FACTORS ASSOCIATED WITH CANDIDATES FAILURE TO ATTEMPT SOME QUESTIONS IN THE KENYA CERTIFICATE OF PRIMARY EDUCATION (KCPE) EXAMINATION *"A QUALITY ASSURANCE ISSUE"*

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ABSTRACT

As a quality assurance measure in the Kenya Certificate of Primary Education (KCPE) examination, the Kenya National Examination Council (KNEC) has developed a computer Programme ***(Omits programme)*** *to monitor the questions that are not attempted by candidates (omits) in all the KCPE examination papers in order to determine the magnitude and nature of such questions and the contributory factors.*

As a result of this programme, many and varied cases of omits have been identified in various papers particularly the mathematics paper over the years, the research department, KNEC carried out an investigation in order to establish the magnitude of omits in the Mathematics paper in year 2000 and the associated factors. This paper gives the finding of this investigation and the accompanying recommendations. In the paper the following issues are examined: The relationship between:-

a) *time allocation and the number of omits;*
b) *omitted questions, the skills tested and level of difficult of the questions;*
c) *the questions not attempted by candidates and their positioning in the question paper.*

Inferences are then made based on the information derived from these relationships.

1.0 INTRODUCTION

Harlen (1994:2) defines Educational Assessment as *"… the process of making judgments about a student's performance in a particular task"* It includes the processes of gathering, interpreting, recording and use of information about a pupil's response to an educational task. Combinations of different means of obtaining information with various kinds of tasks result in a vast array of assessment practices. Further permutations develop depending on whether marking is carried out by an external agency or by the teacher and by the reference base used for interpretation (norm-referenced, criterion referenced or pupil referenced).

Notwithstanding its limitations, high stakes assessment, such as examinations constitute the most powerful force in education. Noah and Eckstein (1992:5) in a comparative study of examination systems found that debates about *'raising standards in education'* has become the strongest justification when nations seek ways to bring about educational change. Assessment has a powerful influence on schooling arrangements and has changed from being exclusively directed at regulating credentials for entry into higher education to controlling access to a variety of further education and training opportunities. Noah and Eckstein (ibid) found that some countries that tried to abandon school end examinations have reinstated them. In their report they observed that *"… examinations are accepted as politically and ethically defensible ways of deciding which high school graduates to reward, and which to deny reward"*. Apart from the selection and allocation functions, examination results serve, the study concluded that examination results are used to evaluate the "quality" of a teacher or a school to establish preferential treatment in allocation of money for salaries, buildings, materials, equipments etc; to motivate teachers and students and; to stimulate teaching and learning efforts by specifying in detail the system's expectations of students' learning.

Broadfoot (1992: 61), argues that in societies demanding equality of opportunity and moving towards a meritocratic basis for the allocation of occupational roles, it is necessary to find a rational means of selection. These two dominant principles of identification of merit and equality of opportunity under pin the domination of examinations in our education system as despite their widely acknowledged

shortcomings, examinations are still perceived to be the most objective and thus the fairest way of allocating restricted opportunities between competitors"(ibid. 62).

Give this important role examinations play in our educational systems, quality assurance in all the processes of the examinations is necessary. One area which is commonly ignored or taken for granted when it comes to quality assurance in examinations is the processing of candidates results. Too often we are occupied with quality assurance in the processes of moderation, proof reading, field administration and marking of examinations with exclusion of the processing stage of the examinations which is also an important stage. Errors during processing could result into candidates being awarded marks that do not match their achievement levels and hence invalidating the whole process and purpose of the examination. To avoid this, the Kenya National Examinations Council (KNEC) has put in place, several quality assurance systems during processing of examinations not only to ensure valid and reliable examination results but also to validate the process and create a data base of informing all other examination processes including test development and examination administration.

2.0 BACKGROUND INFORMATION

One of the quality assurance programme (package) developed by KNEC is the ***omits programme***. This programme was developed to monitor the scoring of the Kenya Certificate of Primary Education (KCPE) Examination answer sheets so as to ensure that the scoring is accurate.

The omits programme was developed after it was noted that some of the KCPE examination answer sheets marked by the optical marker readers gave different scores when manually marked. The omits programme was then designed to indicate the actual information picked from the answer sheet.

Some of this information include un attempted question(s), shaded two or more, responses, responses soiled by dust, rubbing done by candidate(s), light shading of ellipses etc. Using this programme all such cases are flagged for further analysis to

ensure that no candidate is duly disadvantaged due to a fault that does not emanate from the candidate as a measure of quality assurance.

The omits programme identifies the candidates answer sheet by subject and shows the information of all the questions that are affected by any of the above factors which are then physically inspected and decisions taken.

The **Omits Programme** also monitors the reading and scoring of the candidates responses based on the number of responses omitted or not attempted by candidates (genuine omits) and those that are not picked by the document reader (false omits). This programme identifies and records the number of questions ***'deemed'*** to have been omitted by the candidate. The candidates scripts are then identified and checked manually to establish whether the omits are ***'genuine'*** or ***'false'***. The scripts with ***'false omits'*** are those the machine indicates as having not been attempted by the candidates and yet are answered by the candidates.

As a result of many cases of genuine omits, during the KCPE examination processing of candidates' results, it was found necessary to carry out an investigation in order to establish the magnitude of genuine omits and the factors associated with such omits.

Of great concern was that Mathematics paper which had very many genuine omits as compared to the other subjects. Due to this scenario it was decided that the factors that are associated with omits in Mathematics needed to be investigated for intervention purposes.

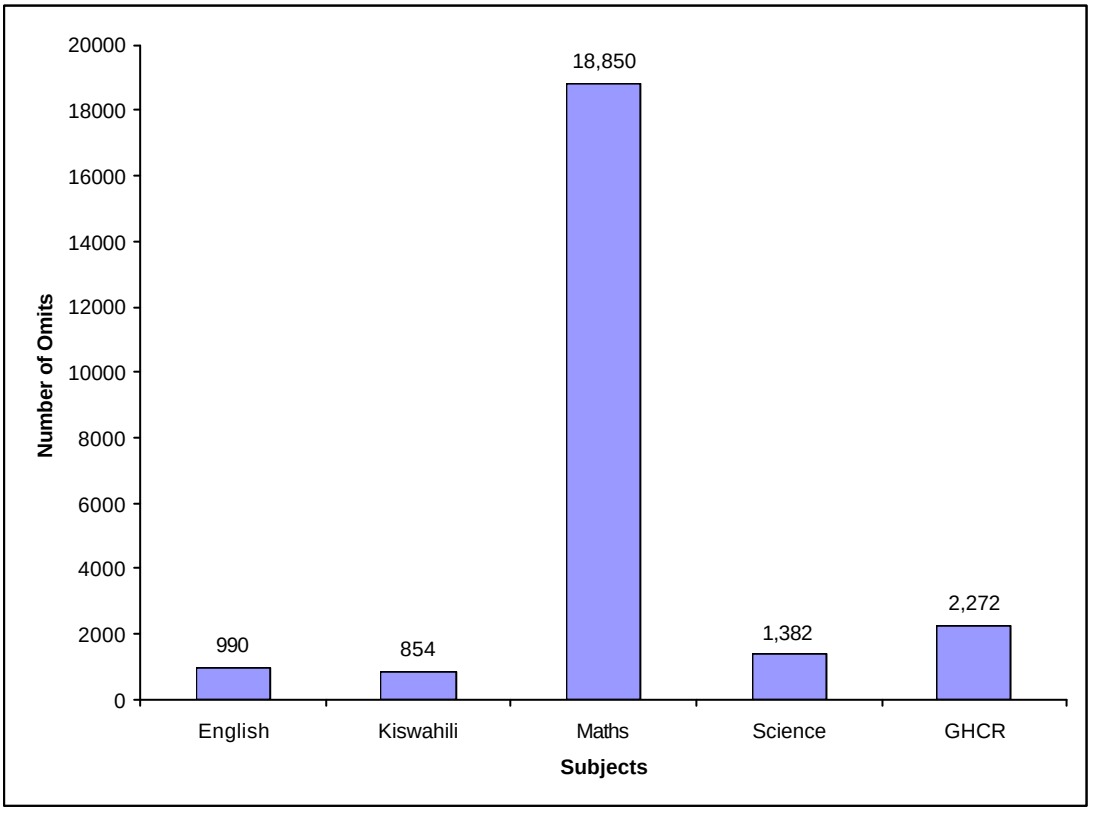
The main purpose of the investigation reported in this paper was therefore to find out the magnitude of omitted questions in the year 2000 KCPE Mathematics Examination and the associated factors as a measure of quality assurance.

During the year ***2000 KCPE*** examination, ***18,850 candidates*** did not attempt various questions in the Mathematics paper. This was deemed to be a significantly large candidature who had left several questions unattempted in the Mathematics paper when compared to the other subjects as can be seen from ***Table 1*** below:-

Table 1: Number of Omits per Subject Nationally

SUBJECT	CANDIDATURE	NUMBER OF OMITS	% MEAN PERFORMANCE
English	470,537	990(0.2%)	49.33
Kiswahili	470,537	854(0.18%)	48.46
Maths	470,537	18,850(4%)	48.19
Science	470,537	1,382(0.29)	48.33
GHCR	470,537	2,272(0.48%)	49.63

Figure 1: Graphical representation of the number of Omits per subject Nationally



As can be seen from Table 1 and Figure 1 the number of omits in the year 2000 KCPE Mathematics paper is comparatively very high. It was therefore necessary to investigate why so many candidates ***(4% of the total candidature)*** did not attempt all the questions in the Mathematics paper.

4.0 DATA COLLECTION

The data collection procedures involved the following:-

4.1 Talling the omits for the Mathematics paper by question, per province and nationally from the KCPE omits print-outs;

4.2 Extracting performance data by question for the Mathematics paper and the omits per question from the candidates answer sheets,

4.3 Using the Mathematics question paper, to identify the concepts and skills that were tested in each question and correlating this with the magnitude of omits per question;

4.4 Extracting performance data from KCPE Mathematics item analysis printouts and correlating it with the magnitude of omits per question.

5.0 DATA ANALYSIS AND INFERENCES

5.1 Number of omits for the Mathematics paper per province and nationally

The information in **Table 2** shows the cumulative number of omits for Mathematics and the Mean Performance by province and nationally.

Table 2 Number of Omits for the Mathematics paper in each Province

Province	Candidature	Number of Omits	% Mean Performance
Coast	25,438	2,142 ***(8.42%)***	47.34
Central	87,308	2,151 ***(2.46%)***	48.60
Eastern	87,979	2,109 ***(2.40%)***	50.66
Nairobi (Urban)	19,168	2,241 ***(11.70)***	49.38
Rift Valley	107,805	3,719 ***(3.4%)***	52.86
Western	55,307	2,092 ***(3.8%)***	49.36
Nyanza	84,894	3,812 ***(4.5%)***	49.74
North Eastern	2638	583 ***(22.1%)***	41.94
National	***470,537***	***18,850 (4.0%)***	***50.18***

Observations

5.1.1 The highest number of omits were from North Eastern, Nairobi and Coast Province respectively;

5.1.2 There seems to be no strong correlation between the number of omits and performance in any province except in North Eastern Province.

These results call for further investigation of the factors associated with the high magnitude of omits especially in the North Eastern Province.

5.2 Analysis of omits per question for the KCPE Mathematics Examination

The data in **figure 2a** was obtained by adding omits for each question from the candidates' answer sheets with omits. The Mathematics question paper carries ***50 questions***. **Figure 2** below indicates the magnitude of omits associated with each of the ***50 questions***. The purpose of this data was to determine the relationship between positioning of the question on the question paper and the number of omits. For this investigation ***300 omits*** and above per question were considered to be significantly high enough for a particular question.

Figure 2a: Number of Omits per Question (1 – 25) for the Mathematics paper

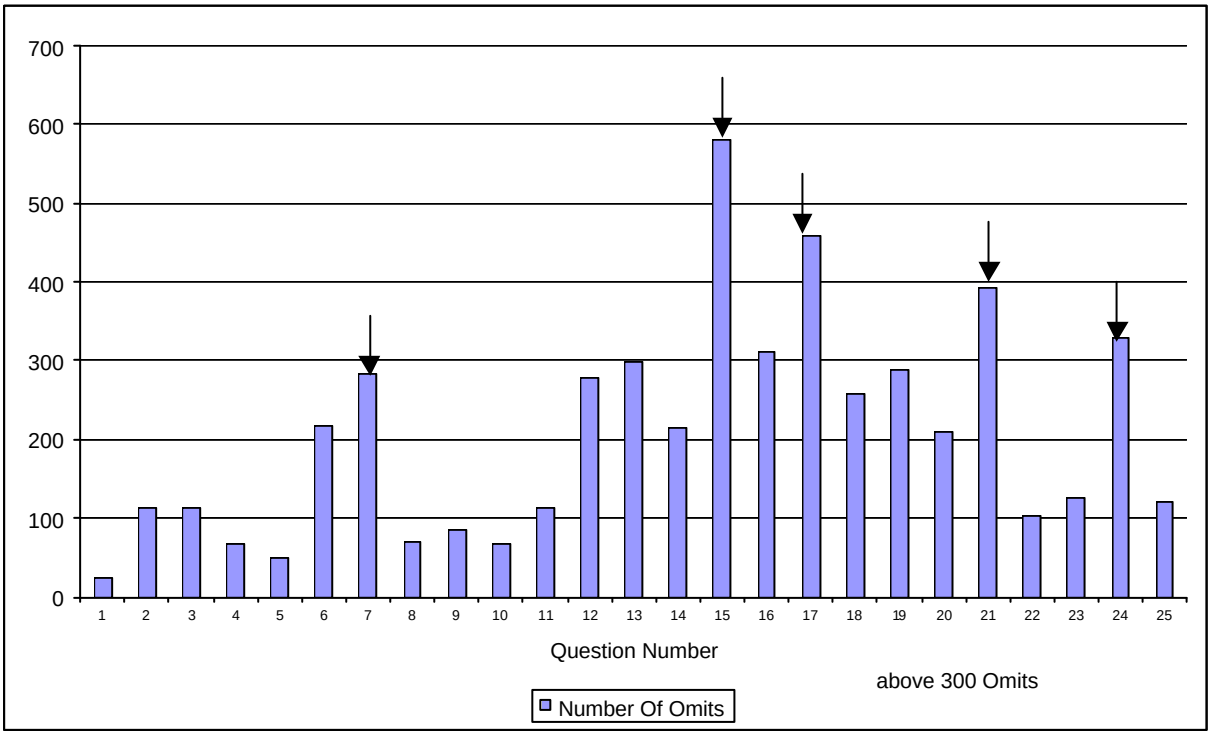
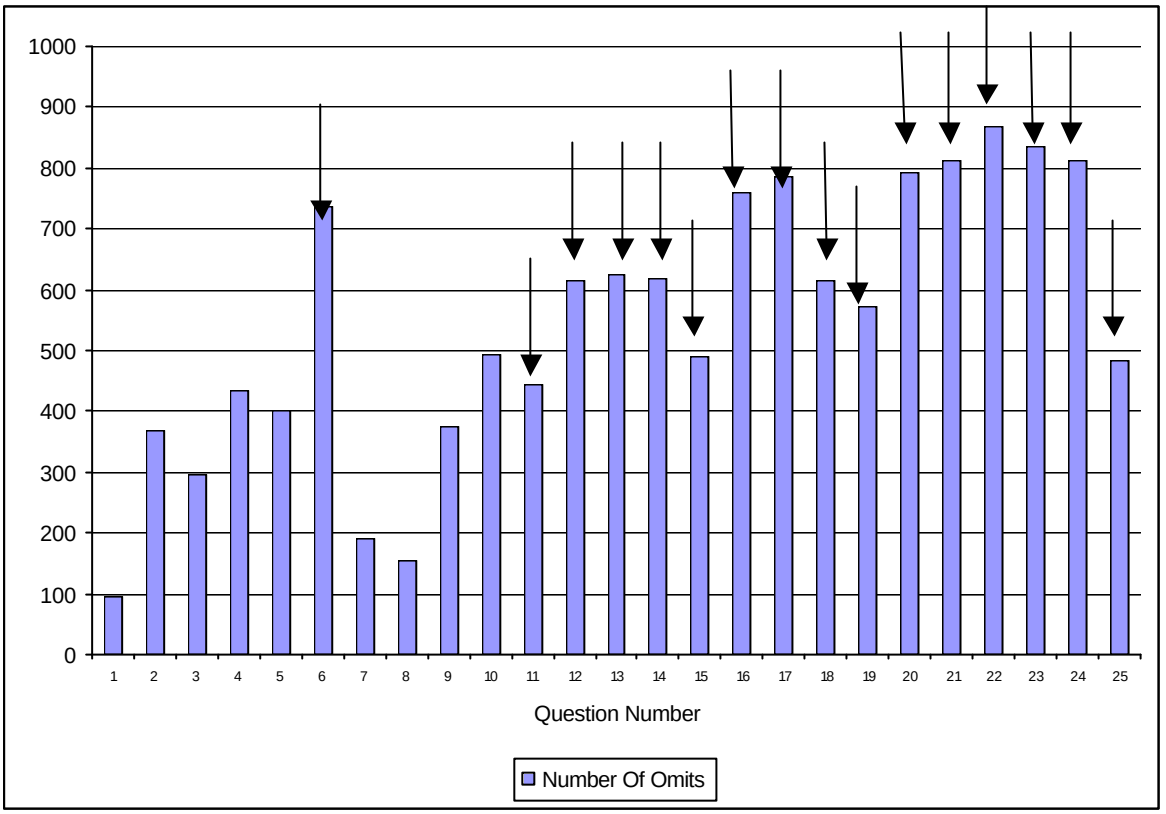


Figure 2b: Number of Omits per Question (25 – 50) for the Mathematics paper



Observations

5.2.1 among the first ***25 questions*** there were only ***five (5) questions*** with more than ***300 omits*** while ***21 questions*** had more than ***300 omits*** among the last ***25 questions*** in this paper;

5.2.2 ***question 47*** had the highest number of omits followed by ***question 48, 46, 49, 45, 42 and 41*** in that order compared to the other questions. Questions therefore between ***41 and 50*** registered the highest number of omits;

5.2.3 ***question 1*** had the ***least number*** of omits but ***question 50*** did not have the ***highest number*** of omits.

These observations indicate that there is a direct relationship between the times allocated for this paper and the level of difficultness of the question.

5.3 Analysis of the KCPE mathematics Examination questions in relation to the number of omits

Tables 3 below show the number of omits associated with each question the topic/concept tested, the skills tested and the percentage of candidates scoring correctly in the item (performance index).

The purpose of this information was to establish the relationship between the number of omits and:-

5.3.1 the topics/concepts tested per question;

5.3.2 the skills tested per question; and

5.3.3 performance of the candidates per question.

Table 3: Relationship between number of omits and the position topic and skill for each question

Question Number	Number of Omits	Topic/Concept Tested	Skills Tested in Question	% of Candidates Scoring Correctly (Performance index)
1	25	Writing numbers in words	Recall	84.48%
2	114	Comparison of numbers	Recall	61.52%
3	113	Capacity	Recall	64.21%
4	67	Approximation	Recall	71.08%
5	50	Place value (numbers)	Recall	75.98%
6	218	Operation on whole numbers	Recall	56.48%
7	282	Squares	Recall	65.16%
8	70	Decimal places	Recall	65.96%
9	86	Percentage decrease	Recall	55.22%
10	67	Lowest common multiple	Recall	66.37%
11	114	Temperature in degrees Celsius	Application	64.16%
12	278	Ratio	Recall	49.49%

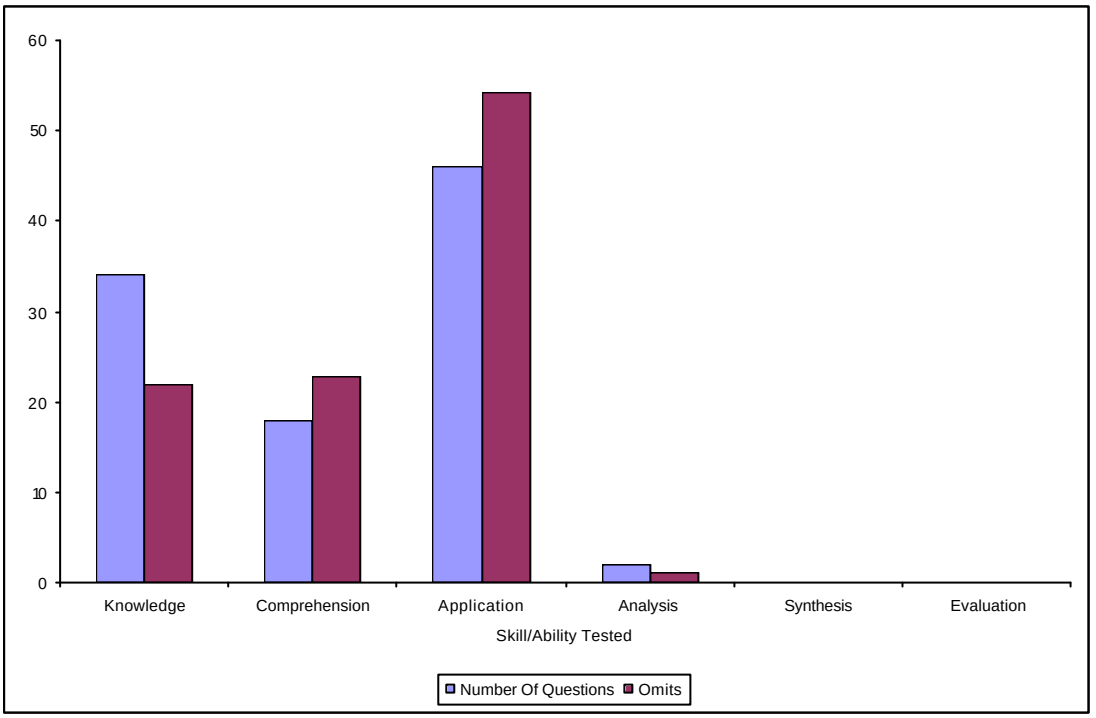
Question Number	Number of Omits	Topic/Concept Tested	Skills Tested in Question	% of Candidates Scoring Correctly (Performance index)
13	298	Angle properties	Application	36.29%
14	214	Time (Calendar)	Recall	35.94%
15	580	Decimal operation	Recall	33.50%
16	311	Volume	Application	42.57%
17	458	Surface Area	Recall	28.11%
18	259	3-D Geometry	Application	23.28%
19	288	Discount	Application	33.47%
20	209	Number patterns	Analysis	52.43%
21	392	Equations	Recall	45.51%
22	104	Rates of work	Application	77.37%
23	127	Rates of consumption	Application	88.75%
24	330	Construction of angles	Application	28.75%
25	122	Weight	Comprehension	31.01%
26	96	Bills	Comprehension	48.50%
27	367	Time/speed	Application	50.68%
28	297	Fractions	Application	48.68%
29	433	Pythagorean relationship	Application	35.85%
30	401	Hire purchase	Application	51.52%
31	736	Perimeter (measurement)	Application	34.49%
32	190	Pie-chart	Comprehension	49.71%
33	156	Squares	Application	26.67%
34	374	Time a.m./p.m.	Comprehension	38.98%
35	494	Angle properties of a triangle	Application	33.45%
36	444	Substitution	Recall	57.44%
37	616	Percentage profit	Comprehension	35.69%
38	624	Scale drawing	Application	28.64%
39	617	Averages	Application	40.10%
40	489	Money change	Comprehension	47.95%
41	760	Ratio	Application	34.10%

Question Number	Number of Omits	Topic/Concept Tested	Skills Tested in Question	% of Candidates Scoring Correctly (Performance index)
42	785	Area of combined shapes	Application	27.26%
43	616	Commission	Comprehension	41.81%
44	573	Algebraic expressions (simplifying)	Recall knowledge	60.17%
45	792	Travel graphs	Application	27.53%
46	814	Postal services	Comprehension	45.20%
47	868	Construction	Application	57.58%
48	835	Simple interest	Application	29.94%
49	813	Forming algebraic expressions	Comprehension	23.77%
50	484	Patterns of shapes	Application	81.13%
TOTAL	***18850***	-	-	-

Table 4: **Summary of total number of questions tested in each skill and the number of omits**

Skill/Ability Tested	Questions	Number Of Questions	Omits
Knowledge	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 17, 21, 36, 44	17(34%)	4,122 (21.87%)
Comprehension	25, 26, 32, 34, 37, 40, 43, 46, 49	9(18%)	4,295 (22.79%)
Application	11, 13, 16, 18, 22, 23, 24, 27, 28, 29, 30, 31, 33, 35, 38, 39, 41, 42, 45, 47, 48, 50	23(46%)	10,213 (54.18%)
Analysis *(question 20 only)*	20	1(2%)	217 (1.15%)
Synthesis	0	0	0
Evaluation	0	0	0
Total		***50(100%)***	***18,850 (100%)***

Figure 3: Graphical representation of magnitude of Omits as compared to skills tested



Observations

5.3.4 Candidates performed poorly in ***eleven [11(22%)]*** questions that had the highest number of omits and most of these question also appeared towards the end of the question paper and their facility indices were also very low.

5.3.5 Most of the questions with many omissions were on ***application question (54.18%).***

5.3.6 Questions on ***recall of knowledge*** were placed mainly in the beginning of the paper and had comparatively ***fewer omits*** and the performance was above average ***(high performance index)*** in most of them.

5.3.7 Poor performance was registered in questions with many omits and many of them were on ***measurement and geometry***. However, good performance was recorded in questions on ***fractions, numbers, algebra***, ***proportions and tables*** which also had comparatively fewer omits.

6.0 CONCLUSION

As expected, there is a direct relationship between the time allocated for a paper and the finishing rates was established but what is of major concern is the fact that this relationship was very significant in the Mathematics paper when compared to the other papers. The question therefore is, what considerations should be put in place during the determination of the time required to answer a Mathematics paper?

Thorndike & Hagen, 1977 observed that *"Most individuals work more slowly when dealing with quantitative materials, therefore if items required mathematical computation the time allocated per item must be longer than for purely verbal items"*.

It could therefore be argued that for Mathematics there is a case for the timing to be empirically determined so that a timing as accurate as possible is arrived at since it is evident that timing in Mathematics is a key factor on performance.

The results from this investigation also indicate that there is a direct relationship between the level of difficultness of a question and omits. Test developers should therefore fine tune their items to ensure that the level of difficult is not of great variance. This can be achieved through pre-testing so that questions with very a low performance index are discarded.

Distribution of questions has also been shown as an important factor in performance and should therefore be a consideration when compiling a question paper. Questions testing different abilities should be distributed evenly in any question paper.

Finally, the investigation revealed the importance of auditing procedures during various examination stages to eliminate any extraneous factors that could have a negative influence on performance of candidates.

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