepts to unfamiliar contexts
- Analyse or evaluate supplied or recalled information, or create a new product

Levels of difficulty:

- Easy: a question that is easy to understand, based on content that learners find easy to learn, and requiring an output that is easy to construct.
- Moderate: questions that are somewhat more difficult to understand, based on content that learners find more difficult to learn, and requiring an output that is more difficult to construct.
- Difficult questions are difficult to understand, and/or based on content or skills that are cognitively challenging, and require an output that learners find difficult to construct.

The examination papers analysed were IEB Papers 1, 2 and 3, which examined only the New Content Framework, although the IEB adapted this.

The IEB examination papers followed the allocated percentage of marks per knowledge area, as specified in the assessment guidelines (NSC 2009 Handbook for IEB). Adherence to the specified weighting on LOs was not as strictly applied.

IEB examinations

The IEB examinations of 2011 were underweighted in Remember and higher order cognitive skills and over-weighted in relation to the NSC Handbook 2009. Paper 2 was easier than Paper 1, which is explained by the fact that most of the additional depth added to the curriculum occurred in topics examined in Paper 1. Paper 3 was the most difficult paper, but contributed only a small proportion of the total marks.

Comparison with previous years is approached with caution because of the change in curriculum. The examination overall was somewhat less difficult than previous years, but this must be balanced against a more challenging curriculum. The IEB papers present a good model of the use of assessment to promote learning.

Concluding comments

Specific recommendations and critiques of certain types of question are provided. In particular, IEB papers are seen as good examples of the use of assessment *for* learning.

5.3 Introduction

The subject Life Sciences emerged from the merger of the old Biology and Physiology subjects of the NATED 550 curriculum. It is structured around three LOs:

- LO1 The learner is able to competently explore and investigate phenomena relevant to Life Sciences by using inquiry, problem-solving, critical-thinking and other skills.
- LO2 The learner is able to access, interpret, construct and use Life Sciences concepts to explain phenomena relevant to Life Sciences.
- LO3 The learner is able to demonstrate an understanding of the nature of science, the influence of ethics and biases in the Life Sciences, and the interrelationship of science, technology, indigenous knowledge, the environment and society.

The LOs are further subdivided into assessment standards, which indicate progression across the three years of FET. The assessment standards are not used in the design of assessment tasks.

The LOs have been adapted in practice. LO1 is interpreted as any question that can be answered using skills only. It includes extracting information in given text, interpreting tables of data and graphs, and drawing graphs. LO2 is interpreted as any question that requires acquired knowledge or concepts for the construction of an answer. LO3 is interpreted as questions that relate to learners' everyday life.

The subject matter is organised into four knowledge areas:

- Tissues, cells and molecular studies
- Structure, control and life processes in plants and animals
- Environmental studies
- Biodiversity, change and continuity

(National Curriculum Statement Life Sciences 2003)

New Content Framework 2011

A new curriculum for Life Sciences was introduced in Grade 10 in 2009 and is examined in the NSC for the first time in 2011. The IEB adapted the New Content Framework and examined only that curriculum.

Comments

The IEB NSC Handbook of 2011 expands on the content that is to be examined in Grade 12 and discusses it in more detail than the official curriculum document. The IEB has departed somewhat from the official curriculum document, the New Content Framework of 2007.

The IEB 2011 curriculum omitted a number of large sections, for example the human nervous system, plant responses to the environment, and life cycles of plants and some insects. In addition, more depth than that specified in the 2007 curriculum was added to gene technology, speciation, human evolution and ecology.

Changes in the structure of examination papers

In 2011, the allocation of subject matter to each paper changed from the previous allocation. The IEB changed the weighting of subject matter between the papers in the following way:

Table 16: Prescribed weighting of subject matter 2010–2011

	2010	**2011**
Paper 1	DNA, protein synthesis & genetics (60%) Reproduction in humans & plants (40%)	DNA, protein synthesis & genetics (60%) Evolution (40%)
Paper 2	Local environmental issues (50%) Evolution (50%)	Chemical coordination & reproduction in plants and animals (60%) Ecology (40%)
Paper 3		Practical examination

Prescribed weighting per LO changed between 2010 and 2011, as shown in Table 17.

Table 17: Weighting per learning outcome 2010–2011

Learning outcome	2010	2011
LO1	20%	31%
LO2	46.6%	40%
LO3	33.3%	29%

The structure of the examination papers is as follows:

IEB 2011

Theory papers x 2 (2,5 hour each)

- Question 1: short answers 40 marks
- Question 2-4: variety of question types 90 marks
- Question 5: essay 20 marks

Practical examination (1,5 hour)

- Execution of practical activity; 27 marks
- Design original investigation 23 marks
- Total marks 350 marks

Analysis of examination papers

- Paper 1
- Paper 2
- Paper 3

Documents used to guide the analysis were the following:

- NSC Handbook 2009
- National Senior Certificate Handbook 2011

5.4 Method of analysis

Cognitive demand

Pollitt, Ahmed and Crisp (2007) define "demand" as the "cognitive mental processes that a typical student is assumed to have to carry out in order to complete the task set by a question" (p. 169) and "difficulty" as "an empirical measure of how

successful a group of students were on a question" (p. 169). Demand requires that examiners and evaluators of examinations identify what happens in the student's mind as s/he makes sense of a question and constructs a response to a question. Difficulty derives from the ability of the student and the requirements of an assessment task. It is estimated by analysis of students' scores on an examination or test. Accurate analysis of difficulty can only be conducted after the examination process, since many unexpected factors intervene when students actually respond to questions (Pollitt et al. 2007; Coe 2008).

In the 2008 Maintaining Standards project, Umalusi required analysts to assign questions to one of three levels of cognitive demand, using a supplied analytical instrument. It also required analysts to make a subjective assessment of the level of difficulty on a three-level scale. This was conducted before examination results were available. The release of average marks for the three years prior to 2010 (Mabizela, 2011) enabled us to check our estimates of level of difficulty of examinations against the actual performance of learners. The results are presented in the tables that follow.

Life Sciences has been analysed for four successive years, using a three-level instrument as requested by Umalusi. There are advantages to all subjects using the same instrument, such as enabling comparability across subjects, as has been attempted by the Curriculum and Qualifications Authority and its successor, Ofqual in the United Kingdom (see, for example, QCA 2008a, 2008b; Ofqual 2011). However, in South Africa, agreement has not been reached among subjects on a common taxonomy, and each subject has adapted the recommended Umalusi instrument to suit that subject.

The curriculum change in 2011 permitted Life Sciences to change to a four-level taxonomy, which is aligned with the IEB taxonomy. The taxonomy used in 2011 is based on the cognitive dimension of the Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001) and shown in Table 18. One addition was made to the Anderson and Krathwohl definition for the cognitive skill "apply": apply conceptual or factual knowledge in an unfamiliar context. This is in line with the original Bloom's definition of the conceptual skill "application".

Table 18: Taxonomy of cognitive demand used in the analysis

Type of cognitive demand	Description
Remember	Recall; remember; identify; recognise
Understand	Interpret, exemplify, classify, categorise, infer (draw conclusion), compare, explain why
Apply	Implement, execute a procedure; apply conceptual or factual knowledge in an unfamiliar context
Analyse, evaluate, create	Find coherence, integrate, differentiate, check, create hypothesis, make a product, deconstruct complex information

IEB gives the weighting as 60% for knowledge, comprehension and application and 40% for analysis, synthesis and evaluation. It does not specify finer divisions than these two in the National Senior Certificate Handbook for 2011.

Levels of difficulty

Levels of difficulty have remained unchanged since the 2008 study.

Table 19: Criteria used in assigning levels of difficulty

Level of difficulty	Description
Easy	Simple wording, easy subject matter, short answer, answer easily extracted from text, professional experience
Moderate	Between easy and difficult
Difficult	Complex wording, more difficult subject matter, extended answer, use own knowledge and understanding in addition to provided information; professional experience

Not all three criteria need to be present for a question to be rated in terms of level of difficulty. Our combined experience of teaching Life Sciences also enables us to make a subjective judgement of the level of difficulty of each question.

The three analysts discussed the various levels to clarify the criteria for each. We also referred to the definitions for each type of cognitive demand given by Anderson and Krathwohl (2001). We then analysed each exam paper independently, and entered our analysis on a spreadsheet. Where it was noticeable that we differed markedly in our analysis, we discussed the question, and arrived at a more similar decision. Totals for each cognitive level and level of difficulty were then calculated for each analyst, and averages calculated.

Each question was allocated to an LO and a Knowledge Area. Totals were calculated for each paper.

5.5 Compliance with Subject Assessment Guidelines

Q: Do the 2011 exam paper(s) comply with the National Senior Certificate Handbook?

Table 20: Proportion of marks allocated to each knowledge area and learning outcome compared with 2009 NSC Handbook

Knowledge area/LO	NSC Handbook	Paper 1	Paper 2	Total
DNA, protein synthesis, genetics	60	64		
Evolution	40	36		
Coordination & reproduction in plants & animals	60		56	
Ecology	40		44	
LO1	31			35.7
LO2	40			42.6
LO3	29			21.7

The proportion of marks allocated to each knowledge area was similar to that specified in the Handbook (p. 24/2). The mark allocation per LO was also similar to that specified in the Handbook, although there were fewer questions on LO3 than specified, and more on LOs 1 & 2.

5.6 Cognitive demand and level of difficulty

Table 21: Percentage marks by cognitive demand, compared with specifications in NSC handbook

Cognitive demand	IEB				Analysis grid 2011	
	Paper 1	Paper 2	Paper 3	Total		
Remember	18.4	38.4	0	24.4	30	Knowledge
Understand	25.6	29.6	4.0	24.2	20	Comprehension
Apply	22.4	12.0	58.0	23.0	10	Application
Analyse, evaluate & create	33.6	20.0	38.0	28.4	40	Analysis, synthesis & evaluation
Total marks	150	150	50	350		

The three papers vary in the proportion of marks allocated to each cognitive level. In total, our analysis indicates underweighting of recall and higher order cognitive skills and overweighting of apply.

Table 22: Percentage marks by level of difficulty for Papers 1, 2 and 3

Level of difficulty	Paper 1	Paper 2	Paper 3	Total
Easy	40.9	47.8	24.7	41.5
Moderate	42.9	41.3	42.0	42.1
Difficult	16.2	10.9	33.3	16.4

We rated Paper 2 as easier than Paper 1. This is related to the nature of the subject matter included in Paper 1: most of the additional depth added to the curriculum was in topics examined in Paper 1. Paper 3 was the most difficult paper, but contributed a small proportion of the total marks.

5.7 Model for future use

- The IEB papers are exciting, relevant papers that draw on local context wherever possible. They illustrate the potential of examinations as an instrument for promoting learning, rather than merely assessment of learning (Harlen, 2007). Section A employs a variety of techniques for assessing short answers – multiple-choice questions, matching columns, filling in missing words, providing labels for parts of diagrams, and drawing structures and graphs. The questions are answered on the question paper. The short-answer sections are good models for future use.
- Section B contains five questions based on diagrams and/or text. The origin of diagrams and text is indicated on the paper, thus validating the authenticity of the diagram or text. This is a good model to be followed.
- The essay requires synthesis of information from a number of supplied sources, together with learners' own knowledge. The sources are varied, and most are quite simple. The rubric supplied with the marking memorandum was appropriate for the task. This is a good model for testing ability to synthesise information from a variety of sources, and construct an argument, without relying heavily on recall.
- The Practical examination is an authentic assessment of ability to handle apparatus and carry out a given procedure, as well as ability to plan an open-

ended investigation, as intended by LO1. The actual task is unrelated to the content studied during the year, but is possible to accomplish in schools that are geographically scattered. It would be advisable to assess a task similar to one conducted during the year, for example to dissect a flower.

5.8 Standard and quality of papers

This section comments on the standard and quality of the 2011 final exam papers especially with regard to language level, format of questions, the contextualisation of questions, and the use and appropriateness of text and stimulus material for the questions.

- No spelling or grammatical errors were noted. The y-axis of the graph in Q2.3.3 is incorrectly labelled, and may affect learners' ability to answer the question correctly.
- Technically, these are well-presented papers. Diagrams are clear, and source material is acknowledged. Each question is placed on a new page, and questions related to the source material are on the same page. Questions are original, interesting and creative.
- As we stated in 2010, the reading demand overall in the papers is noticeably high. This is compensated by having relatively fewer questions to answer (55–56 individual questions per theory paper). The source material for the mini essay is varied, with diagrams and text, and it was not overloaded. We note that despite our reservations about the high reading load in 2010, the average mark for the 2010 examinations was 66% (Umalusi press release, 2011). This indicates that learners are coping extremely well with the amount of reading required in the papers.
- We did not detect any fabricated datasets or diagrams.

5.9 Comparability 2008–2011

Q: How would you rate the standard and quality of the 2011 IEB exam papers to that of the 2008–2010 IEB exam papers?

Several factors impact on a direct comparison of the 2011 papers with the 2008 to 2010 papers:

- 2011 examinations are based on somewhat different subject matter, with greater depth and complexity than 2008 to 2010.
- Previous analyses did not include the Practical examination. This is included in 2011.

Table 23: Percentage marks by cognitive demand and level of difficulty 2008–2011

	2008	2009	2010	2011
Cognitive demand				
Remember	29.0	33.1	30.6	24.4
Understand & apply	41.6	43.1	45.9	49.2
Analyse, evaluate, create.	29.4	23.8	23.6	28.4
Level of difficulty				
Easy	24.7	34.4	30.3	41.5
Moderate	43.7	47.3	56.2	42.1
Difficult	31.7	18.3	13.4	16.4
Raw mean score and standardisation decision		66.2 adj to 63.3	66.5	

We note that our overall evaluation of the level of difficulty of 2009 and 2010 examinations is not reflected in the mean scores obtained by learners, which were the same for both years. However, we assessed the 2010 examinations as less difficult than 2009. Our evaluation of the 2011 examinations is that the questions asked were substantially easier than in the previous three years. Given that the curriculum was more demanding, we predict a similar mark profile to previous years.

5.10 Closing remarks

- The examined curriculum of IEB deviates from the New Content Framework in that breadth of subject matter has been reduced and depth added to certain topics.
- Format of the examination papers for IEB follows the short question – longer questions – essay format, but adds a Practical examination.
- IEB usually provides the sources of case studies, diagrams and data sets. IEB papers also illustrate the use of examination papers to promote learning.
- The reading demand of IEB examination papers is high and the IEB essay requires learners to read and select relevant ideas from several sources, and

to construct an argument presenting a chosen point of view. This is a good demonstration of the cognitive skill "create", as defined by Anderson and Krathwohl (2001). A rubric designed for the task is used for assessing these open-ended essays.

5.11 References

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HISTORY

6.1 Evaluators

Dr Carol Bertram (team leader), Mr Brian Mathews and Mr Simon Haw

6.2 Summary of the conclusions

The IEB 2011 papers were found to be cognitively demanding in terms of extended writing. In terms of source-based questions, the IEB papers tended to have more Level 3 questions and fewer Level 1 questions, thus making it slightly more demanding.

6.3 Introduction

A team of three members analysed the examination papers. The whole team worked together to analyse the two IEB papers. Where there were differences of opinion, we discussed the question until we reached consensus.

In 2009, the team of History evaluators compared the curriculum documents and analysed the 2009 IEB papers, among others. The team subsequently developed an analysis instrument that worked for all the papers evaluated, and which the team used to evaluate the IEB papers in 2010 and 2011.

The 2011 IEB Paper 1 comprises Section A, which includes a single source analysis of a text, a visual picture or cartoon and a media artefact, Section B, which consists of questions on a range of sources on the same theme, and Section C, which is a source-based essay. Paper 2 is the extended writing paper which comprises one discursive essay (70 marks) and two stimulus-based extended writing tasks (40 x 2 marks).

6.4 Method of analysis

The set of cognitive demand descriptors given by the Umalusi instrument in 2009 was found to be difficult to adapt to all types of question found in the History exam papers. Accordingly, to provide a guide for decisions made about the type of cognitive demand, the History team developed a tool that was loosely based on the levels provided in the marking memos of the NATED (the old Senior Certificate

curriculum) examination papers. This was deemed to be more appropriate than the NSC levels, which are linked to assessment standards. This tool was developed in order to ensure that the analysis covered all possible categories of question.

The History exam papers include both essay questions (extended writing) and source-based questions. Since essay and source-based questions differ in nature, the team felt that it was necessary to have a different set of categories for each.

The criteria for the levels of difficulty were the same for both the essay questions and the source-based questions. Levels of difficulty were assessed using the following criteria: the level of language in the question, the number of marks allocated compared to the number of points listed in the exam memoranda; whether learners typically find the content topic complex and difficult, and the density and complexity of textual sources.

6.5 Results of examination paper analysis

Source-based questions

While the NATED Memoranda discussion guidelines (2003) provide four types of question that may be asked about sources, the IEB uses six levels of cognitive demand based on Bloom's Taxonomy for both source-based and essay questions. The IEB groups knowledge, comprehension and application into lower order cognitive levels (60%), and analysis, synthesis and evaluation into higher order cognitive levels (40%).

It was therefore necessary for the Umalusi team to develop a set of levels that would be workable for the papers set by all three examining bodies. The team developed the following set of three levels based predominantly on the NATED levels:

Table 24: Levels of cognitive demand for source-based questions

Category	Description	Examples
Level 1/B (Basic comprehension of sources)	Extract relevant textual or statistical information from source/s to answer a question. Possibly does not require historical knowledge to answer. OR Definition of historical concepts	What was Nyerere's vision for Tanzania? (DBE 2011 P1 Q2.1.2) *(Answer clearly stated in the source document)*

Level 2/I (Interpretation and understanding of sources)	Use the source/s for the purposes of historical explanation Locate the sources in the wider context of the topic by bringing together the source/s with historical knowledge Relate the sources to key historical concepts Recognise the perspective of the producer of the source/comparison of the content of two sources. OR Show understanding of a historical context or concept.	Using the source and your own knowledge, explain why Vietnam became a focal point of the Cold War in the East. (DBE 2010 P1 Q 1.1.6) In what way did Gorbachev's decision to abandon the Brezhnev Doctrine lead to a "more human face of socialism"? (IEB Paper 1, Section B, Q9)
Level 3/Y (Analysis and evaluation of sources)	Demonstrate an understanding of the multi-layered nature of sources as historical by analysing and/or evaluating one or more sources in terms of: usefulness, reliability, bias, appropriateness for the historical task.	Explain which one of the three sources you would consider to be most useful to a historian researching the USA's involvement in the Vietnam war. (DBE 2010 P1 Q 1.4) Explain why this photograph is so famously symbolic of the Cold War (of an East German border guard jumping over to the West). (IEB 2010 Paper 1, Q 1.4)

Table 25: Level of cognitive demand for extended writing or essays

Category	**Description**	**Examples**
Level 1/N (Narrative essay)	The development of a coherent narrative or descriptive essay which requires description and historical explanation. (Possible task words: *explain, describe*)	Use all the sources and your own knowledge to explain the role that Kennedy played in the Cuban Missile Crisis. (DBE 2011, Q1.6)
Level 2/G Discursive (with a given line of argument)	Discursive essay with a given line of argument. Requires some basic level of analysis (Possible task words: *Explain why, discuss*)	Write an article for your local newspaper showing how peaceful resistance brought about changes to the policy of segregation in the USA. (DBE P1 3.7.2)
Level 3/A (Argumentative essay)	The development of a coherent, relevant, independent line of argument together with analysis and historical explanation. (Possible task words: *Critically evaluate, argue for a particular viewpoint*)	Explain whether the TRC succeeded in healing SA from its divided past. (DBE P2 4.6.1)

6.6 Compliance with Subject Assessment Guidelines

In terms of structure and the coverage of content, the IEB History Paper 1 complies with the three key sections as described in the IEB documents. This paper focuses on LO1, 2 and 3. The IEB documents state that 60% of questions should be lower order cognitive skills (knowledge, comprehension and application) while 40% target higher order cognitive levels (analysis, synthesis and evaluation).

It is difficult to map the team's analysis onto the IEB SAG, since questions that we would label "interpretation" (Level 2), might be categorised by the IEB as lower order (application) or as higher order (analysis)

The IEB History Paper 2 complies with the structure of the extended writing paper as described.

6.7 Cognitive demand and level of difficulty

What impacts on the level of difficulty?

- The "difficulty" or familiarity of the theme/topic
- The use of language, how the question is phrased, the clarity of meaning
- The complexity and length of the source (in the case of source-based questions)

Table 26: Levels of difficulty for all questions

Easy	The topic is understood to be familiar; the language used is straightforward; there is no ambiguity about what the question means. For source-based questions, the source is clear and uses fairly straightforward language. There is one source to work with. For essay questions, the topic was familiar, a strong likelihood that this topic had been seen before in class. For extended writing based on sources, the sources were familiar or fairly straightforward in terms of language.
Moderate	The topic is understood to be somewhat familiar; the language used is fairly clear; perhaps some ambiguity in terms of what the question means. For source-based questions, the source/s may use fairly complex language. Working with more than one source. For essay questions, the topic was somewhat familiar, a possibility that this topic had been seen before in class. If source-based extended writing, then the sources were moderately complex.
Difficult	The topic is understood to be unfamiliar and complex; the language used is difficult; there is ambiguity about what the question means. For source-based questions, the source/s may use complex language, and be difficult to understand. Working with a number of sources. For essay questions, the topic was not familiar, very little possibility that this topic had been seen before in class. If source-based extended writing, then the sources were complex and lengthy.

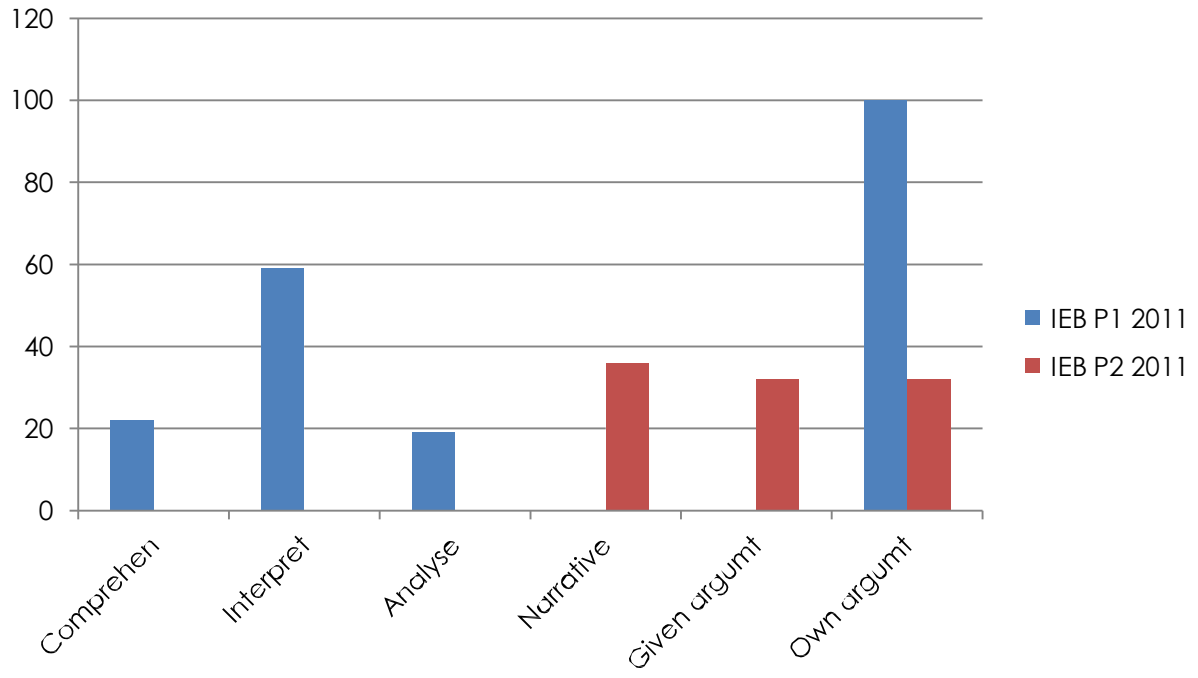
The application of these "levels of difficulty" categories to particular examination questions relies on the personal opinion and experience of the evaluators. The questions can only be analysed at face value. Of course it is possible that an essay that appears to require an argument, in fact has been learnt off by heart. It is also not possible to know exactly how markers applied the memo. In order to provide an

indication of the level and difficulty of a question, we also used the marking memo, looking particularly at the number of "facts" given in the memo compared to the number of marks allocated to the question.

Graph 18 shows that the two IEB papers assess different history skills. Paper 1 is source-based, and includes one source-based essay in this paper.

The level 3 questions comprise 19% of the marks, while levels 1 and 2 make up 22% and 59% respectively. The essay for Paper 1 is a level 3 essay, which would in fact bring up the percentage of higher order questions in this paper.

Paper 2 assesses only the writing of one long essay and two extended writing tasks, which are equally distributed across the three levels of difficulty.



Graph 18: Cognitive demand for papers 1 and 2

6.8 Weighting of cognitive demand

IEB History Paper 1 is weighted towards what we categorise as Level 2 questions (59%), which require a candidate to interpret and analyse a source. The cognitive demand of Paper 2 is well balanced between essays which require narrative (level

1), those that require a given argument and those that require a student to take their own stance (level 3).

The weighting of the levels of difficulty is inclined towards moderate questions (82%).

6.9 Model for future use

The IEB structure of P1 is such that it includes source-based questions, a visual analysis and a source-based essay. P2 comprises one discursive essay (a choice of two) and two "extended writing" tasks which use one source as a stimulus for the response.

The team found the structure of the IEB Paper 1 to be flexible, as it makes it easier for the examiner to find more sources that offer contrasting interpretations.

The source-based essay in Paper 1 expects students to work with the sources in an integrated manner. There are seven sources on the same topic, which provides a good range of resources for students to use when writing the essay.

The team felt that Q1 of P1 of the IEB paper was a good model in that it requires historical knowledge from learners that is not found in the sources. The visual analysis in this question also requires learners to do an in-depth analysis of the photograph, and to understand how such a photograph would be viewed by the two "sides". Overall, the IEB paper has high expectations of learners in terms of visual literacy, media analysis and cartoon analysis and assumes that these skills are taught explicitly.

At least half of the source-based questions in Section B rely on both the candidate's own knowledge and interpretation of the source. This was felt to be an ideal model, but perhaps is not appropriate for an examination paper that is not differentiated.

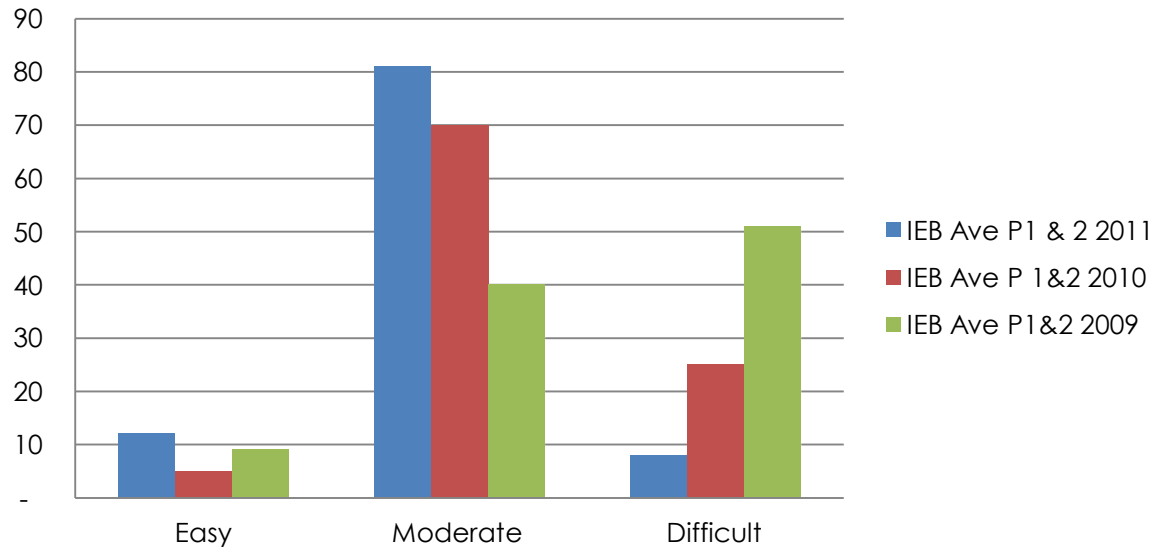
6.10 Standard and quality of papers

The team generally found the questions to be of good quality. There were questions that asked students to show they had knowledge of a particular historical context which could not be extracted from the source. IEB History Paper 1 contained a number of questions that engaged with the issue of bias and the reliability of historical evidence.

The question that involved the media analysis of a cartoon (P1, Q3) requires a good historical knowledge as well as good analysis skills.

6.11 Comparability 2009–2011

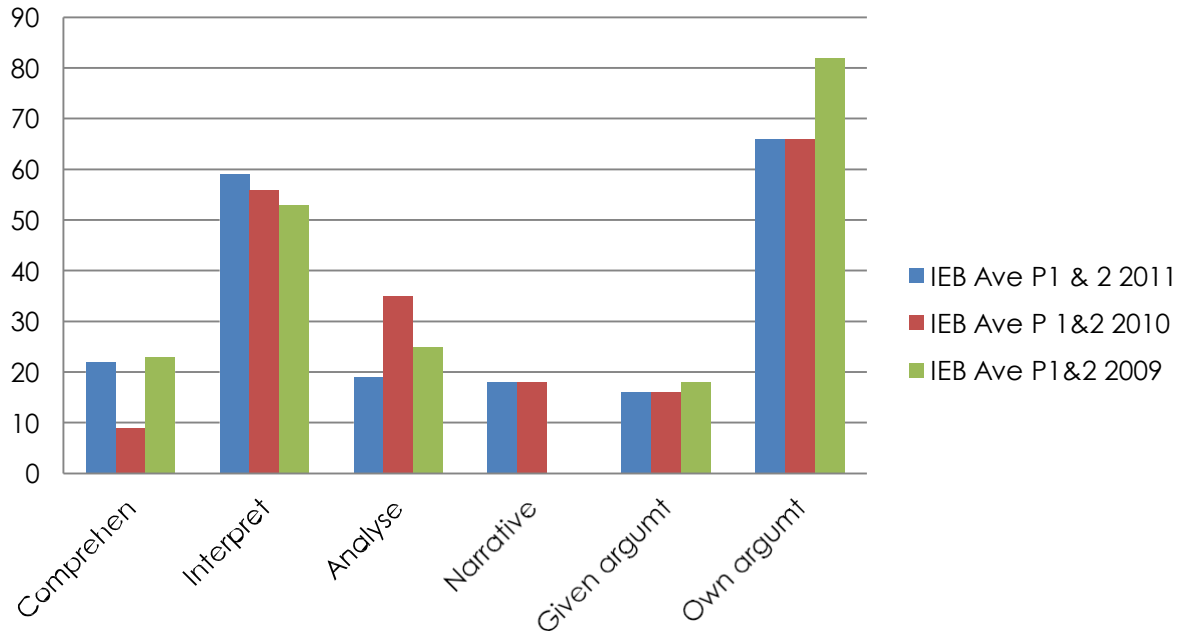
When comparing levels of difficulty in the History papers over the past three years (Graph 19), the number of marks in the moderate category is higher in 2011 than in 2010 and 2009. Conversely, the number of marks categorised as difficult is much less in 2011. This is because none of the extended writing tasks were categorised as difficult in 2011, even though they were level 3 essays which demanded the creation of an own argument.



Graph 19: Level of difficulty 2009–2011

However, when comparing cognitive demand (Graph 20), the 2011 papers allocated fewer marks to level 3 source-based questions, and more to level 1 source-based questions than the 2010 paper. Thus, it seems that the 2011 source-based paper (Paper 1) was less cognitively demanding than that of 2010, and closer to the demand of the 2009 paper.

The 2011 essay paper (Paper 2) was very similar to the 2010 paper, with the same percentage of marks allocated to the three levels of extended writing tasks.



Graph 20: Cognitive demand 2009–2011

6.12 Closing remarks

The IEB 2011 paper allocates fewer marks to Level 3 questions than the 2010 IEB paper, as none of the essays in the 2011 paper were categorised as difficult. The marks that were Level 3 in 2010 have been allocated to Level 1 in 2011.

GEOGRAPHY

7.1 Evaluators

Dr Sue Cohen (team leader), Ms Kedi Molapo and Ms Jenny Simons

7.2 Introduction

The 2011 Geography papers of the Independent Examinations Board (IEB) were analysed. The examination comprises two papers, Paper 1, a theory paper, and Paper 2, mainly a map work paper.

Both papers were analysed with regard to their compliance with the IEB SAG. In this analysis, both the structure and mark allocation the various sections as specified by the SAG for each paper were analysed, as well as the compliance of each paper separately and combined as the examination as a whole with regard to cognitive demand. The level of difficulty of each paper was also analysed, but the spread of questions across these levels is not specified in the SAG, and so the question of compliance was not considered. The cognitive demand and levels of difficulty of the 2011 papers were then compared with those of the 2008, 2009 and 2010 papers.

7.3 Method of analysis

The Umalusi instrument used for the analysis required that each question be analysed in terms of

- cognitive demand
- level of difficulty
- curriculum content

In Geography, five types of cognitive demand in a hierarchy of demand and three levels of difficulty for each were considered. This allowed for a fairly nuanced analysis of the papers.

Table 27: The Umalusi 5-level instrument – types of cognitive demand and level of difficulty

Type of cognitive demand	Level of difficulty
Conceptual knowledge (CK) Recall and recite knowledge Define and describe Identify, label, select, locate information	Easy
	Moderate
	Difficult
Comprehension (C) 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 (A) 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 & Problem-solving (A&PS) 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 & Synthesis (E&S) Making judgements (evaluate), critique, and recommend by considering all material available Weigh possibilities and make recommendations Synthesise or create innovative solution Construct or formulate new ideas	Easy
	Moderate
	Difficult

However, the papers were initially analysed using the three-level instrument shown in table 28. In this three-level typology, the two highest cognitive levels on the five-level typology are collapsed into one, and comprehension and application are similarly collapsed to make one middle level category. For the sake of consistency, therefore, the findings of the analysis of cognitive demand are reported using this three-level typology. Where relevant, more nuanced information from the five-level analysis is used to comment on the findings.

Table 28: The Umalusi 3-level typology

	Type of cognitive demand	Level of difficulty
Lower order	Basic conceptual knowledge Recall, Literal comprehension, Making simple evaluative judgements in terms of previously acquired facts, etc.	Easy
		Moderate
		Difficult
Middle order	Comprehension, application Understanding, application, analysis of previously acquired information in a familiar context Making evaluative judgements that require the use of a range of previously acquired facts/information, etc	Easy
		Moderate
		Difficult
Higher order	Problem solving Analysis, interpretation and application of information in a new or unfamiliar context Synthesis, creation of novel solution or product Evaluation or making judgement in relation to a mixture of old and new material or information	Easy
		Moderate
		Difficult

7.4 Compliance with Subject Assessment Guidelines

Structure of the examination

Analysis of the structure of the examination showed that it complied with the IEB SAG as shown in Table 29 in terms of the number and nature of the papers, and the mark allocations for each.

Table 29: Structure of the examination

Paper	Total marks	No. of questions set	Number of questions to be answered
Paper 1	300	Five, in three sections	Three, one from each section The question in section A is compulsory
Paper 2	100	Not specified	All

The structure of Paper 1 was found to be in line with the specifications for this paper as shown in Table 30.

Table 30: Structure of Paper 1

Section	Number and Focus of questions	Type of questions and mark allocations
A	One question, which must be answered by all candidates. This is a question on Geographical Issues, in which all learning outcomes and content themes are integrated.	100 marks; questions to range from short objective-type questions to those requiring application, analysis, synthesis and evaluation.
B	Two questions, both on Natural Environments. Topics in each question will be: Climate and weather Fluvial processes and landforms	100 marks; questions to range from short objective-type questions to those requiring application, analysis, synthesis and evaluation. No indication of the marks to be allocated to either topic is given.
C	Two questions, both on Human Environments. Topics in each will be: People and Places: Rural and Urban Settlement People and their Needs	100 marks; questions to range from short objective-type questions to those requiring application, analysis, synthesis and evaluation. No indication of the marks to be allocated to either topic is given.

Table 31 shows the weighting of marks for two different kinds of questions in Paper 2. The analysis of the weighting for "basic mapwork skills" and application to theory, suggests that the IEB paper is underweighted in terms of marks awarded to basic mapwork skills and techniques per se. Only 28% of the marks for the paper are for questions that test these directly. However, these skills are well embedded in most of the other question in the paper, where, in order to answer a question, learners have to apply mapwork skills to analysing information on the map. The focus of these questions is not, however, on the mapwork skill per se, and it is difficult to separate out the marks that are dependent on it.

Table 31: Compliance with the SAG

Focus of question	Specified marks/100	Actual marks/100 in 2011
Basic map work skills	40%	28%
Application of theory	60%	72%
TOTAL	100	100

Cognitive demand

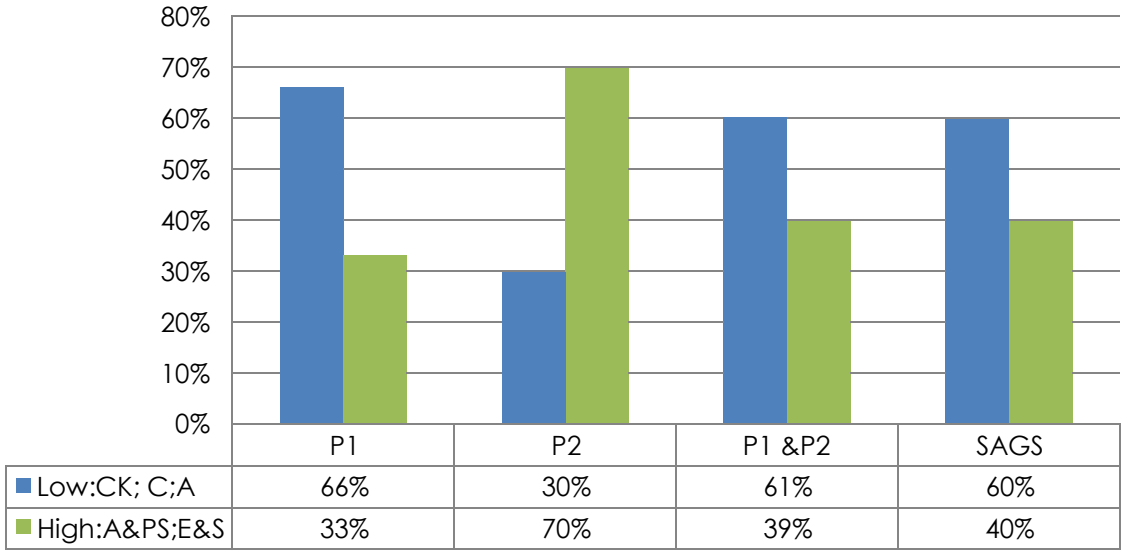
The Umalusi instrument organises cognitive skills into a three-level hierarchy that differs from the IEB typology, which is shown in table 32. The IEB typology has only two levels, low and high, while the Umalusi instrument has a middle level as well.

Graph 21 also shows the Umalusi skills that correspond with those of the IEB on each level. It should be noted that in the IEB typology, the middle level of the Umalusi instrument is entirely located in the lowest level of the IEB typology, with only analysis and problem solving, and evaluation and synthesis, being considered higher order skills.

Table 32: The 2-level typology of cognitive skills and their weighting

Cognitive level	Cognitive skills	Corresponding cognitive demand types in Umalusi instrument	Weighting
Lower order	Fragmented knowledge, Knowledge, Comprehension, Application	Conceptual Knowledge (CK) Comprehension (C) Application (A)	60%
Higher order	Analysis, synthesis, and evaluation	Analysis and problem solving (A&PS) Evaluation and synthesis (E&S)	40%

Graph 21 shows the compliance of the 2011 IEB examination with the IEB SAG.



Graph 21: Comparison of papers with the SAG

Graph 21 shows that IEB Geography Paper 1 is slightly more weighed in the lower order, and underweighted in the higher order than is required by the SAG. In Paper 2, the situation is reversed. This is probably as a result of the high number of questions in this paper that require the analysis of map and photographic information in order for the question to be answered.

Summary of key points regarding compliance with the SAG

The IEB papers conformed to the requirements of the IEB SAG with regard to their structure.

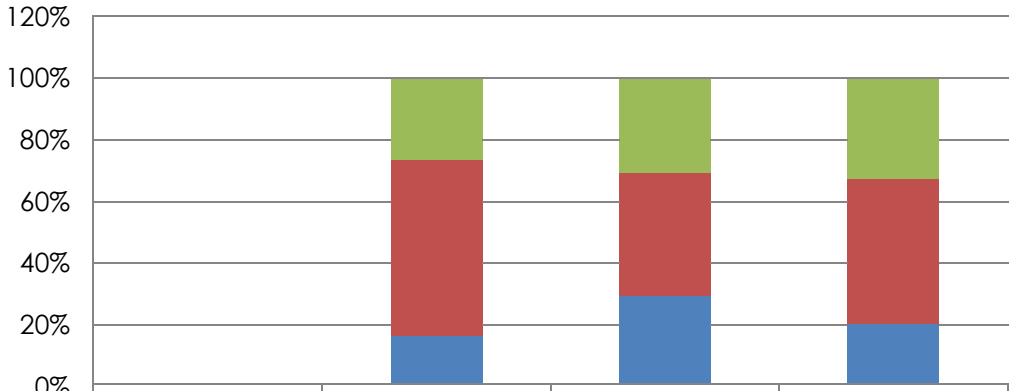
Overall, the papers together comply almost perfectly with the SAG – but neither paper alone does so. Paper 2 is most different from the SAG, probably because of the high proportion of questions requiring analysis of information.

7.5 Cognitive demand and level of difficulty

Cognitive demand

Graphs 22, 23 and 24 provide information about the cognitive demand for 2011 and for the preceding two years for each paper separately, and for the examination as a whole. No data was available for the papers separately in 2008.

Graph 22 shows the findings for Paper 1.



	2008	2009	2010	2011
High order	0%	28%	32%	33%
Middle order	0%	58%	40%	49%
Low order	0%	15%	29%	18%

Graph 22: Paper 1 – comparison of cognitive demand 2009–2011

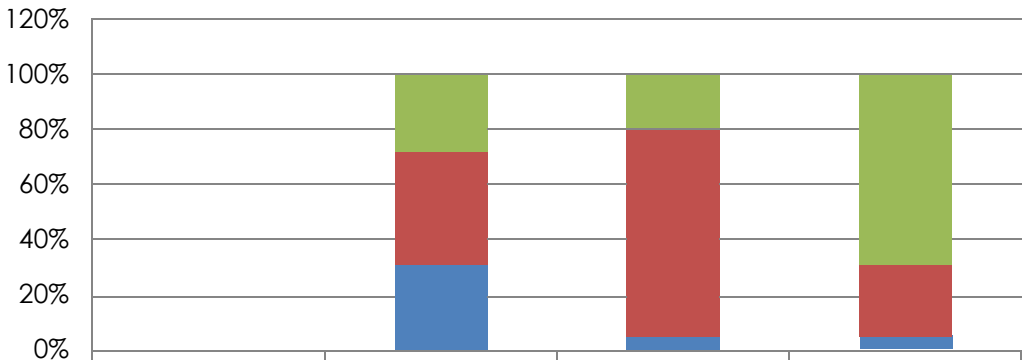
In 2011, cognitive demand is most heavily weighted on the middle level – comprehension and application. Higher order skills are next most heavily weighted and low order skills are least weighted. This suggests that, in terms of cognitive demand, this paper will be difficult for weak candidates, with only 18% of the marks

allocated to questions making low cognitive demand, and it will also be challenging for stronger candidates, with 33% of the marks awarded to questions with a high cognitive demand.

When compared with previous papers, the 2011 paper is probably more difficult than the 2010 paper, and similar to that of 2009 with regard to the weighting of the lowest level of cognitive demand. The percentage of marks in the middle level lies between the percentages for 2009 and 2010. The weighing for high cognitive demand is slightly increased – but is very similar to that for 2010.

Overall, Paper 1 has a higher cognitive demand than the papers preceding it as there has been a shift in the proportion of marks from the lowest to the middle level. Weaker candidates will find it more difficult than the previous papers while for stronger candidates the demand at the higher end is similar to previous years.

Graph 23 presents the findings for Paper 2.



	2008	2009	2010	2011
High order	0%	29%	19%	70%
Middle order	0%	40%	74%	25%
Low order	0%	31%	7%	5%

Graph 23: Paper 2 – comparison of cognitive demand 2009–2011

Paper 2 is most heavily weighted in the highest level of cognitive demand, and much more lightly weighted on the other two levels, especially the lowest level.

When 2011 is compared with the previous years, it can be seen that the weighting for the middle category in 2010 is very similar to that of the middle level in 2011, which was noticeably higher than the other two levels. This change reflects an

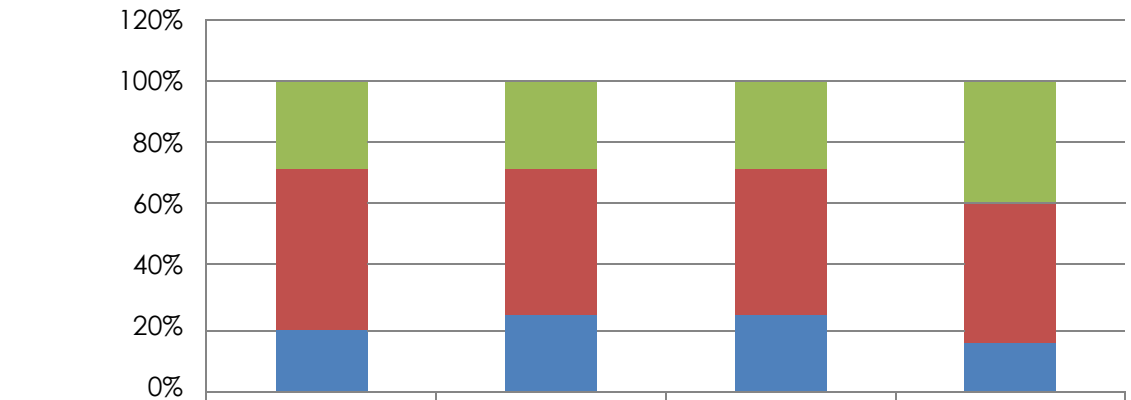
increase in the number of questions that require analysis rather than application. The team members were aware of this trend in their decision making – and checked carefully to see whether they had shifted in their understanding of what should be classified in these categories, or whether the questions had in fact changed. There was consensus that the questions in 2011 did seem to have shifted toward the higher level.

Overall, Paper 2 is a more challenging paper in terms of cognitive demand than the papers that preceded it. The proportion of marks for content knowledge is the lowest of the three years, as is the proportion for comprehension and application in the middle level, while the proportion for the highest level of demand is significantly higher than in previous years. Even if some questions had been incorrectly assigned, this proportion would remain higher.

Candidates, especially weaker students, are likely to have found the 2011 Paper 2 more difficult than those of previous years.

Graph 24 shows that in the 2011 examination as a whole, the middle and highest levels of cognitive demand together are markedly more weighted than the lowest level. This reflects the trend observed in the papers separately, and in particular, the heavy weighting on the highest level in Paper 2.

The weighting of the middle level is fairly constant from year to year – with about 45–50% of the marks for each examination awarded here. In previous years, the lowest level has always been the least weighted; in 2011 this is more marked, with the decrease here being reflected in the increase in weighting in the highest level, making it only slightly less than for the middle level. If some marks were reassigned from the highest to the middle level, 2011 would be more similar to the 2010 paper. However, the decrease in the lowest level would remain a feature.



	2008	2009	2010	2011
High order	29%	28%	29%	39%
Middle order	52%	49%	46%	45%
Low order	19%	23%	25%	16%

Graph 24: Combined papers – comparison of cognitive demand 2008–2011

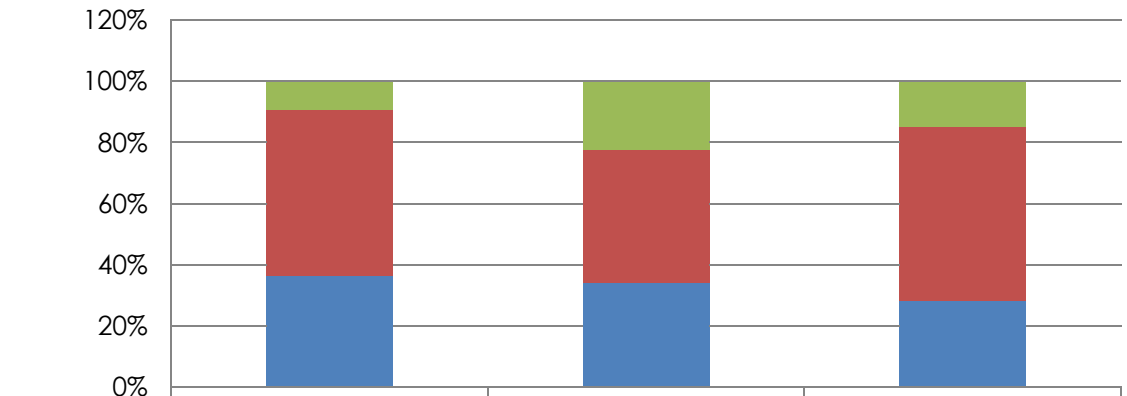
Candidates across the board are likely to have found this examination more cognitively demanding than previous papers. Weak candidates in particular would have found it challenging, but strong candidates would probably have found it more demanding, too.

Level of difficulty

Graphs 25, 26 and 27 provide information on the level of difficulty of each paper separately, and the examination as a whole for the 2011 examination, and the preceding two years.

Graph 25 shows that for 2011 the paper is most weighted in the moderately difficult category and the difficult questions have least weighting.

Looking at the trend over the three years, the 2011 paper shows a decrease in easy questions, and an increase in moderately difficult questions compared with the papers for 2009 and 2010. The weighting for difficult questions lies between that weighting in the other two papers.

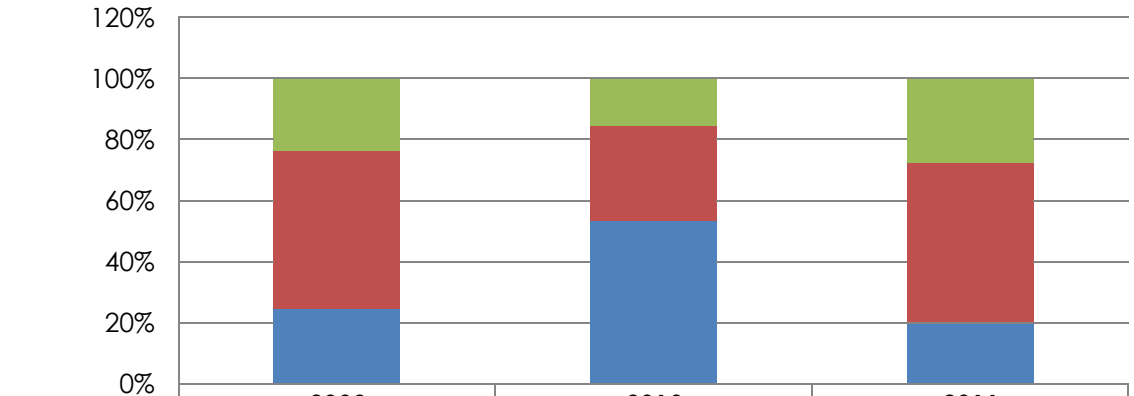


	2009	2010	2011
Difficult	10%	23%	15%
Moderate	54%	44%	57%
Easy	36%	34%	28%

Graph 25: Paper 1 – comparison of levels of difficulty 2009–2011

Weaker candidates are likely to have found this paper more difficult than those that preceded it, while for stronger candidates the high proportion of cognitively demanding questions might be offset to some extent by the fact that the proportion of marks for difficult questions has decreased. They would still, however, find it more challenging than the 2009 paper.

Graph 26 shows the findings for Paper 2.



	2009	2010	2011
Difficult	24%	16%	28%
Moderate	52%	31%	52%
Easy	24%	53%	20%

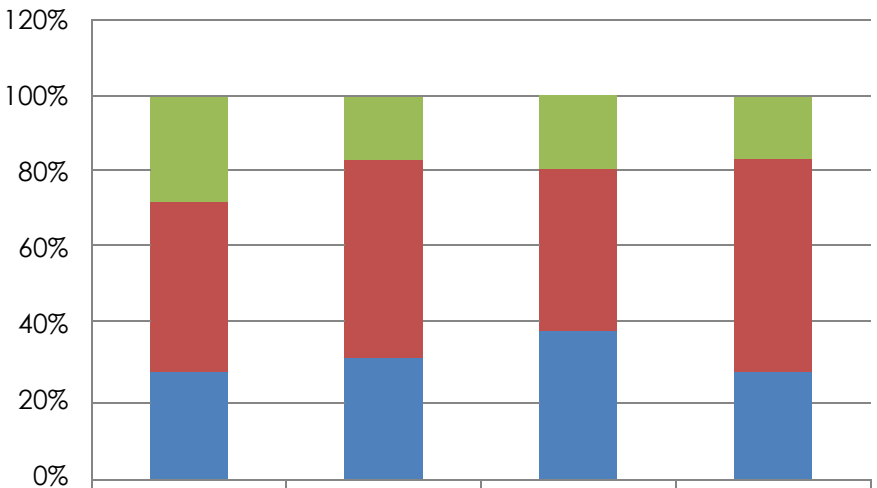
Graph 26: Paper 2 – comparison of levels of difficulty 2009–2011

Paper 2 is also most weighted in the moderately difficult category. It has the smallest proportion of marks in the easy category – unlike Paper 1. This paper is likely to be challenging for both strong and weak candidates because of these weightings.

Compared with previous years, the 2011 paper seems more difficult. The proportion of marks awarded to "easy" questions is lowest, and that for "difficult" highest for any of the years. The change in weighting for these categories is particularly marked from the 2010 paper – it has decreased from 53 to 20% of the marks. Similarly, the weighting for difficult questions has increased from 16 to 28%.

Overall, both weak and strong candidates are likely to have found Paper 2 more difficult than in previous years.

Graph 27 shows the findings for the entire examination.



	2008	2009	2010	2011
Difficult	29%	17%	22%	17%
Moderate	43%	53%	42%	56%
Easy	28%	30%	37%	26%

Graph 27: Combined papers – comparison of levels of difficulty 2008–2011

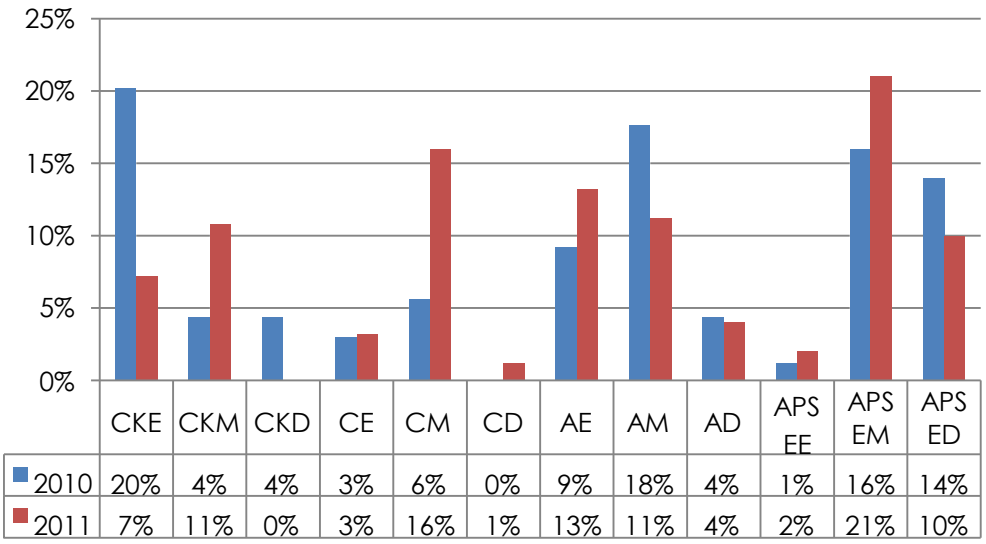
Graph 27 shows the heaviest weighting in the moderately difficult category, which characterised the two papers. It also shows that in terms of level of difficulty, the 2011 examination is quite similar to the 2009 examination, although the weighting in the easy category is slightly lower, and in the moderately difficult slightly higher.

Compared to the examination for 2010, it is less weighed in both the easy and difficult categories. This suggests that the examination as a whole is harder for weaker candidates, and slightly less difficult for stronger candidates than the 2010 paper.

Given that the examination was more cognitively challenging, it is likely that overall candidates would have found this examination more difficult than that of 2010, although the slightly lower weighting on difficult questions might moderate the impact of the increase in cognitively higher order questions.

Cognitive demand and level of difficulty combined.

Graphs 28, 29 and 30 provide information on cognitive demand and levels of difficulty combined for 2010 and 2011.



Graph 28: Paper 1 – comparison of cognitive demand/difficulty 2010–2011

Graph 28 shows that, for Paper 1, there has been an upward shift in cognitive demand and levels of difficulty at the lower end of the spectrum – from content knowledge to comprehension, and from easy to more moderately difficult questions. This makes Paper 1 more difficult for weaker candidates. In the middle level there has been a slight downward shift to easy rather than moderately difficult questions, while the proportion of difficult application questions remains the same. At the

highest level the proportion of marks has remained similar overall, but there has been an increase in weighting for moderately difficult and a decrease in weighting for difficult questions here. This should make the 2011 paper slightly easier for stronger candidates than the 2010 Paper 1.

Graph 29 below shows that, for Paper 2, there has been a marked shift away from easy content knowledge and comprehension questions towards moderately difficult content knowledge and difficult comprehension questions. Overall, there has been a decline in marks in the lowest levels from 13% of the paper to 5%. This will make the paper more difficult for weak candidates. There has been a marked shift from application questions to more cognitively demanding questions and a noticeable increase in weighting on moderately difficult rather than easy questions in both the middle and higher order categories of demand. There has also been an increase in marks allocated to difficult questions. This will make Paper 2 more challenging for strong candidates than was the paper in 2010.

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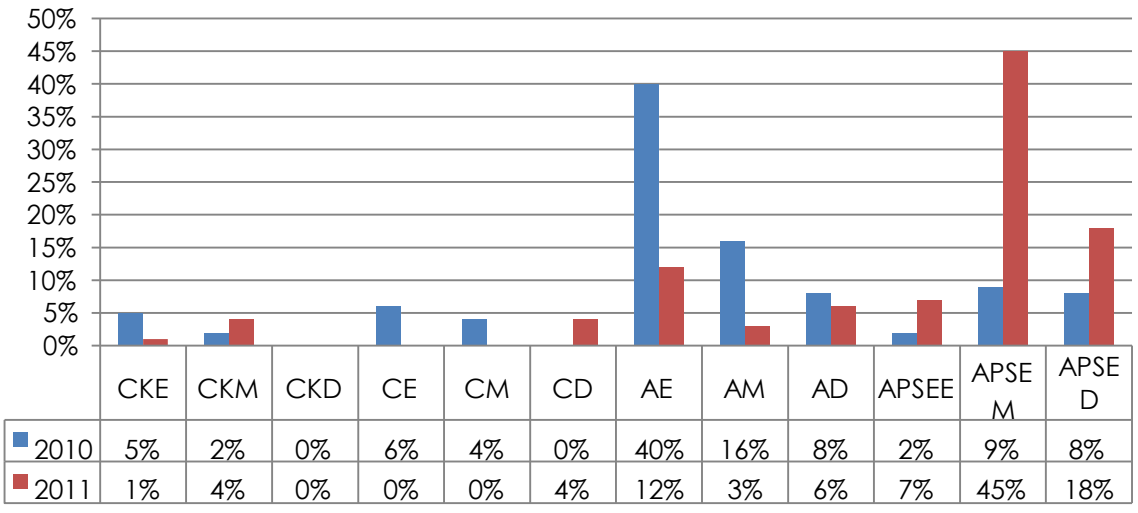
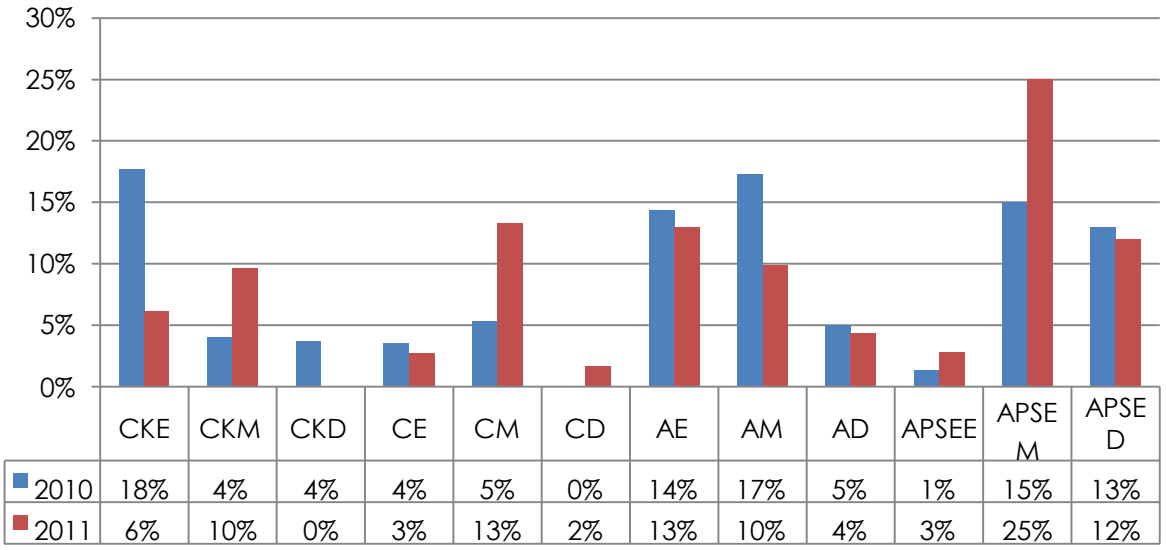


	CKE	CKM	CKD	CE	CM	CD	AE	AM	AD	APSEE	APSEM	APSED
2010	5%	2%	0%	6%	4%	0%	40%	16%	8%	2%	9%	8%
2011	1%	4%	0%	0%	0%	4%	12%	3%	6%	7%	45%	18%

Graph 29: Paper 2 – comparison of cognitive demand/difficulty 2010–2011

Graph 30 below shows clearly that there has been a shift towards more moderately difficult than easy questions in both content knowledge and comprehension. In addition, there has been a shift of marks from content knowledge to comprehension. As a result, weaker learners will be more challenged in 2011 than they were in 2010. There has also been a shift in marks from application to the higher

cognitive level, with some compensation shift from moderate to easy in the middle level. However, the weighting on difficult questions at the highest level has increased, so, overall, this examination is likely also to have been more difficult for stronger candidates in 2011 than it was in 2010.



	CKE	CKM	CKD	CE	CM	CD	AE	AM	AD	APSEE	APSEM	APSED
2010	18%	4%	4%	4%	5%	0%	14%	17%	5%	1%	15%	13%
2011	6%	10%	0%	3%	13%	2%	13%	10%	4%	3%	25%	12%

Graph 30: Combined papers – comparison of cognitive demand/difficulty 2010–2011

7.6 Model for future use

We like the compulsory integrated question, which did an excellent job of integrating physical and human geography content in an authentic context, and requiring the use of a range of geographical techniques.

We thought that Q1.2.2 of Paper 2 was an innovative and interesting question that drew on a range of skills in one question in a meaningful way.

Q4 of Paper 2 is a good way to check learners' understanding of GIS and its value, and not just the recall of terminology. Questions like it could well be used in future by all the examination boards.

7.7 Standard and quality of papers

Overall the quality and standard of the IEB papers is excellent. Minor concerns related to the following:

- A few instances where we felt that the question could have be more sharply formulated to ensure learner would answer in the way expected by the memo – but these were few and far between. Paper 1, Q2.2.6 is a case in point. Learners might have needed a bit more help as to what was expected by the term "evaluate"; in this context. Perhaps a question that asked; "describe and explain positive and negative effects of the cold front" would have made the question accessible to more learners. In Q4.5.3 we felt the sub-headings provided as scaffolds to the answer in fact did not help learners answer the question. The questions asked learners to consider whether floods are manmade or natural – and the sub-sections asked them to examine the benefits and drawbacks of floods – which was not helpful in answering the question set.
- While the case studies were excellent, we were a little concerned that they might introduce some bias in favour of learners familiar with the contest, but in general we felt that there was a good spread of locales across the country, and that, to a more than satisfactory extent, the information needed to answer the question was provided in some way in the stimulus material.
- The mind map as a long question does encourage synthesis of information, but we wondered if a mind map should be the end of the road or if perhaps, some structured writing could be included in these questions – maybe one paragraph on one of the key aspects in the mind map.

Strengths of the papers included the following:

- Excellent photographs – of good quality and pertinent to the questions in which they were used.
- Interesting topical source material – which probably extended learners' knowledge and made the examination a learning experience.
- A good variety of resources; graphs, photos, maps, diagram etc were all of good quality. They were generally integral to the question, but we felt this was not the case in Paper 1, Q3.3.1, where learners could have managed just as well without the stimulus material.
- A good spread across provinces and context on the whole – although the Cape was possibly a little favoured (in one team member's view)?

- Good scaffolding of the more complex questions, especially those with longer answers.
- Some good essay-type questions

Note: the examiners clearly do a huge amount of research in preparation for setting the papers, including, it seems, purposefully taking their own photographs. They should be commended for this effort.

ACCOUNTING

8.1 Evaluators

Mrs Jabu Ngwenya (team leader), Mrs Pamela Townsend and Mrs Mahlape Vanneer

8.2 Introduction

The 2011 Accounting examination papers of the Independent Examination Board (IEB) were analysed to assess the standard of the question papers with regard to the following:

- distribution of curriculum content over the three major Accounting disciplines (i.e. Learning outcomes (LOs) and assessment standards (ASs)
- the cognitive demand
- the levels of challenge
- the degree to which problem-solving questions were addressed

The 2011 exam papers were analysed with the 2010, 2009 and 2008 exam papers with the aim of rating the standard and quality.

As part of the final concluding remarks on the analysis, a comparison of the cognitive demand, levels of difficulty (challenge) and the degree to which problem-solving questions were addressed was done to provide a very clear picture of the overall standard and quality of the 2011 question papers.

8.3 Method of analysis

The SAG documents published by the IEB include reference to the setting of Grade 12 NSC papers. The panel considered this document in analysing and assessing the quality of the papers.

The papers were individually analysed with regard to content coverage, cognitive levels, degree of difficulty (challenge) and problem-solving questions.

The targets relating to content coverage are as follows:

Table 33: Targets for content coverage

LO1	LO2	LO3
50–60%	20–25%	20–25%

With regard to addressing of cognitive levels, the IEB uses a two-way split between lower and higher cognitive levels. The IEB papers were analysed in that manner.

Therefore, the IEB SAG document reflects a two-way split for each paper.

Table 34: Cognitive levels applied

	Lower order	Middle order	Higher order
Paper 1 target	65%		35%
Paper 2 target	50%		50%
Combined p1&p2 calculation	60%		40%

Owing to the nature of the subject, Accounting, cognitive levels do not necessarily correlate with the degree of challenge. Although the following targets for degree of challenge are not stipulated in the SAG documents, it is generally accepted that they have been historically accepted as reasonable by the external moderators:

Table 35: Generally accepted targets for degree of challenge

Easy	Medium	Difficult
30%	40%	30%

Problem-solving questions of a deep nature would normally form part of the Creative cognitive level, catering for new and unfamiliar situations within the context of the Accounting curriculum, and would require responses from candidates based on detailed financial information provided. Problem-solving questions of a surface nature were regarded as those of a more general nature that do not require in-depth interaction with information in a question. The following target is accepted as reasonable in the current context of high school education (in Accounting).

Table 36: Target for percentage of problem-solving questions

Surface	Deep	Total
		10.0%

8.4 Compliance with Subject Assessment Guidelines

Content coverage

IEB Accounting Paper 2 complies with the SAG documents as the LOs are within the target range. Paper 1 does not strictly comply with the SAG with LO1 above the target range and LO2 and LO3 below the target range. As a whole, when the paper is combined, it does not comply strictly with the SAG.

Table 37: Content coverage

	LO1	LO2	LO3
Paper 1	63%	19%	18%
Paper 2	56%	22%	22%
Combined papers	61%	20%	19%
Target	50–60%	20–25%	20–25%

8.5 Cognitive demand and level of difficulty

Cognitive demand

The IEB SAG document reflects a two-way split between lower order and higher order levels and reflects different targets in this regard for each paper.

There is a noticeable difference between Paper 1 and Paper 2 without either paper adhering to the SAG document. Paper 1 reflects a heavy focus on the middle order level with 71% and less focus on higher order at 9%. Paper 2 focuses more on the higher order levels at 51%. When combined, the paper reflects a heavy focus on the middle order levels at 53% at the expense of lower and higher order questions.

Paper 1 again reflects a heavier emphasis on easy questions (81%) in comparison to the target of 65%. Although the paper conforms to the IEB's rationale for assessing the application of theoretical knowledge, there is still a heavy emphasis on the

preparation of financial statements. The preparation of budgets is a Grade 11 assessment standard and this resulted in the weighting of the middle order being higher (71%) than the target of 40%. There should rather have been analysis and interpretation of the cash budget, as this would have balanced the allocation of marks according the IEB cognitive level targets.

Paper 2 for 2011 was slightly more challenging from a cognitive point of view. We accept that learners would find the creditors' reconciliation difficult. The use of relevant financial information to analyse and interpret financial information in question 2 should allow learners of all abilities to score on this question and we consider this to be fair.

Table 38: Cognitive levels

	Lower order			**Middle order**		**Higher order**		
	Remember	**Understand**	**Apply 1**	**Apply 2**	**Analyse 1**	**Analyse 2**	**Evaluate**	**Create**
Paper 1	2%	1%	18%	61%	10%	0%	7%	2%
	21%			71%		9%		
Paper 2	0%	12%	17%	8%	12%	14%	32%	5%
	29%			20%		51%		
Combined	1%	5%	18%	43%	11%	5%	16%	2%
	24%			53%		23%		

	Lower order	**Higher order**
Paper 1	81%	19%
Target	65%	35%
Paper 2	37%	63%
Target	50%	50%
Combined	66%	34%
Target	60%	40%

Levels of difficulty

Across the three levels of challenge, Paper 1 reflected a spread of 40%:39%:21% while Paper 2 reflected a closer adherence to the target. When combined, the paper focused more on easy level questions at 36%.

Table 39: Levels of challenge

	Easy	Medium	Difficult
Target	30%	40%	30%
Paper 1	40%	39%	21%
Paper 2	30%	38%	32%
Combined paper	36%	39%	25%

Paper 1 of 2011 was more challenging than last year's Paper 1. For example, in Q5 where learners were asked to calculate the amount awing to SARS they first had to identify how the transactions would affect the elements of the accounting equation (so indirectly testing journal and ledger accounts) yet in the answer booklet they were not asked to prepare ledger accounts but simply indicate with plus or minus how the amount would affect the balance. In our opinion, this is difficult for the average to weaker learner(s). Yet this type of question would be suitable for those stronger candidates and this could have been used to distinguish between the top learners and the average learners.

Problem solving

Regarding problem-solving questions, the paper reflected 3% surface and 5% deep problem-solving questions. This was, in our opinion, as a result of the learners having to solve a real problem faced by the business. In Paper 2 they had to provide reasons for how stock was being manipulated and to write a report providing reasons as to how they could decrease costs and increase profits based on the scenario presented (in Q2.3.4). Q3.3 asked learners to provide a strategy to solve a problem.

Table 40: Problem-solving questions

	Surface	Deep	Total
Target			10%
Actual			
Combined	3%	5%	8%

8.6 Weighting of cognitive demand

Paper 1 focused more on application with a weighting of 79%. When combined, the paper tended to weigh towards the application of the knowledge at 61%. This is due to the examination of Grade 11 assessment standards where learners were asked to prepare financial statements and the cash budget.

Table 41: Weighting of cognitive levels

	Lower- order			Middle-order		Higher-order		
	Remember	Understand	Apply 1	Apply 2	Analyse 1	Analyse 2	Evaluate	Create
Paper 1	2%	1%	18%	61%	10%	0%	7%	2%
Paper 2	0%	12%	17%	8%	12%	14%	32%	5%
Combined	1%	5%	18%	43%	11%	5%	16%	2%
Application paper 1			79%					
Application paper 2			25%					
Application combined			61%					

8.7 Model for future use

In our opinion the paper can be used in future as the questions in the papers assessed a variety of topics and skills. The form of the questions tested the knowledge in different ways and at different levels of challenge. However, cash budgets should rather be assessed by asking learners to analyse and interpret the information provided.

The team still believes that the format and structure of the accounting papers needs to be debated. We found that having some information in the information booklet and another part of the information in the answer book time was consuming and

confusing. Learners need to be presented with all the information in the same place: the required information at the end of the question and a separate answer book in which to write the answers.

8.8 Standard and quality of papers

Language

The language used was simple, non-discriminatory and appropriate for the vast majority of learners. The provision of a glossary with the meaning and mark allocation was useful and might help those students who do not have English as their home language.

Format

While the instructions were clear, the required information could have been complicated by having to refer backwards and forwards to the information booklet. The team is still of the opinion that having the questions and the information sheets separate is not a logical way of presenting the information and is not user-friendly. Learners are still required to move between what was provided in the answer book and to match what was required with what was in the information booklet or to determine what was missing. In our opinion, this lack of a logical presentation of information has an impact on the learners' allocation of time to the questions.

In addition, the panel is of the opinion that the provision of a ratios and percentages formulae sheet does not enhance the subject and promotes rote learning by learners without really understanding what these ratios mean.

Structure

In terms of the SAG document, Paper 1 conforms to the IEB's apparent rationale for predominantly assessing understanding and application of knowledge. In Paper 2, the emphasis on analysis, evaluation and interpretation of the knowledge is being met. In our opinion the depth of understanding in terms of higher-order problem-solving type questions in Paper 2 is being met more than adequately.

The answer book contained far too much structure. One of the key principles of Accounting is for learners to be able to identify and recognise what elements are

being affected by a transaction and how this transaction should have been recorded in the accounting records. By providing extensive scaffolding in the financial statements preparation, for example, this skill is being lost and learners are simply required to calculate and place the value next to the element which has been already identified for them. What is happening here, in our opinion, is that learners are being tested on their mathematical ability and not on their Accounting knowledge.

Having information in the information booklet and in the answer book and having to move between the two can result in learners missing vital information required in order to answer the question.

Layout

The layout was clear and there was adequate space for learners to show their working. Blank pages should be clearly indicated that they are to be used for workings and students need to reference these workings.

As mentioned above, the use of a separate information booklet and a combined question and answer book is confusing and time consuming.

8.9 Comparability 2009–2011

Content coverage

Table 42: Comparison of content coverage 2009–2011

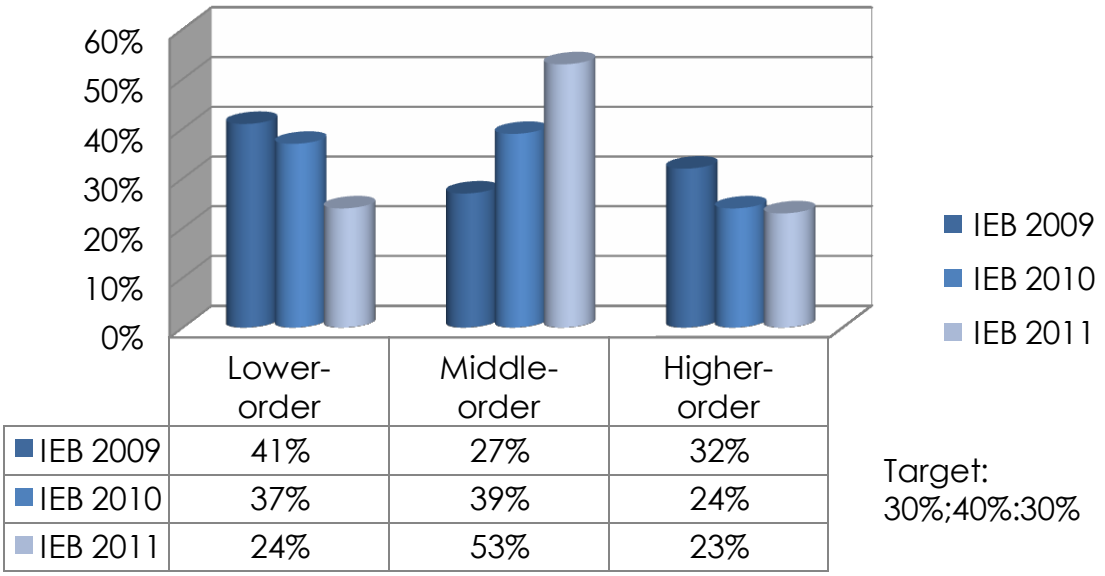
	LO 1	LO 2	LO 3
Paper 1: 2009	66%	18%	16%
Paper 1: 2010	57%	25%	18%
Paper 1: 2011	63%	19%	18%
Paper 2: 2009	54%	25%	21%
Paper 2: 2010	53%	43%	4%
Paper 2: 2011	56%	22%	22%
Combined 2009	62%	20%	18%
Combined 2010	55%	34%	11%
Combined 2011	61%	20%	19%
Target	50–60%	20–25%	20–25%

Cognitive levels

None of the papers appear to conform strictly to the SAG documents in terms of the required target cognitive levels. In all papers from the three years, Paper 1 reflects a spread which is above the target for lower-order levels and below the target for higher-order levels. Paper 2 in all years does not meet the stated target of 50:50. When combined, all papers do not conform to the SAG document.

Table 43: Cognitive levels compared 2009–2011

	Lower- order			Middle-order		Higher-order		
	Remember	**Understand**	**Apply 1**	**Apply 2**	**Analyse 1**	**Analyse 2**	**Evaluate**	**Create**
2009								
Paper 1	4%	8%	34%	30%	6%	6%	7%	5%
Paper 2	2%	21%	7%	0%	11%	14%	42%	3%
Combined	3%	12%	26%	20%	7%	9%	19%	4%
	41%			27%		32%		
2010								
Paper 1	1%	3%	46%	28%	9%	7%	6%	0%
Paper 2	1%	2%	7%	30%	13%	13%	24%	10%
Combined	1%	3%	33%	29%	10%	9%	12%	3%
	37			39		24		
2011								
Paper 1	2%	1%	18%	61%	10%	0%	7%	2%
Paper 2	0%	12%	17%	8%	12%	14%	32%	5%
Combined	1%	5%	18%	43%	11%	5%	16%	2%
	24			54		23		



	Lower-order	Middle-order	Higher-order
IEB 2009	41%	27%	32%
IEB 2010	37%	39%	24%
IEB 2011	24%	53%	23%

Graph 31: Comparison of cognitive levels 2009–2011

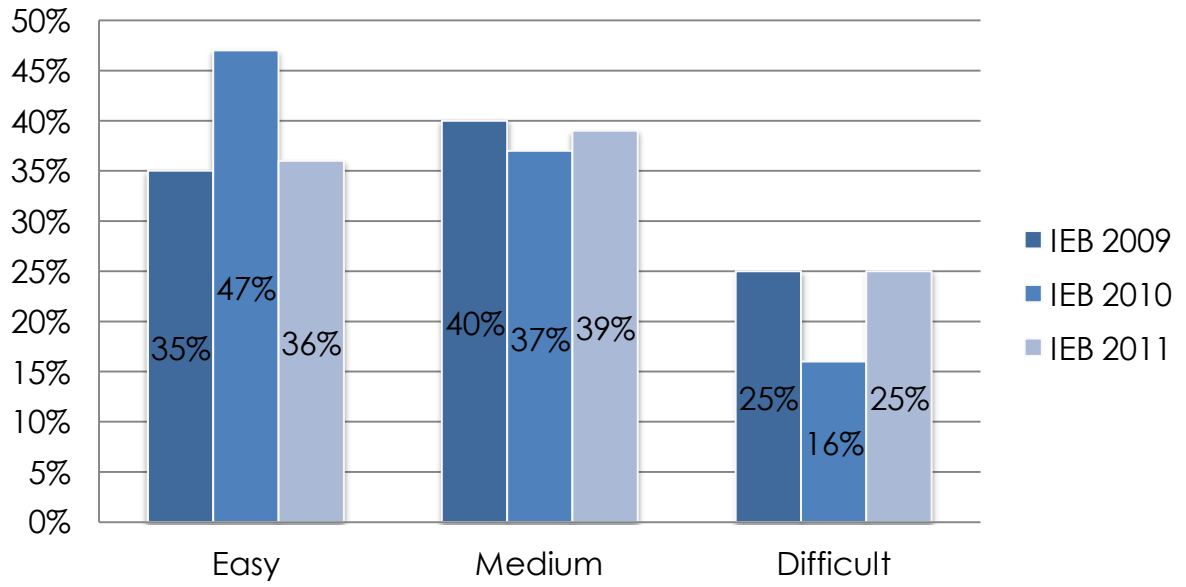
Levels of difficulty

Table 44: Levels of difficulty compared 2009–2011

	Easy	Medium	Difficult
Target	30%	40%	30%
2009 p1	35%	38%	28%
2010 p1	59%	37%	5%
2011 p1	40%	39%	21%
2009 p2	35%	46%	19%
2010 p2	25%	37%	38%
2011 p2	30%	38%	32%
2009 combined	35%	40%	25%
2010 combined	47%	37%	16%
2011 combined	36%	39%	25%

All papers do not strictly meet the stated target, with the exception of 2011 Paper 2, which reflects a closer adherence to the targets. Although the emphasis in Paper 2 is on analysis, evaluation and interpretation of knowledge, the 2009 Paper 2 reflects a

very low percentage of difficult questions with 19%. When combined, the 2010 paper appeared to be the lenient paper compared to 2009 and 2011 papers.

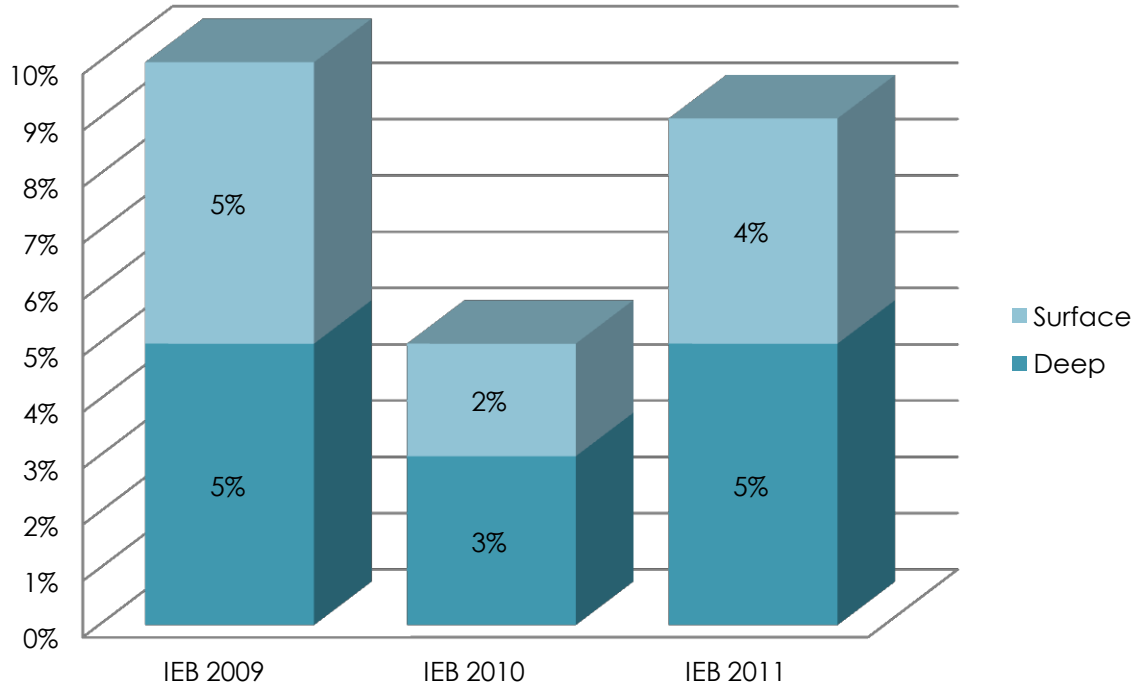


Graph 32: Comparison of levels of challenge 2009–2011

Problem solving

NOTE: For the comparison of problem-solving questions in each paper, combined scores were used, as the IEB does not stipulate a percentage for each paper and the scores are complicated by the fact that Paper 1 is out 200 and Paper 2 is out of 100.

In 2009 and 2011 problem-solving questions amounted to the norm of 10% over the combined papers, while 2010 paper reflected only 5%.



Graph 33: Comparison of problem-solving questions 2009–2011

Conclusion

Based on the above analysis, the 2010 paper reflected more easy and fewer difficult questions compared to the 2009 and 2011 papers. The 2009 paper reflected a higher percentage of easy and difficult questions, while 2011 focused more on middle order questions

Based on the cognitive levels, levels of challenge and higher percentage of problem-solving questions, 2009 and 2011 papers are of better quality than the 2010 paper.

ECONOMICS

9.1 Evaluators

Dr SM Maistry (team leader), Prof M van Wyk and Ms L Rambuda

9.2 Introduction

This report documents the findings of the team of evaluators for the subject Economics for 2011. The final examination paper for the IEB National Senior Certificate Examination 2011 was analysed..

9.3 Method of analysis

In order to maintain consistency and to engage in meaningful comparisons across years, the Umalusi examination analysis framework that was employed for the analysis exercise for 2008 to 2010 was used again for the 2011 analysis process. As with previous years, the team applied a rigorous analysis procedure that entailed a careful scrutiny of both the examination question paper and the marking memorandum. The team leader discussed and reviewed the way in which the instrument had been employed in previous years and emphasised the need for consistency in the approach to the 2011 examination papers.

Before the paper was subjected to a panel analysis, each team member performed an *individual* analysis, making notes of areas of concern, ambiguity and uncertainty. The process entailed a fine-grained analysis of each question so as to establish its suitability, the cognitive demand, the level of difficulty, as well as the assessment standards and learning outcomes that were being assessed. The marking memorandum provided was also used to inform the analysis and classification of each question. When conflicting assessments of specific questions were encountered, the team leader allowed members to carefully deliberate with justification for the positions they had taken. These deliberations provided useful insights as to how different questions might be interpreted by learners. Eventually consensus was reached.

All questions in the IEB paper were compulsory.

The following analysis categories were employed:

Table 45: Types and levels of cognitive demand

Type of cognitive demand	Level of Difficulty
Basic conceptual, knowledge Recall Literal comprehension Making simple evaluative judgements in terms of previously acquired facts etc.	Easy
	Moderate
	Difficult
Comprehension, application Understanding, application, analysis of previously acquired information in a familiar context Making evaluative judgements that require the use of a range of previously acquired facts/information etc	Easy
	Moderate
	Difficult
Problem-solving, analysis, synthesis Analysis, interpretation and application of information in a new or unfamiliar context Synthesis, creation of novel solution or product Evaluation or making judgements in relation to a mixture of old and new material or information	Easy
	Moderate
	Difficult

9.4 Compliance with Subject Assessment Guidelines

As indicated above, the structure of the IEB paper is such that there are no choice questions – all questions are compulsory.

The IEB Subject Assessment Guidelines (SAG) for Economics suggests an equal assessment weighting for each of the four LOs in Economics. In the table below, a comparison of the IEB SAG requirements and the actual distribution of questions for the 2011 IEB examination paper across the four learning outcomes are presented.

Table 46: Comparison of the SAG requirements and the actual distribution of questions

Learning outcome	IEB SAG	IEB 2011
LO1	25%	23%
LO2	25%	19%
LO3	25%	22%
LO4	25%	36%

The above distribution reflects a significant shift from the norm of 25% especially for LO2 and 4. LO4 in particular is loaded by 11% more than is expected. This may be

acceptable if it had been communicated to the teachers and learners writing this paper.

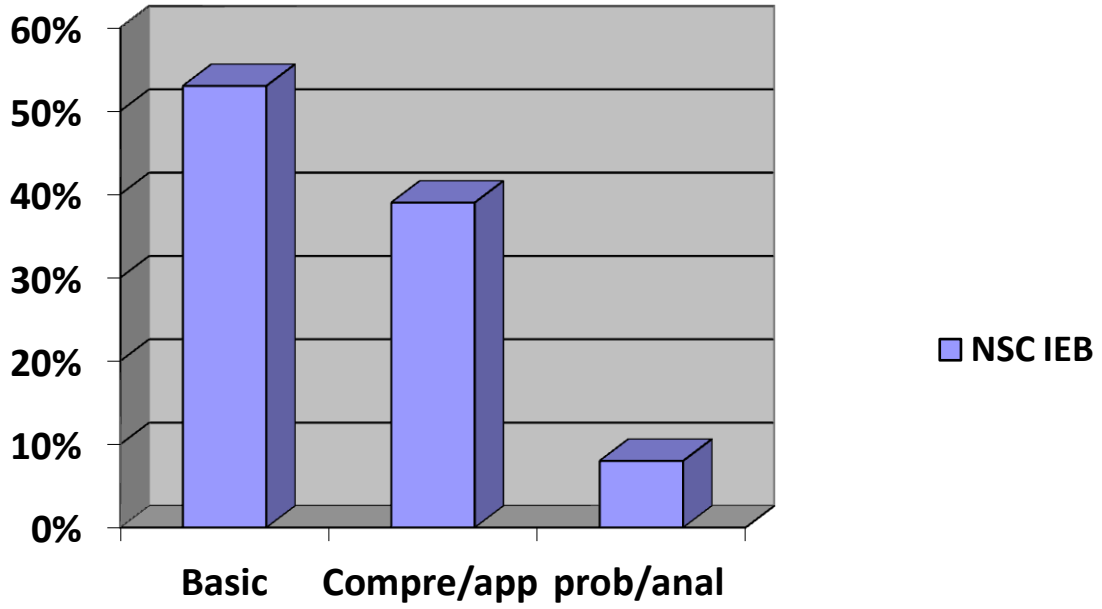
9.5 Cognitive demand and level of difficulty

The distribution of questions across the cognitive and difficulty levelled is reflected in the table below.

Table 47: Distribution of questions by cognitive and difficulty level

Type of cognitive demand			Level of difficulty		
Basic	**Comprehension application**	**Problem solving/analysis**	**Easy**	**Moderate**	**Difficult**
53%	39%	8%	34%	56%	10%

The above data on cognitive demand are represented graphically below in graph 6.



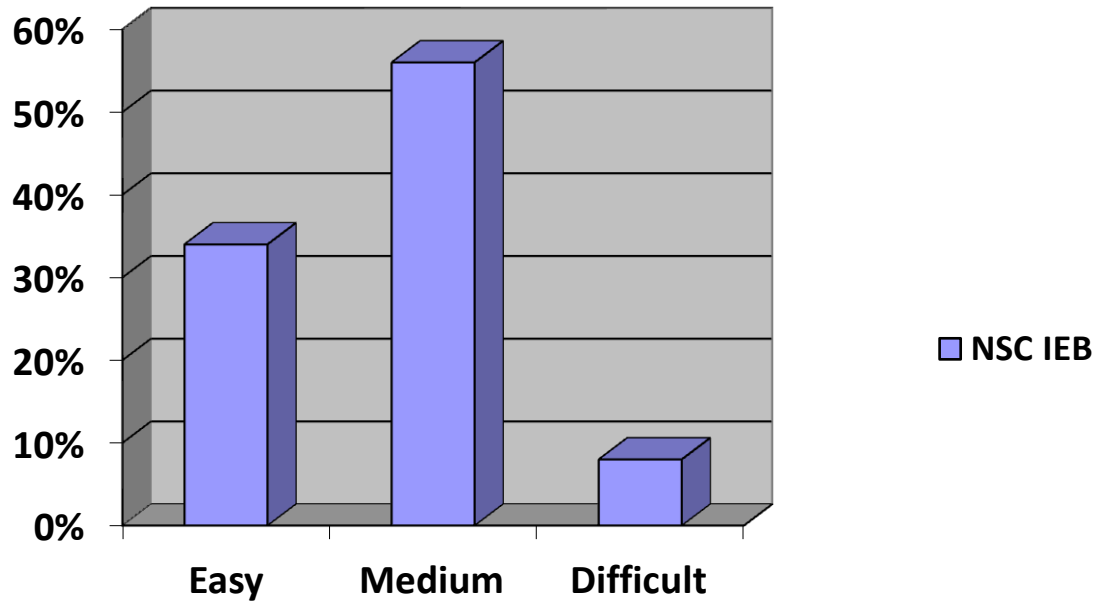
Graph 34: Distribution of questions by cognitive demand

9.6 Weighting of cognitive demand

The IEB SAG suggests a 60:40 ratio of lower order questions (knowledge, comprehension and application) to higher order questions (analysis, synthesis and evaluation) for the 2011 IEB Economics paper. The analysis above indicates a divergence from the SAG. The problem-solving/analysis questions, which the IEB SAG stipulates as 40%, only emerged with 8%. Questions set at the difficult level comprised only 10% of the paper. Whereas the SAG recommended 60% of the paper to be pitched at the "knowledge, comprehension and application" level, just over 90% of this paper comprised this category of questions. This indicates a definite shift from the expectations of the IEB SAG.

More than half the paper (53%) comprised basic questions while 39% of the questions were in the comprehension/application category.

Thirty-four percent of the paper comprised questions set at the easy level and 56% at the medium difficulty level. This is reflected in the graph below.



Graph 35: Distribution of questions by level of difficulty

9.7 Model for future use

The structure of the IEB paper is such that all questions are compulsory. This enables internal flexibility, as the examiner can manoeuvre and create questions without the restrictions and a rigid regime of attempting to maintain consistency in standard across questions.

Learners are assessed on the full spectrum of content in the Economics curriculum and are discouraged from "spotting" as there are no choice questions. A critique of this taken verbatim from the 2010 report is: "The downside of this is that in a context like SA there are large numbers of unqualified and under-qualified teachers with knowledge gaps. These colleagues may avoid teaching topics they do not understand, yet their students are expected to answer all questions set in the examination."

However, the evaluation team is of the view that the structure of the IEB paper is sound as it demands that learners demonstrate competence with the entire curriculum.

9.8 Standard and quality of papers

The level of language used in this paper is appropriate to the grade (Gr 12). In the main, the design of questions is good. Apart from a few questions where the formulation could be improved, the team was satisfied with the quality of this examination paper. The question that let this paper down was Q6. In this question, five pieces of stimulus material were presented (equivalent to two full pages of data). However, the questions that were set were not strongly linked or related to the rich data presented.

9.9 Comparability 2009–2011

In the table below, a comparison of the IEB papers for the past three years (2009–2011) is presented.

Table 48: Comparison by cognitive and difficulty levels 2009–2011

	Type of cognitive demand			Level of difficulty		
Year	**Basic**	**Comprehension application**	**Problem solving**	**Easy**	**Moderate**	**Difficult**
2009	18%	47%	35%	12%	54%	34%
2010	27%	51%	22%	22%	66%	12%
2011	53%	39%	8%	34%	56%	10%

From the above data, it is clear that the trend in the easy and basic categories has been an increasing one; rising from 18% in 2009 to 53% in 2011 in the easy basic category and from 12 to 34% in the easy category. Accordingly, the problem-solving/analysis and difficult categories have displayed a downward trend, falling from 35% in 2009 to 8% in 2011 and from 34 to 10% in the difficult category from 2009 to 2011.

The overall assessment is that the 2011 IEB paper was of a lower standard than the previous two years.

BUSINESS STUDIES

10.1 Evaluators

Ms Carina America (team leader), Mr Bernard Botha and Dr Milton M Nkoane

10.2 Introduction

This report provides an analysis of the NSC examination question papers for Business Studies Grade 12 of the Independent Examination Board (IEB). The analysis focuses on cognitive demand and levels of difficulty.

The evaluation of the Business Studies Grade 12 examinations was done against the backdrop of the learners' knowledge and skills acquired in the FET-phase (Grades 10 to12). Teaching and learning for Business Studies take place within the framework of a National Curriculum Statement (NCS) and are informed by developments in the business environment, recent and changed legislation and changing markets.

10.3 Method of analysis

The Umalusi instrument is user-friendly and makes provision for comments to substantiate the selection of categories. Item-by-item analysis of each question allows for standardisation, consistency and comparability. There may be deviations of 1% in the calculations owing to the rounding of decimals in the Excel spreadsheet.

It should be noted that the experiences and personal viewpoints of evaluators may in some instances have influenced the individual selection of categories. In cases where the selection of categories was not unanimous, it was extensively discussed by the team members until an agreement was reached.

As indicated below a three-levelled typology aligned to the SAG document was used. The CK category refers to "conceptual knowledge" which includes "factual" knowledge. The P category includes evaluation and synthesis. The codes used in the analysis are as follows:

- CK = conceptual knowledge
- C = comprehension & application
- P = problem solving & analysis

Table 49: Types and levels of cognitive demand

Type of cognitive demand	Level of difficulty	Example
CK = conceptual knowledge/basic factual ± 30% of exam questions	Easy: factual recall	Name two challenges of corporate social investment for a business.
	Moderate: low level application, literal comprehension	Identify any two key success factors of Mazwe Tom's business enterprise. (Case study given)
	Difficult: making simple evaluative judgements in terms of previously acquired facts	Discuss the degree to which the following factors may impact on the success or failure of Toyota South Africa (Pty) Ltd: Capital requirements Taxation
C = comprehension/ application ± 50% of exam questions	Easy: simple explanations, application	Identify the sectors which the various business enterprises mentioned above belong to. Motivate your answer. (Case study given)
	Moderate: interpretation and low-level analysis, evaluative judgements that require the use of a range of previously acquired facts/information	Give Vusi advice on the different ways in which he can overcome his dissatisfaction as an employee at Bush Lodge. (Case study given)
	Difficult: moderately high thinking skills, more advanced application	Determine which investment earned the highest return. Show calculations to substantiate your answer. (Case study given)
P = problem solving/ analysis/evaluation/ synthesis ± 20% of exam questions	Easy: in-depth explanation, simple procedural calculations	What in your opinion has influenced the sales figures? (Scenario and pie chart given)
	Moderate: advanced analytical skills, application of information in a new or unfamiliar context;	Bongani states that the premium of R2 800 per month is not within his budget. What advice would you offer? Provide two suggestions. (Scenario given)
	Difficult: synthesis and evaluation; making judgements in relation to a mixture of old and new material or information	As a business consultant for Makhaya Tali's winery, identify the business challenges, devise strategies to overcome the challenges and determine the environment in which the challenges exist. Advise Makhaya Tali on how to evaluate the effectiveness of the strategies. (Case study given)

The following document was consulted in the analysis:

- National Senior Certificate Handbook. Implementation: Grade 12, 2010. Independent Education Board (IEB)

10.4 Results of examination paper analysis

The marks allocated according to cognitive demand and levels of difficulty are expressed in percentages. These are presented in Table 51 below:

Table 50: Results of analysis of examination papers

Type of cognitive demand			Level of difficulty		
Conceptual knowledge	**Comprehension & analysis**	**Problem-solving**	**Level 1 (Easy)**	**Level 2 (Moderate)**	**Level 3 (Difficult)**
36%	25%	39%	31%	51%	18%

The combined analysis of cognitive demand and level of difficulty are reflected as follows:

Table 51: Combined analysis: Results of analysis of examination

Level of difficulty and cognitive demand								
CKE	**CKM**	**CKD**	**CE**	**CM**	**CD**	**PE**	**PM**	**PD**
24%	12%	0%	4%	19%	0%	3%	20%	17%

The codes reflected in Table 52 are defined as follows and used accordingly in the rest of the report:

- CKE = conceptual knowledge easy
- CKM = conceptual knowledge moderate
- CKD = conceptual knowledge difficult
- CE = comprehension easy
- CM = comprehension moderate
- CD = comprehension difficult
- PE = problem solving easy
- PM = problem solving moderate
- PD = problem solving difficult

10.5 Compliance with Subject Assessment Guidelines

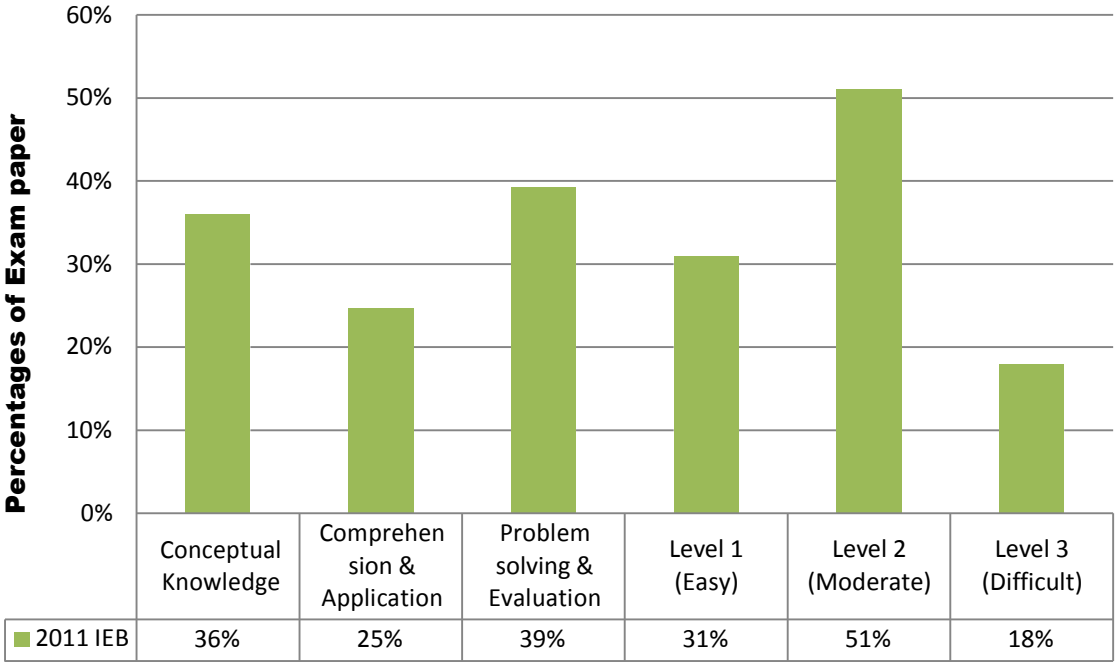
The IEB examination consists of two question papers of two hours each. For this analysis, the two IEB papers were combined and treated as one paper totalling 300 marks.

10.6 Cognitive demand and level of difficulty

The SAG of IEB (p 1) suggests the following cognitive levels:

- Knowledge 30%
- Understanding 15%
- Application 15%
- Analysis 10%
- Synthesis 10%
- Evaluation and problem solving 20%

For the purposes of this analysis the cognitive demand categories were combined as: knowledge (30%) understanding and application (30%); analysis, synthesis, evaluation and problem solving (40%). The 2011 IEB analysis indicates 36% for conceptual knowledge; 25% for comprehension and application; 39% for problem solving and analysis. When compared to the SAG of IEB, this shows a 5% decrease in comprehension and application, with an increase of 6% for conceptual knowledge. This implies that the questions are fairly consistent in relation to the requirements in the IEB SAG document.



Graph 37: Cognitive demand and level of difficulty

The difficult questions fall within the problem-solving category (CKD = 0%; CD = 0%; PD = 17%), whilst 24% of the total of easy questions are basic factual recall questions. The majority of the questions are of a moderate level of difficulty, ranging from moderate factual knowledge of 12%, comprehension and application of 19%, and problem solving and analysis of 20%.

Table 52: Combined analysis of cognitive demand and level of difficulty

Conceptual knowledge			Comprehension & application			Problem-solving & analysis			
CKE	**CKM**	**CKD**	**CE**	**CM**	**CD**	**PE**	**PM**	**PD**	**Total**
24%	12%	0%	4%	19%	0%	3%	20%	17%	100%

10.7 Weighting of cognitive demand

The IEB paper appears to be evenly distributed in terms of the requirements of the SAG document.

Table 53: Weighting of cognitive levels

	Conceptual knowledge (basic, easy items)	Comprehension & application	Problem-solving, analysis & evaluation
SAG IEB	30%	30%	40%
Actual	36%	25%	39%

10.8 Model for future use

The majority of the questions of the IEB papers can be used in future, with a few exceptions; for example in Q1.13 "incapacity" implies that the employee can no longer perform due to ill health or injury (in terms of schedule 8 of code of good practice: dismissal). The answer given is dubious; the first part can be considered as incapacity whereas the latter part makes reference to poor work performance which, in terms of the code of good practice, is considered to differ from incapacity. Two answers are given for Q1.5, which are contradictory (correct answer is B). Also, in Q4.2.3, the term "manpower" is outdated, "employee training" is appropriate. With regard to essay-type questions, instead of asking learners to "write a letter"; detailed notes would have been appropriate. It must be cautioned that pictures/statements must be relevant to the question, or else they can be distracting to the learners, for example Q1.15 and Q6.6.

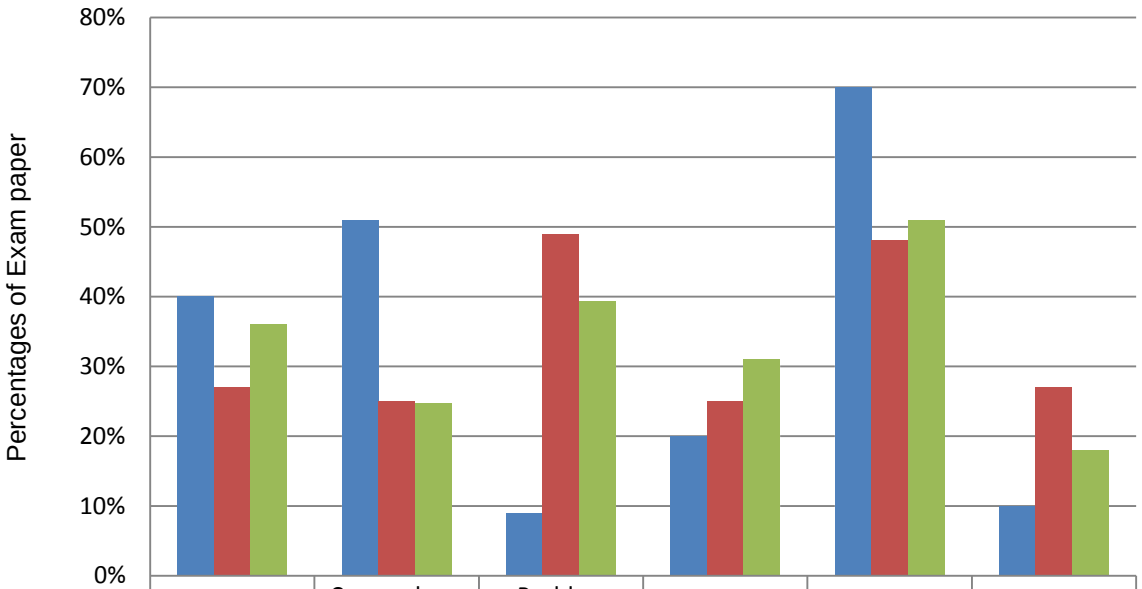
10.9 Standard and quality of papers

Standard and quality of papers

Most of the problem-solving questions are of a moderate nature (20%), whilst 17% are difficult, that is, the kinds of questions which require evaluation and synthesis, and making judgements in relation to a mixture of old and new material and information. The average learner would find the paper challenging given that the easy questions make up only 31% of the paper (CKE = 24%; CE = 4%; PE = 3%), but will be able to pass given that the additional basic factual knowledge at a moderate level is 12%. Learners may also find it difficult because the comprehension and analysis required consists of CM = 19%; PM = 20%. Furthermore, no allowance is made for choice in the long essay-type questions, which could add to the level of difficulty.

10.10 Comparability 2009 – 2011

The cognitive demand for 2009 was 40%:51%:9%, whilst in 2010 it was 19%:32%:49% and in 2011 it was 36%:25%:39%. There is a decrease from 2009 to 2010 of 21% for factual recall; a decrease of 19% for comprehension and application; and an increase of 40% for problem solving. However, the 2011 paper is somewhat in the middle of the 2009 and 2010 papers. Although there has been a decrease of 10% in the problem-solving questions compared to 2010, there has been a significant increase in the basic factual recall questions compared to 2010.



	Conceptual Knowledge	Comprehension & Application	Problem solving & Evaluation	Level 1 (Easy)	Level 2 (Moderate)	Level 3 (Difficult)
2009 IEB	40%	51%	9%	20%	70%	10%
2010 IEB	27%	25%	49%	25%	48%	27%
2011 IEB	36%	25%	39%	31%	51%	18%

Graph 38: Comparison of cognitive demand and level of difficulty 2009–2011

In 2010 there was a definite shift to more difficult questions; PD = 44% which has decreased significantly in 2011 to PD = 17%. The 2010 paper was more difficult than the 2009 paper, whilst the 2011 paper appears to be a balance between the 2010 and 2009 paper.

Table 54: Combined analysis of cognitive demand and level of difficulty 2009–2011

	Conceptual knowledge			Comprehension & application			Problem-solving & analysis			Total
	CKE	CKM	CKD	CE	CM	CD	PE	PM	PD	
2009	18%	20%	2%	3%	40%	8%	0%	9%	0%	100%
2010	5%	14%	0%	1%	29%	2%	0%	5%	44%	100%
2011	24%	12%	0%	4%	19%	0%	3%	20%	17%	100%

CONCLUSION

As indicated in the introductory paragraph of this report, the findings presented herein should be read and understood within the context of the purpose of the Post-Exam Analysis project – to provide Umalusi with the quality and standard of the current year's question papers as compared to the previous years' papers. This information then forms part of the basis for the standardisation decisions.

Generally, the findings indicate that the IEB question papers are good models for future use in terms of structure and format. The Life Sciences report perceives the IEB question papers as good examples of the use of assessment FOR learning.

With regard to cognitive challenge, the report presents varying views. The following are a few examples:

- **English FAL.** Paper 2 is less demanding than the 2010 paper.
- **Mathematical Literacy.** The papers are skewed towards Routine Procedure, therefore, they are lacking in terms of differentiating high achievers. Accordingly, the papers are perceived as being too easy.
- **Physical Sciences.** The overall standard is lower than that of 2009 and 2010.
- **History.** The paper is cognitively demanding in terms of extended writing. As regards source-based questions, there are more level 3 and fewer level 1 questions, making the paper more demanding.
- **Geography**. The papers are cognitively more demanding.
- **Economics.** The paper is heavily weighted towards the lower order questions and very lean on the higher order questions.