

**(b) Amendment of the examination time frames**

In 2008 the Council of Education Ministers (CEM) and Heads of Education Departments Committee (HEDCOM) decided that the 2008 NSC examinations commence later in the year in order to allow for more time for teaching and learning. The examination therefore commenced on 3 November 2008 and concluded on 3 December 2008 (Annexure E). This late commencement of the examination without the shifting of the originally planned date of the release of results led to a limited time period for the marking, capturing and processing of results. Hence the provincial education departments were under immense pressure to mark and finalise the examination results in 27 days, a process in previous years that took 47 days. Despite the far reaching efforts of the Inter-Provincial Examinations Committee (IPEC) to accomplish these processes to meet the new time-frames, the final mopping-up processes were compromised.

**(c) Capacity of the examination units of the Department of Education**

The examination units in each of the PEDs is responsible for the conduct of the NSC, Senior Certificate, GEC and ABET (Level 4) examinations and the staff capacity in all provinces has not increased proportionately to the increased functions indicated above. Also, based on the existing organogram there are a number of vacancies in key areas of examination administration. For example, in the Mpumalanga province, the posts of two assistant directors responsible for examination administration were not filled and current staff were not able to cope with their workload. Therefore, the staff vacancies together with the additional responsibilities relating to the NSC, resulted in current staff being over extended and this compromised timeous completion of the examination process.

**4.2 INTEGRATED EXAMINATION COMPUTER SYSTEM (IECS)**

The introduction of the new computer system (Integrated Examination Computer System: IECS) with the new curriculum compounded the demand placed on examination officials. This entailed officials adapting to a new system in which the modules were developed as the examination cycle unfolded. Therefore, staff training for associated administrative processes was inadequate. With the new web based technology which is a change from the previous mainframe technology, more in depth training was necessary. The limited training and more comprehensive testing impacted on the processing and late release of 4,5% of candidates' results.

The implementation of the new curriculum in Grade 12 in 2008 required the development of a new computer system to replace the mainframe legacy system. The new system had to support and automate examination processes such as standardization, resulting and the printing of statements/certificates. Requests for bids to develop the system was published on open tender and awarded to the successful bidder, Magna FS (Pty) Ltd at the end of 2006.

Development of the IECS proceeded from 2007 on a modular basis. The first module (registration of candidates) was implemented during the last quarter of 2007. Initial access and response on the system was well received by all the provinces. However, throughput and response times from provinces reduced after the release of additional modules. This was further compounded by the rapid growth of the data base, specifically during the last quarter of 2008. The following aspects had an impact on the release of results:

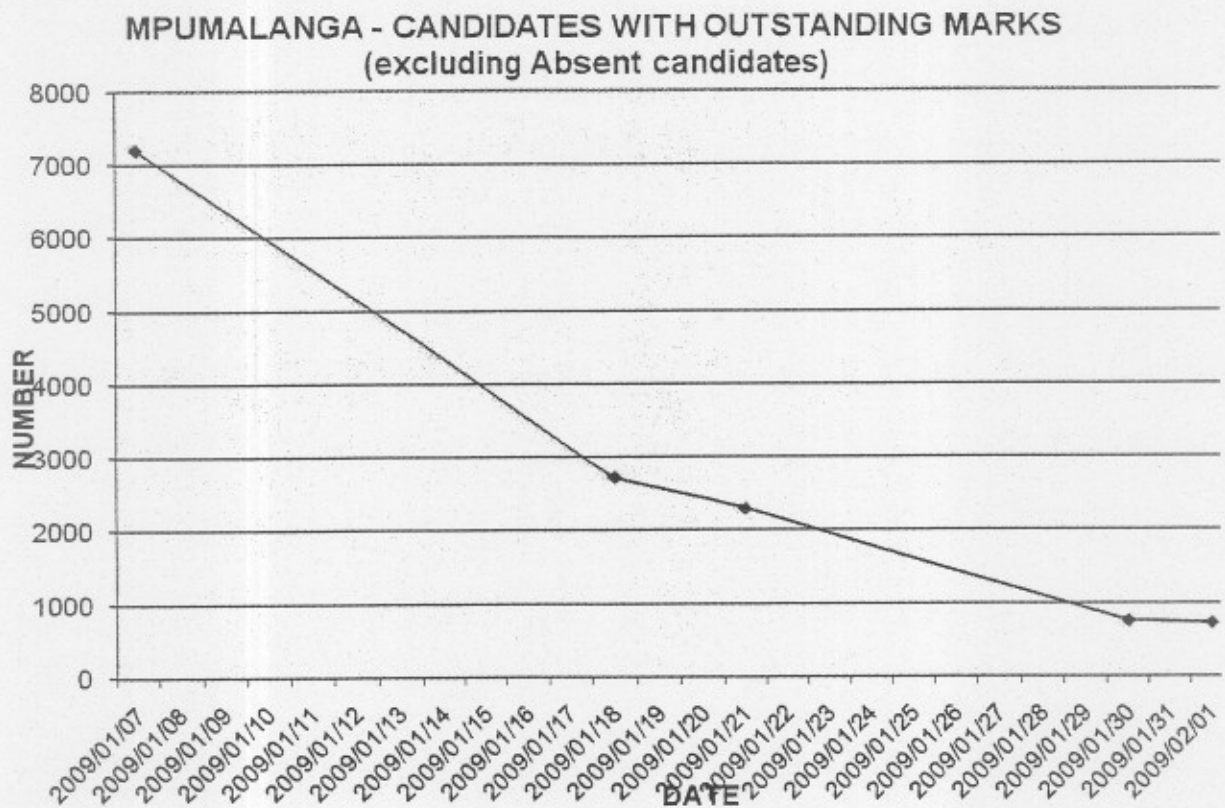
- i. The late release of modules/functionality when the examination processes unfold. For example, the resulting module was under development from October till December 2008 and functional testing continued till 12 December 2008 before it was released. The printing functionality for SBA mark sheets was released too late to rectify mistakes before the printing of the written mark sheets commenced.
- ii. The capturing process was hampered by the speed of the system and the off-line periods during new releases.
- iii. The reporting functionality did not provide the provinces the flexibility to extract the kind of reports that would address their needs and peculiarities. Reporting was further hampered by the speed of the system.
- iv. Certain functionalities to enable controls by the provinces was postponed for development and release during 2009. For example, the functionality to provide audit trails of transactions per capturer was not available to provinces, only to the national Department of Education.
- v. The helpdesk facility for functional support was not resourced and fully implemented to provide support at provincial level. It merely functioned to log service calls. Provinces had to communicate directly with the National System Administrator and/or service provider for support.
- vi. Training was provided to all System Administrators on the registration module of the IECS and later on skills to train the trainer. Training on the rest of the modules (provincially) was not adequately provided. It was, however, found that the IECS had a good on-line manual that could have assisted users adequately. It was unfortunately not updated before new functionality or changes to modules were released, specifically the modules released to support post resulting processes.

The new integrated examination system (IECS) is a web based system that is hosted in the Department of Education's Virtual Private Network by the State Information Technology Agency (SITA). It is accessible via the Government's Wide Area Network (WAN) and/or the Internet. Technical specifications and technology platforms were not initially shared with the Information Technology components (IT) of the provinces and the following concerns have merit. It was confirmed at the KwaZulu-Natal, Gauteng and Mpumalanga that the IECS retrieves candidates from all the provinces during searches resulting in large datasets. Better throughput and response would be achieved if the data base was partitioned. A central data base versus a decentralized or central partitioned data base per province with off-line capturing facilities is recommended.

It was found that the infrastructure of all the provinces complied with the minimum requirements provided presently. Provinces upgraded their Local Area Networks (LAN) to some degree and provision was made for technical support by their IT components. In KwaZulu-Natal, Mpumalanga and Gauteng it was confirmed that the support included traffic shaping for the IECS and continuous cleaning of viruses on work stations as well as the fine tuning of the configuration of their LAN infrastructure (Switches and Routers).

### IECS in the Mpumalanga Education Department

Mpumalanga PED experienced the slowest response in the IECS. SITA did an assessment of their LAN in January 2009. It was found that they are connected to the IECS via the outside IP address (Internet) instead of the inside IP address (WAN). It was corrected but did not have a significant impact on the response. Further investigation revealed that they had connected their wireless telephone system to the LAN on the same IP range as the IECS, resulting in IP clashes which could affect the performance of their router. It was disconnected and improved throughput and response time was immediately visible. However this was achieved very late when the province had already lagged far behind in the finalization of results.



The graph above indicates that the number of outstanding results of candidates has been reduced from 7 195 on the 7<sup>th</sup> of January, 1 133 on 26 January 2009 to 319 on 1 February 2009.

There were enquiries about the fluctuating data and the Department of Education clarified that this was caused by a large number of candidates that were identified as duplicate candidates in Mpumalanga due to administrative



errors in the registration process among many other reasons. This problem is caused by one candidate registered with 2 or more exam numbers. In finalizing the candidate registration after marks were captured, the two or more records were collapsed into one. This results in a decrease in the number that wrote. There were also candidates which were registered for the NSC examination who were in fact Grade 11 learners of Mpumalanga. These candidates were either indicated on the system with 999 or no marks or 777 (mark missing). When these candidate records were confirmed as Grade 11 candidates, these candidates were de-registered as Grade 12 candidates. Therefore the number of candidates enrolled reduced with this correction. Candidates were also recorded as absent for all assessments then later marks were found for the candidate. This led to an increase in the number of candidates who wrote. Further, the explanation of fluctuation in the examination statistics is due incomplete results captured as 777 or no marks, where on verification of school marks it was discovered that the candidates were either absent or the candidates must have been de-registered. This will lead to a decrease in the original number of candidates who wrote. It is highly recommended that an intensive training programme be conducted in this regard.

### **Bandwidth**

All the provinces experienced the IECS as bandwidth intensive. Despite the fact that all provinces have upgraded their bandwidth to some degree, those who made provision for more bandwidth experienced better response times than their colleagues with lesser bandwidth. Therefore generally provinces suggested that better bandwidth and more user-friendly applications in the IECS will improve speed.

The Ministerial Committee conducted an investigation on the service provider (Magna FS) that is currently developing and supporting the IECS. A submission was requested on whether the IECS impacted negatively on the provincial departments' ability to capture and verify marks as well if the system's performance could have impacted on the release of results. The submission received from the service provider is attached as (Annexure F). Magna FS suggested that the IECS is not the root cause of the late release after 30 December 2008 for approximately 56,000 candidates.

The IECS required on demand changes and support during production that was further compounded by the lack of communication between all role-players (users, developer, infrastructure and provincial network and IT requirements). These challenges can only be addressed by following a proper System Design Lifecycle (SDLC) methodology.

### **Recommendation**

The subsequent development of IECS modules should unfold in the following processes:

More comprehensive user acceptance tests to confirm efficiency of the functional requirements.

- i. More appropriate technical acceptance tests to confirm the technical specifications followed by the mandatory certification of the system (quality of the coding, security and interoperability with Government standards). The test will also include more comprehensive stress testing, performance of the system on the network infrastructure (WAN) from all access points and bandwidth requirements.
- ii. Provisioning of support structures on provincial level for technical and functional support to the IECS. It could be centrally managed by a service desk (helpdesk).

### **Generation of Mark Sheets**

The SBA and examination mark sheets were generated towards the end of September 08. This was due to a delay in the finalization of the mark sheet function on the IECS.

It was also necessary to print both mark sheets simultaneously so as to ensure that there are no differences between SBA and exam mark sheets. This will ensure better control of both these mark sheets. In some PEDS, errors or omissions identified on the SBA mark sheets were not corrected on the system but had to be declared technical irregularities and dealt with after the regular mark sheets were handled. This resulted in the large number of handwritten mark sheets which posed a major challenge in the mopping up of results. This impacted on the marks capture and verification process since marks recorded on manually generated mark sheets (**Annexure G**) must first be transferred to system generated mark sheets, which takes a substantial amount of time given the slowness of the system. The mark sheet number is the basis for the capture and processing of marks.

The late printing of mark sheets placed all PEDs under severe time pressure since the mark sheets were almost four weeks late compared to previous years. SBA mark sheets had to be completed by schools by the end of October 08, giving schools and districts a month to complete the transfer of marks to mark sheets and all their control and checking processes. As a result some of the control and checking mechanisms were compromised.

Given the nature of the examination cycle it is important to note that a delay, change or amendment to one process has a domino effect on all subsequent processes. This therefore compromises the quality of the examination as a whole.

### **Registration of Candidates**

The registration of candidates is fundamental to ensuring accurate resulting on the IECS. Any shortcomings in the registration database will result either in inaccurate results or incomplete results. In terms of the design of the new computer system, which is in keeping with the new qualification requirements, candidates are registered in Grade 10, and then transferred to Grade 11 if they are successful and finally to Grade 12. This allows the Department of Education to record candidate's performance in the three years of the FET band and to ensure that candidates that sit for the examination in Grade 12 have completed three years of the prescribed curriculum and have

satisfied the internal assessment requirements for each of the three years. However, given that the IECS was not ready for registration in 2006, when this cohort of learners was in Grade 10, registration commenced in Grade 11 in most of the provinces.

In all provinces, except KwaZulu Natal, Eastern Cape and Western Cape, candidates were registered in Grade 11 in 2007 and then the failures were retained on the Grade 11 data base and those that passed were promoted to the Grade 12 data base.

In the case of KwaZulu Natal, candidates were registered on the old system in Grade 10 and then transferred to the Grade 11 data base. The other provinces that registered candidates in Grade 11, also utilized the old system and candidates were transferred to the IECS. This transfer from the old system to the IECS also impacted on the accuracy of the transferred data.

Eastern Cape registered the candidates for the first time in Grade 12 and used the Grade 11 promotion schedules to verify candidates that passed Grade 11. Western Cape Education Department did on line registrations via the Central Education Management Information System (CEMIS) which was then transferred electronically to the IECS.

Although the transfer posed a challenge for the province the exercise was finally completed successfully. Eastern Cape and Free State submitted the preliminary schedule three times to schools for verification and this resulted in the reduced number of outstanding marks in these two provinces.

When the candidates are registered or transferred to the next academic year, the province prints the preliminary admission details per candidate on a single A4 page and this is submitted to the school for verification of the details. In the case of KwaZulu-Natal that followed the ideal procedure, the preliminary admission details were printed in Grade 10 for checking and then in Grade 11 and then in Grade 12. The other provinces would have subjected these admission details to checks in Grade 11 and Grade 12. Each of the candidate's admission details have to be verified by the candidate, the parent and the school principal and each one of them signs to confirm the accuracy of the details (**Annexure H**). However, it is of concern that despite the verification by these three parties, errors and omissions were not detected and corrected. It would appear that all three parties have in various instances failed to realize the importance of the accuracy of this information and therefore have not taken this exercise seriously.

In the Limpopo province, after the amendments from the schools were incorporated onto the registration data base, the province printed subject lists for the different schools. This assisted in ensuring that the subject entries were checked by the subject teachers, since previous verification checks were done by school principals and parents. This assisted in further enhancing the accuracy of the registration data. The province must be commended for the extra effort in attempting to ensure accuracy of the registration data.



Despite the fact that all provinces adopted at least two stages in the finalization of Grade 12 registration data, schools did not thoroughly check the preliminary schedules. Hence, there were still errors on the finalized schedules. The two main causes of errors on the data base were the duplicate candidates (please see the next section on this matter) and subject changes.

### **Duplicate entries**

A duplicate candidate registration is the same candidate being registered twice or in some cases more than twice (**Annexure I**). The IECS was not programmed to prevent a candidate from being registered more than once. The IECS is programmed only to identify the candidate as a duplicate and the capturers in most cases ignored this notice and proceeded with the registration. This resulted in the unusually high number of duplicate entries. Duplicate entries implied that the candidate's marks were recorded against one of the entries and the second entry would remain incomplete.

Duplicate entries were caused due to:

- i. Candidates transfer from one school to the other and this was not indicated by the school principals. The candidate was re-registered as a new candidate at the second school, without the candidate being deleted from the previous school. This created a second record of the same candidate.
- ii. Candidates changed their names from one grade to the other. This was recognized by the IECS as a new candidate and therefore allocated a new unique examination number to the same candidate.
- iii. In some cases candidates were registered with an ID number and the second record with only the date of birth.
- iv. The incorrect spelling of names also contributed to the double registration of candidates.

The duplication of candidates emerged as a problem when the mark sheets were generated and SBA marks were submitted. This resulted in schools recording some of the marks for a candidate under one number and others under the second number. This resulted in two candidate records being created and both of them being incomplete. Many of these records were not combined before the resulting took place and the candidates could not be de-registered before the marks from one record were captured against the correct unique examination number. Capturing of external examination marks was concluded by 15 December 2008 in preparation for the standardization meeting on 17 December 2008. This did not allow any time for such corrections to be effected and hence the large number of incomplete results on the release date of 30 December 2008.

The rectification of these duplicate records could only be done after all the marks were captured, post 30 December 2008. Given the complexities of this process, where a candidate's different records had to be combined utilising the correct examination number, one of these corrections took up to an hour.

## Subject Changes

A high number of late "subject changes" contributed to the high number of incomplete candidates. Once a candidate changes subject, the province is required to validate the reasons for the change, effect the changes on the IECS system, create and print new mark sheets for the candidate and issue an admission letter to the candidate. The changes included:

- i. More subject changes occurred in Mathematics to Mathematical Literacy than in any other subject. Such changes even took place in the examination room on the day of the examination. These changes could not be corrected prior to the release of the results and therefore the candidate's results were reflected as incomplete.
- ii. Late subject changes also emanated from confusion at school level on the language nomenclature. School principals were not able to distinguish between First Additional, Second Additional and Home Language in the NSC and assumed they were similar to First and Second Language of the Report 550 curriculum.
- iii. In one particular case in the Gauteng province, a school registered approximately two hundred candidates for Afrikaans First Additional language only to realise that they should have registered the candidates for Home Language. The school proceeded to submit the oral and SBA marks on the First Additional language mark sheet issued to the school. This error was only detected when the results were released and candidates were listed as incomplete. This entailed a subject change for each of these candidates on the IECS.
- iv. In the case of KwaZulu Natal, 4200 candidates in total were incorrectly registered for Second Additional Language, instead of First Additional Language. This meant that the marks for these candidates could not be captured until the subject change was made and therefore these candidates were listed as incomplete as at 30 December 08.

## Grade 11 candidates registered on the Grade 12 data base

The inaccurate registration of Grade 11 candidates on the grade 12 data also contributed to registration problems. On the initial screen of the IECS, capturers are requested to select using a drop down menu, the data base that they would like to access. This selection is done each time an entry is made. Data capturers in certain cases selected the incorrect Grade from the drop down menu and Grade 11 candidates were erroneously registered on the Grade 12 data base. These Grade 11 candidates were now registered on the system as legitimate Grade 12 candidates. Since these candidates did not write the examination they were subsequently recorded as absent (999) since no marks were available for such candidates. These candidates had to be de-registered and this was only done post 30 December 2008. However, as at 30 December 2008, these results of these candidates were reflected as incomplete.



## Recommendations

- (a) All provinces must ensure that the candidate registration data is finalized by 30<sup>th</sup> of June. No changes to candidates registration must be allowed beyond this date unless there are special reasons for this change which must be approved by the Head of the Department or his/her designee.
- (b) In the case of subject changes, all changes must be finalized not later than the first week when schools open for Grade 12 year. This would ensure that the candidates are not disadvantaged in terms of the teaching and learning and this would also not compromise the reliability of the registration data. Subject changes any time beyond this date will place in question the reliability of the SBA mark. The SBA and the content requirements should have been completed over three years and therefore an SBA mark that is compiled over a few months of the Grade 12 year is suspect.
- (c) There is also a need for greater control and monitoring of subject changes by the PED and the DoE to ensure that the processes complied with the *Regulations pertaining to the Conduct, Administration and Management of Assessment for the National Senior Certificate* (2008). The Regulations state that approval for changing a subject in Grade 12 must be obtained from the Head of the Assessment body, provided the following are furnished:
- a letter of motivation from the learner's parent or guardian.
  - a letter from the Principal, either supporting or providing reasons for not supporting the change; and
  - a letter from the subject teacher, outlining the programme to be followed to assist the learner in covering those aspects of the curriculum statements for the previous grade that were not covered.
- Strict compliance with the above will enhance the credibility of processes leading to the processing of the National Senior Certificate results.
- (d) After the finalization of the registration of candidates on 30<sup>th</sup> of June, the Department of Education must conduct an intensive audit of the registration database to validate the accuracy and completeness of all candidate registration. Provinces should not be allowed to continue with the subsequent examination processes if the candidate registration is either incomplete or inaccurate, since accurate candidate registration is vital for all subsequent examination processes, which includes printing and packing of question papers, organizing marking centres, appointments of markers, etc.