

Realising the potential of school based assessment
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Abstract:

Teachers and learners, quite understandably, respond to circumstances that affect them. As a consequence teachers teach to the test and learners are motivated to study for these events, especially if it is a high stakes examination. However it is, today, for many reasons, widely recognized that tests and examinations need to be complemented by alternative ways of assessing what learners know and can do. School Based Assessment (SBA) offers an opportunity to introduce these alternative ways. However to achieve this purpose, SBA must be, and must be seen to be, of major relevance to the outcome of the high stakes assessment. On the other hand examination boards and quality assurance bodies cannot allow SBA to affect the examination result significantly unless they can be confident that it is valid, fair and reliable. This paper looks at steps that have been taken by the IEB, an examination board that serves mostly well resourced schools across South Africa, to make SBA relevant and significant. These steps cover aspects like changing teacher perceptions, broadening the types of tasks used in SBA to ensure that assessment complements examinations and tests, moderation processes and the management of these processes using the internet. Examples are taken from the subject Physical Science.

At the end of their twelfth year of school successful South African grade 12 learners receive a senior certificate. Depending on the grades achieved the senior certificate also provides access to tertiary education. For the large majority of subjects 75% of the final result is based on this examination. However, within the 75% there is a 25% performance assessment in subjects like languages (for the oral component) and visual arts, computer studies and music (for the practical component). This component is often based on an externally set task or examination that is administered and marked by teachers of the candidates at the school against an externally supplied memorandum. A moderation process checks the marking of a sample of these tasks and examinations. The final 25% of the senior certificate result is allocated to school based assessment (SBA) for all subjects.

In the South African State system half a million candidates are assessed in a final written examination in all subjects across all provincial examining bodies each year. In contrast some 7000 candidates, who attend almost exclusively well resourced private schools country wide, are assessed by the IEB.

During the latter half of the 20th century, curriculum reform in South Africa tended to take a back seat as political issues dominated the national agenda. This is graphically illustrated in the case of Physical Science by a study of the external examination question papers. They have not undergone any meaningful change since the beginning of the 1970s. While South Africa was influenced by the science curriculum reforms of the 1960s the move to a more skills based approach to teaching and learning Physical Science was not generally implemented. The reasons for this were numerous including an inequitable distribution of physical and human resources. The moves in the 1980s to integrate science into the real world and make it more relevant through movements like 'Science Technology and Society' also had little impact on day to day science teaching in South Africa. A handful of enthusiasts engaged with the ideas associated the misconceptions research of the 1980s, but this had no formal impact on the curriculum. The arrival of learner centred approaches and outcomes based education in the 1990s is still not a part of the current Senior Certificate at grade 12.

The National Curriculum Statement is to be implemented in grade 12 in 2008. It embraces outcomes based principles and the physical science learning outcomes demand significant change.

- The first learning outcome requires that learners design and carry out investigations and demonstrate a wide range of relevant skills in the process.
- The second learning outcome describes the content and context of learning and, for the first time, includes some work on solid state electronics and polymers.
- The third learning outcome requires learners to evaluate knowledge claims as well as the impact of science on humankind and on the environment.

In the context of science teaching world wide this is very ordinary. In the context of South Africa, where science is a body of knowledge largely defined by the questions that have been set in examination question papers over a period of thirty years, science teachers face huge challenges as they adapt to the demands of the NCS over the next few years.

Before the democratisation of South Africa in 1994, a number of the racially segregated education departments were using year marks. Controversy about the abuse of the year mark system had already led to the year marks being more and more tightly moderated against the external examination results. After 1994 the racially segregated education departments were consolidated into a single national and 9 provincial departments. However, for management and credibility reasons, it was decided, as an interim measure, that the senior certificate would be based exclusively on a final examination result. In 2000 the new Department of Education

was ready and introduced SBA, conceptually very different to the old year mark (an estimate, often based on a 'practice or trial' examination written two months before the final examination, of what a candidate was expected to achieve in the final examination). This change was also just a year ahead of the introduction, into high schools, of outcomes based education, as described by the National Curriculum Statement. Criteria were set for the implementation and assessment of SBA. SBA against which it was to be implemented and assessed. A conscious effort was made to set criteria that would prepare teachers for the introduction of the learning outcomes of the NCS.

The difficulty of building a community of trust for the successful implementation of SBA is not helped by society's competitive nature, and, in particular, the desire for league table type of publicity around results. But this is what happened. It has become an annual practice for the National Department of Education to publish lists of the names of schools in categories according to the pass rates in the national press. While the IEB does not publish such lists of the schools that write its examination, the high stakes nature of the Senior certificate makes it inevitable that many parents make a point of getting this information and making their comparisons anyway. In a highly competitive market there are some private schools, especially those that are commercially based, that even make a point of advertising their good results to gain a market advantage.

Umalusi is the independent statutory body that quality assures the assessment instruments and processes of all examining bodies assessing the senior certificate. Umalusi has the task of maintaining standards and has put in place measures to ensure that SBA is valid, reliable and fair. Monitoring and moderation of SBA is a new experience for the vast majority of South African teachers, school managers and even educational officials. As most of the monitoring and moderation is under the direct control of these teachers, Umalusi requires of examining bodies that they have in place processes that monitor the moderation processes. Umalusi uses a sampling process to monitor implementation of these processes by examining bodies. In addition Umalusi has put in place the statistical adjustment of SBA results against Senior Certificate examination averages to ensure that SBA results are not significantly out of line with the achievements of candidates in the external examination.

So SBA has been introduced at a time when

- a thirty year old curriculum defined in terms of old examination question papers is still being taught
- teacher performance is being judged more and more against the success of learners on an examination set on an ever narrowing curriculum
- a new curriculum is about to be introduced at grade 12
- using criteria that
 - ◇ make significantly greater demands on science teachers
- in a way that can be regarded as undermining its importance since the results
 - ◇ only contribute 25% to the final result and
 - ◇ are moderated statistically against the final examination

In addition the implementation and administration of the associated processes have been made largely the responsibility of teachers and school management. In state schools there is at least a district structure that can provide local support at all grade levels. In contrast the IEB only provides assessment and support at the grade 9 and 12 exit points. The fact that schools that write the IEB examinations are also spread across the country means that there is also no district structure available to 'IEB schools'.

The first step in the introduction of SBA in Physical Science (and all other subjects) within IEB schools was the modification of the senior certificate examination requirements to incorporate SBA. The IEB works democratically and uses practising teachers in forums to discuss the way ahead. Teacher representatives from the regions around the country met with examiners and internal moderators and an IEB official (a committee referred to as the National Subject Forum) to decide the requirements. In the end the IEB did not choose a different route. The initial requirements conformed pretty much with what the National Department of Education was asking of its schools.

Table 1 Minimum Requirements for Continuous Assessment (CASS)

Components	Informal Assessment	Practical Work	Projects	Tests	Examinations
Description	<ul style="list-style-type: none"> • Assignments • Homework • Class work • Tutorials • Translation tasks* • Informal tests <p>Candidates should spend about a class period (between 30 and 60 minutes) on each of these activities.</p>	<p>This component should be related to the National Core Syllabus.</p> <p>The focus should be on practical work skills using a variety of assessment methods.</p>	<ul style="list-style-type: none"> • Investigations • Expo projects • Olympiads • Models • Presentations, performances etc <p>This category allows for the inclusion of work or activities of special merit (about 5 hours)</p>	<p>These tests are controlled. This means they are moderated within the school and common to the whole grade within the school.</p>	<p>Common for the whole grade.</p> <p>Examples:</p> <p>Grade 11 or 12 mid-year examination</p> <p>Grade 11 year end examination</p> <p>Grade 12 trial examination</p>
Number	Minimum of 4	Minimum of 4	No minimum	Minimum of 4	Minimum of 1
Weighting Model A	10%	50%	0%	20%	20%
Weighting Model B	10%	40%	10%	20%	20%

* A translation task is a task in which pupils are given information in one format and asked to translate it to another. For example data presented in a table can be translated into a graph or described in a written paragraph.

These requirements were deliberately made conservative. There was a strong belief that many teachers were exceeding these requirements by a significant margin and would choose the option that included the project. On the other hand, for the many teachers that never assessed practical work and more specifically practical skills, this was a significant change.

Umalusi requires that SBA is moderated at four levels: school, district, province and statistically.

The IEB implements these levels using the following structure.

Level 1: This takes place across teachers within subjects, within the school and is the responsibility of school management. During the monitoring process at cluster level and at the IEB sample monitoring and moderation process this is monitored. Umalusi monitors also ask to see evidence that moderation is taking place at school level.

Level 2: District level is referred to as cluster moderation. School clusters are the most logistically sensible groupings, thus cluster groups vary in size according to the number of schools offering a subject in a geographic area. Cluster moderation is a peer review process

and many teachers find this process difficult. Teachers, who are members of the cluster, elect one of their members to lead the cluster. Experience suggests that if the cluster leader is enthusiastic, conscientious and sees the cluster leader role as important, the cluster groups perform a very valuable function. They are able to carry out their monitoring and moderation function effectively and also play a significant role in the professional development of their members. However the ideal of having a neutral IEB official present during the moderation process is not possible without a district structure. This means that, if the cluster leader is weak, problems can arise. While the IEB provides workshops to train examiners and moderators of the examinations, resources have yet to be found for the training of cluster leaders though the need has been identified. In fact a group of schools in one region is being proactive in this regard.

Clusters are required to meet a minimum of twice a year. At the first meeting members consult each other with regard to the assessment they propose presenting for moderation at the end of the year. If a second meeting is held it is to monitor implementation of the initial proposals with the emphasis in the meeting on professional development. At the final meeting of the year, the cluster carries out its monitoring and moderation function. A form is completed on the SBA of each centre in consultation with the teacher from that centre and is forwarded to the IEB where it is sent to the IEB appointed sample moderation committee. The primary purpose of the report, is to provide background information on the SBA at each particular school. The cluster can make recommendations regarding mark changes in the report.

Level 3: An IEB Sample Moderation Committee meets for 5 days at the grade 12 examination marking venue to monitor and moderate a sample of the portfolios from all schools. This committee uses the reports from the cluster moderation process and the reports from previous years to inform them and help them complete relevant and meaningful feedback forms. The primary purpose of these feedback forms is to help teachers improve in the following year. The IEB Sample Moderation Committee also decides whether marks should be changed and makes recommendations as to how.

Level 4: Statistical moderation: After the data is all captured the computer program analyses the SBA mark against the examination mark for each centre and makes final adjustments in accordance with publicised criteria.

For the first two years after the introduction of SBA, 2003 and 2004, the IEB tried to manage the process and track cluster meetings and control the submission of reports by capturing data on a database as it was submitted on paper and then filing the paper. Despite its efforts, with the limited human resources at its disposal, the IEB was unable to track all this information to the degree of accuracy required of such a process.

As of 2005 the IEB changed to a web based process. Cluster leaders are supplied with a password and have access to parts of the database linked to the Cluster Report Manager (CRM) program. They can post meetings for their cluster on the IEB website, update the contact details of their cluster members, then send out notices, agendas and messages directly to the desktop of their cluster members with the click of a mouse button. Members who receive the notice of a meeting can click on a link in the notice and are taken to the website where they can respond to the invitation, accept the invitation or apologise if they are unable to attend and provide motivation. This information is used to immediately update the attendance list for the meeting. The cluster leader can monitor responses from members and follow-up if necessary. After the last cluster meeting of the year at which reports are generated and after which they are posted or faxed to the IEB, the cluster leader generates a

checklist against which the IEB can monitor the receipt of reports by indicating on the website which reports were completed and submitted.

At the same time the IEB can monitor that cluster leaders are in place and that they are calling meetings as well as who is attending the meetings. The IEB can generate reports that show which schools and for which subjects, have missed cluster meetings. The IEB can then send out a generic email that picks up and includes the information specific to each school, alerting school management to the fact that they need to investigate why the IEB has no record that the school was not represented at a particular cluster meeting.

However the introduction of the CRM has not been without problems. Many cluster members do not receive the notices. Even though all but a handful of 'IEB schools' have email addresses and access to the internet many teachers do not use the facility with ease or regularity. There are situations where there is only one computer at a school with a dial up connection. The emailed notice arrives on the desktop of the one busy teacher or secretary with internet access without the cluster member's name.

In other cases the notices are printed out, but without access to the web the teacher cannot respond to the notice online.

Passwords have not been used and not been passed on. Another major problem has been the use of passwords. These were originally emailed to the schools that convened the first meetings the year the process started. The IEB asked the email recipient at these schools to give the nominated convenors the initial password. These convenors would then have access to the CRM and using their passwords were to have entered the details of the first elected cluster leaders. Once this information was submitted the cluster leaders would receive an automatically generated email giving them their password. In many cases this process broke down.

Lastly the IEB discovered that the level of computer literacy amongst teachers was less than expected.

However the CRM is the only way to manage the process. Data is captured once, it is immediately available to all who need it, those that are involved are responsible for the data on the system and it gives the IEB instant access to information about the monitoring and moderation of SBA.

Two parts of the process have worked together to have a significant positive effect on the standard of SBA in science in 'IEB schools'.

The first part is the feedback forms prepared by the IEB Sample Moderation Committee that are sent back to the schools and principals. See the Appendix for a copy of the form the IEB is currently using. As the form has evolved it has required that cluster members fill in more and more detail. This has been in response to the difficulty teachers have experienced carrying out the peer review process. At the start of the process the IEB had felt that the less prescription and paper work the better and forms tended to require relatively few quite open ended responses. But from their initial experiences teachers felt that if the form requested more detail there would be less reliance on individual teacher-moderator initiative, the teachers would be more comfortable, the process would be less open to individual interpretation and this should increase the reliability of the process.

The second part is the IEB annual National User group subject conference for teachers. This conference is always very well attended and includes a report back on the examination of previous year's question papers by the IEB examiners. Teachers are also given an opportunity to question examiners. Since February 2004 the portfolio moderator has reported back on the SBA moderation process. Over the last 3 years the lively debate that has ensued has gone a long way to making teachers more aware of the requirements of SBA.

Towards the end of 2004 the IEB decided to interview a small group of science teachers about the implementation of SBA. The first version of the SBA requirements had set a minimum of four science practicals to be submitted as part of the portfolio and stated further:

- This component should be related to the National Core Syllabus.
- The focus should be on practical work skills using a variety of assessment methods.

The interviews suggested, not surprisingly looking at the first bullet point above, that practical work was mostly related to illustrating the concepts being taught in the course. However only some of those interviewed seemed to give any attention to the second bullet point. The practical work described tended to be very traditional. In many cases learners were typically supplied with a worksheet. Learners would be required to follow a set of instructions, fill in their observations or data on a table supplied on the worksheet and perhaps use the data to draw a graph. Conclusions would more than likely be consistent with the theory being taught rather than with the practical results.

At the end of the year, the IEB Sample Moderation Committee used an expanded reporting sheet on which they could monitor the investigative skills covered by the practical work submitted in the portfolios. This more than confirmed the results of the interviews. Most teachers were still using practical work to illustrate the concepts the learners had to know for the written examination and giving little attention to developing investigative skills. In the interview the assessment methods being used by teachers was also surveyed. Not surprisingly, the teachers were, almost exclusively, using exercises (tutorials), tests and examinations based very heavily on old IEB examination question papers. Once again the expanded reporting sheet used by the IEB Sample Moderation Committee to monitor the portfolios confirmed this finding.

At the National User Group conference for Physical Science the following February, the issues raised by the survey process were vigorously debated. The use of the extended report form as given in the appendix was also accepted.

At the end of 2005 the IEB Sample Moderation Committee used the latest extended report. While they observed some increase in the number of different assessment methods being used and in the number of teachers using them and more teachers are assessing practical work skills, IEB examination questions still dominate learner activities.

SBA and the NCS together offer South Africa a vision of assessment that might just be able to provide a way out of the cycle of an ever narrowing curriculum defined by old examination question papers leading to less learning but ever better results. However there are already danger signs that the opportunity may be lost. Teachers cannot be blamed for resisting the very real and important challenges of SBA when it is allocated so low a weighting and then can be ignored because it compares unfavourably with the examination results. The challenge for teachers and examination bodies is to establish a system of teacher moderated SBA that can be trusted, is valid and still reliable. Then perhaps statistical moderation might be replaced with after the event statistical monitoring. If this were held up as the goal of the current process it might just provide the incentive that enthusiasts need to implement SBA in a meaningful way.

Appendix G (Part A)



SAMPLE MODERATION GRADE 12 – PHYSICAL SCIENCE
To be completed and returned to the school

Examination Centre Number: _____

Date: December 2006

Records

Summary of candidates' marks available (teacher file)
 Summary of assessment available (1st page of candidate's portfolio)
 Appropriate aggregation of marks (1st page of candidate's portfolio)
 All the tasks with marking memoranda are available in teacher's file
 Appendix D for Physical Science available (Cluster Moderator's Checklist)
 Evidence of school based moderation (Appendix H plus any other ...)
 Candidate's portfolios supplied according to list from IEB

Response and comment	
y/n	accurate/ complete/ clear
y/n	accurate/ complete/ clear
y/n	accurate/ complete/ clear
y/n	mostly / several missing /
y/n	
y/n	minutes /policy / checklists:
y/n	+2 / no list/

Tasks completed and marked according to requirements

Informal Assessment - 4 items – enter number available and comment
 Practical Work - 8 items – enter number available and comment
 Model B chosen – 1 project – (cross – X - if yes)
 4 controlled tests – enter number available and comment
 1 examination (paper 1 & paper 2 from the same examination session)
 Marking in accordance with the memoranda
 Accountable adjustment of marks for candidates changing from HG to SG
 Correct weighting: Physics : Chemistry :: 40-60% : 40-60-%
 Correct weighting grade 11 : grade 12 :: 0-40% : 60%-100%

Response and comment	
4	varied/innovative/traditional
4	individual/ varied/ group
y / n	
4	original/ IEB questions/ new
4	original/ IEB questions/ new
y / n	rubrics used/ other tools
y / n	calculation/ cf SG candidates
y / n	actual ratio if beyond limit
y / n	actual ratio if beyond limit

		Practicals	Informal	Tests & Exams
<i>Level of difficulty of set tasks</i>	SOME STRAIGHT FORWARD, MANY CHALLENGING	practical	informal	Tests & exams
	MANY STRAIGHT FORWARD, SOME CHALLENGING	practical	informal	Tests & exams
	ALL STRAIGHT FORWARD	practical	informal	Tests & exams

Additional Comments(including descriptions of any tasks or questions of particular merit):

Portfolio Moderator's signature _____

Date: 9 December 2006

Appendix G (Part A – page 2)

Examination Centre Number: _____

Date: December 2006

Survey

<i>Practical work (Teachers should aim to have all the blocks ticked in this table.)</i>	
To what extent did the practical work component of School Based Assessment submitted for moderation assess the candidate's ability to	
identify a phenomenon that can be investigated?	
formulate an hypothesis or write (formulate) a question that can be investigated or predict observations that will follow a particular intervention (PEE – predict explore explain)?	
identify variables?	
design an investigation?	
improve on the design or criticize the design of an investigation?	
manipulate apparatus?	
make observations?	
make measurements like time, mass, length, force, others, using instruments?	
record and organise data (into tables, graphs, ...)?	
draw a conclusion from data collected and organised?	
explain the observations (colour changes during chemical reactions)?	
explain the scientific concepts under investigation?	
<i>A survey of the task types used for School Based Assessment (Teachers should aim to have several blocks ticked in this table.)</i>	
Are there School Based Assessment tasks submitted for moderation that require candidates to produce	
answers to tests and examinations?	
answers to question sheets (tutorials)?	
labeled sketches /drawings (free body /force diagrams, vector diagrams, scale diagrams, of apparatus ...)?	
translation tasks (interpret a graph in words, make a diagram to explain a concept, write words to describe a relationship given in the form of an equation or graph ...)?	
spider diagrams, mind maps, concept maps, flow charts, thinking maps, ...?	
computer products e.g. graphics, spreadsheets, simulations, power point presentations,?	
a demonstration of an experiment / use of apparatus (by a candidate or group of candidates)?	
a model (built by a candidate or group of candidates)?	
test questions with memoranda (products of a metacognitive process – an analysis of their own or a peers thinking, e.g. identifying a mistake in an answer, explaining the reason for the mistake and correcting it)?	
tasks that are self assessed or peer assessed (requiring reflection about the candidate's own learning)?	
a role play, song, dance, speech, presentation, – script written or actual performance?	
a product of computer aided learning – e.g. after going through a simulation of an experiment or industrial process, submitted answers to a set of questions?	
group work - individual task as part of a bigger group work task?	
group work - group work skills?	
group work - a product of group work?	