

**THE IMPACT OF EXAMINATION ANALYSIS FOR IMPROVING THE
MANAGEMENT OF PUBLIC EXAMINATIONS OR OTHERWISE:**

(THE KENYA NATIONAL EXAMINATIONS COUNCIL EXPERIENCE.)

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1.0 INTRODUCTION

Examinations are an inevitable part and parcel of the education process. They are used to among others; measure the level of the candidates' achievement and certify the candidates' levels of education, training and employment. They also provide the basis for evaluating the cost effectiveness of the curriculum both at school and national levels.

At policy level examination results are used to make decisions that have far reaching implications on the lives of learners. Besides being used for certification and selection, they enable learning to be measured, thus giving some indication of the successes of the curriculum. The results of student achievement are reported not only to the government but also to the parents, teachers, curriculum developers and the department of quality assurance and standards.

Examinations can when used properly, help improve the quality of teaching and learning. For this reason, after Kenya Certificate of Secondary Education (KCSE) results are released, feedback is sent to schools through a backwash report indicating not only how candidates have performed but also giving suggestions on what teachers and pupils should do to improve performance in future examinations.

The sub-theme, examination analysis for improving the management of public examinations is quite a diverse one. Consequently, in this paper, both the qualitative and quantitative analysis of examinations will be given consideration and how the Kenya National Examinations Council deals with it.

2.0 ITEM AND EXAMINATION ANALYSIS

The overall function of educational research is to improve the educational process through the refinement and extension of knowledge (Bogdan, 1982). Examination

analysis, therefore, being research based, also seeks to refine the existing knowledge as prescribed in the curriculum through evaluation of candidates' performance.

2.1 Item Analysis

Item analysis can be a powerful technique available to teachers for the guidance and improvement of instruction. For this to be so, the items to be analysed must be valid measures of instructional objectives. Further, the items must be diagnostic in nature. Hence, the incorrect options students select should provide a clue to the nature of the misunderstanding and misconceptions, and thus prescriptive for appropriate remediation. Maunda (2005) alludes to this, reporting that teachers who construct their own examinations may greatly improve the effectiveness of test items and validity of the test scores if they select and rewrite their items on the basis of item performance data.

2.2 Processing of Examinations Results

Processing of examination results means the translation or conversion of raw marks scored by the candidates into the final grades and relevant information, which are eventually issued to the candidates and stakeholders. The activity involves the analysis of the processed marks in order to put meaning to the values and reporting accordingly.

The analysis of examinations results depends on the kind of assessment the examination results will be used for. In the Kenyan context, the Kenya Certificate of Primary Education (KCPE) which is taken after 8 years in primary school is a norm referenced assessment while the Kenya Certificate of Secondary Education (KCSE) is a criterion referenced assessment.

2.3 Analysis of KCPE Examination Results

Analysis of KCPE results involves conversion of the raw marks into standard marks. The process involves adjusting all the raw marks for each paper in the examination to allow for the differences in difficulty and in the extent to which marks scatter (standard deviation). In this process of standardization, the difficulty among the papers is measured in terms of the mean raw marks scored by all the candidates, while differences in the scatter are measured in terms of the standard deviation.

Standardization of raw marks for each paper is done as follows:-

$$X_s = 50 + \frac{(X - \bar{X})}{s.d} \times 15$$

Where, X_s = standard mark
 X = raw mark of the candidate
 \bar{X} = mean of all raw marks
s.d = standard deviation of the raw marks

The Kenya National Examinations Council (KNEC), therefore, converts all raw marks for each paper at KCPE level using the same mean of 50 and standard deviation of 15.

The quantitative item analysis involves determining the Facility index (F-index) and Discrimination index (d-index) of each question in a paper for the chosen sample population of candidates.

At this level a good question is considered to be one that has a facility index of between 30% and 80%. Any question with a facility index of below 30% is considered to have been found difficult by the candidates and one above 80% is considered to have been easy.

2.4 Analysis of KCSE Examinations Results

The Kenya Certificate of Secondary Education (KCSE) is basically criterion referenced. The examination analysis is based on an individual's acquisition of knowledge and competencies after specific instructions. The mean and standard deviation are still used in the analysis and interpretation of candidates' raw marks. This is normally done per paper/subject and comparisons made with previous years performance. The analysis is also done based on gender. In this aspect, the whole population entry into the examination is first established and the number of males and females stated. At a paper level, the same data of male and females is again given and the achievement of each group determined. Appendix 1 shows the KCSE examination candidature by gender for the last nine years while Appendix 2 shows candidates performance by gender in the years 2006 and 2007.

Key observations on candidates' performance that can be drawn from these appendices are as follows:

- (i) In the year 2007 KCSE examination, female candidates performed better than male candidates in only six (6) subjects out of twenty two (22) subjects offered. These were: Christian Religious Education (CRE), Hindu Religious Education (HRE), Home Science, Art and Design, German and Music.
- (ii) Male candidates performed better than female candidates in the remaining fifteen (15) subjects during the year 2007 KCSE examination.
- (iii) In the same year 2007 there were more female candidates who sat for CRE, Home Science, French and German when compared to male candidates.
- (iv) No female candidate sat for the Aviation Technology test in the 2006 and 2007 examination.

The results of Public Examinations are used to monitor performance of candidates, schools, regions and even gender disparities.

2.4.1 *Analysis by School Performance Index*

To determine the performance index of each school, the overall mean grades for each candidate are added and divided by the total number of candidates in the school who attempted the examination. For example, determination of the performance index of a certain school is as shown below.

Table 1: Number of candidate scoring each grade

Candidature	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
192	0	1	7	20	26	40	44	31	16	5	2	0

Table 2: Determination of total point per grade

A-	B+	B	B-	C+	C	C-	D+	D	D-	School Perf. Index
11x1	10x7	9x20	8x26	7x40	6x44	5x31	4x16	3x5	2x2	Total = $\frac{1241}{192}$
=11	=70	=180	=208	=280	=264	=155	=64	=15	=4	≈ 6.4635

The index of the school under consideration = 6.4635.

2.4.2 *Analysis by candidates' performance index*

The candidates' performance index is determined by first converting each candidates marks to percentage scores because all subjects are not marked out of the same mark. After this is done, the total percentage marks for the best seven (7) subjects for every candidate that meet the awards criteria are added and the total divided by 7 to obtain the percentage performance index.

Example:

Considering two (2) candidates Y and Z whose performance was as stated based on the 12-point stanine distribution that is used by the Kenya National Examinations Council.

Table 3: Performance Index by Grade Points

Subject Code	101	102	121	231	232	233	311	561	P-Index by Grade
Y	A (12)	B- (9)	A (12)	A (12)	A (12)	A (12)	A (12)	A (12)	11.5
Z	A (12)	A (12)	A- (11)	A (12)	B+ (10)	A (12)	A (12)	A (12)	11.8

Using results of the same candidate Y and Z their subject percentage performance index is as shown below.

Table 4: Performance Index by Percentage

Subject Code	101	102	121	231	232	233	311	561	P-Index by %
Y	69	66	74	74	73	79	95	89	78
Z	72	79	64	71	56	75	79	88	75.4

$$* \quad 69+66+74+74+79+95+89=546 \div 7=78\%.$$

Thus candidates Y percentage performance index = 78%.

2.4.3 Analysis in term of performance by subject comparison

Comparison of candidates' performance by subject based on preceding years provide an indicator of improvement or decline in performance. Table 5 and 6 shows the performance of candidates in the year 2007 and 2008 KCSE examinations. The candidates' performance for this examination was compared by determining the significance of the difference between the two means for each subject. For subjects with

a candidature of less than 30 “*t*” test was used while “*z*” test was used for subjects with a candidature greater than 30. the difference between the two means is significant when the “*t*” or “*z*” values are greater than +1.65 or less than -1.65.

Table 5: “z” test results for comparison of candidates’ performance in some subjects in year 2007 and 2008 examination

Year	2008			2007			“z” Value	Comments
Subject	N	\bar{X}	SD	N	\bar{X}	SD		
English	300,794	67.57	26.24	273,060	79.39	24.43	-177.14	S
Kiswahili	301,389	74.53	28.01	272,903	91.50	27.46	-231.93	S
Mathematics	302,648	42.59	41.53	273,508	39.45	38.67	+48.3	S
Biology	271,735	60.64	29.12	246,519	83.90	33.87	-382.1	S
Physics	92,648	73.42	35.43	83,160	82.63	35.14	-123.54	S
Chemistry	296,360	45.48	31.78	267,707	50.73	31.86	-588.36	S
Geography	109,745	74.01	31.92	103,285	93.62	34.36	-448.97	S

S=significance

A report on year 2008 KCSE examination results

Table 6: “t” test results for the comparison of candidates’ performance in year 2007 and 2008 KCSE examination

Year	2008			2007			“z” Value	Comments
Subject	N	\bar{X}	SD	N	\bar{X}	SD		
Hindu Religious Education	13	123.38	19.92	7	96.85	35.21	+3.29	S

S=significance

A report on year 2008 KCSE examination results

2.4.4 *Examination Malpractices*

In Kenya, the mode of reporting examination results through the media is a factor that greatly influence the prevalence of examination practices. Traditionally, stakeholders in education, who also include parents, quality assurance officers, education officers and opinion leaders extent pressure on teachers to ensure that their schools appear in the print media as being performing schools. Teachers and by extension candidates, reading under such pressure are tempted to use unorthodox methods such as cheating in an effort to improve their mean performance scores so as to secure a place in the media.

2.4.5 *A critique on the use of examination ranking as a means of analysis*

Ranking by the use of assessment of results compares candidates with their cohorts against a predetermined criteria. The pros and cons of ranking has generated a lot of debate in the recent past in Kenya. The proponents of ranking argue that it motivates both teachers and learners to work harder and hence pay more attention to the demands of the curriculum, its interpretation and implementation. Nevertheless the opponents assert that ranking breeds unhealthy competition which compels teachers to force learners to repeat some classes. The worst of all is that teachers over-work learners to the extent of giving instructions outside the official working hours popularly known as “*extra tuition*”. This denies the learner time for play which is vital for character development.

To diffuse the pressure and strike some balance from this debate, KNEC has now resulted to ranking candidates instead of schools and districts. During the release of the year 2008 examination results to the public through the media only the best 10 candidates nationally and provincially were highlighted.

2.5 Qualitative methods used for analysing KCSE examinations

Kombo et al (2006) alludes that analysis of data varies with the purpose of the research, the complexity of the research design and the extent to which conclusion can be reached easily. KCSE therefore, as a public examination used for formulation of far reaching policy decisions warrants for both qualitative and quantitative analysis.

2.5.1 *Use of Monitoring Reports*

Monitoring is an activity that is carried out periodically during the administration exercise of an examination for purposes of auditing the authenticity of the exercise in terms of adherence to prescribed procedures. In the context of KCSE examination, the key aspects that would be monitored and presented for analysis include inter-alia:-

- Specification of sitting arrangement
- Shortage of question papers
- Security arrangement availability
- Number of supervisors and invigilators per examination centre vis-à-vis number of examination rooms.
- Qualification of supervisors and invigilators
- Examination irregularities
- Role of school administration during the examinations

2.5.2 *Use of Chief Examiners' Report*

No doubt, the chief examiners are central in providing an impressionistic judgment of quality of the paper and the general performance of the candidates in the examination. This information is crucial in assisting KNEC during the fixing of standards and

awarding of grades, and in writing feedback reports on the way candidates responded to question as well. The chief examiners, therefore, with the assistance of the assistant chief examiners and team leaders respond to a questionnaire that demands for a critique of the question paper that they are in-charge.

Some of the key aspects that require for responses and presentation for analysis are:-

- Syllabus coverage: this provides an indicator for content validity.
- Skills tested: this provides an indicator on how the skills were distributed and balanced in terms of difficulty versus easiness in the examination papers.
- Item difficulty: this provides an indicator on the level of difficulty of each question for the expected competency level.
- Item ambiguity: this provides an indicator of clarity of each question in context and wordiness.
- Objectivity: this provides an indicator of fairness in terms of scoring, being unbiased to any group of candidates.
- Errors: this provides an indicator of the level of error freeness in each question.
- Question performance: this provide a clue of the weakness of the candidates in responding to the demands of each task in a question.
- Examination malpractices: this provides an indicator on the magnitude of examination irregularities.

2.5.3 Feedback Reports

Feedback reports highlight areas on weaknesses displayed by candidates in each subject. KNEC prints and publishes these documents and the Ministry of Education facilitates their distribution to teachers, curriculum developers, quality assurance officials and other

stakeholders on the performance of candidates on key aspects of the curriculum. The analysis on candidates' performance in each question is extremely important in diagnosis of areas in the curriculum where instruction has not been strong enough to impart the expected objective skills. Wasanga (2001), explains that backwash reports also identify misconceptions and common errors that candidates make.

3.0 THE RATIONALE OF ANALYSING THE KCSE EXAMINATION

KCSE examination being a nationally – normed subject – content examination, is primarily used as a measure for assessment purposes. The results of this examination, like any other public examination, provide an appropriate quantitative metric for outcome assessment purposes (White, 2004).

Thus, the KCSE examination results are not only used to determine competency levels of an examinee vis-à-vis the examinee's controls but also for comparisons against peer institution. Such comparisons are significant in provision of intervention measure which complement continuous quality improvement efforts both at curriculum planning and implementation levels.

4.0 USE OF INFORMATION OBTAINED FROM ANALYSIS OF EXAMINATION RESULTS

Every year research based backwash documents are written for KCPE and KCSE examinations in every subject. These reports highlight areas in which candidates display weaknesses. The reports are made to act as feedback to teachers, curriculum developers, subject inspectors of schools and other stakeholders.

The reports analyse performance for individual questions where candidates performed poorly and try to establish the reasons why. They identify misconceptions candidates

have and the common errors they make. The main reason why KNEC produces such reports is for enhancement of quality tuition and by extension quality education.

5.0 IMPACT OF EXAMINATION ANALYSIS

The impact of examination analysis can be based on the needs at different levels of an education system. Assessment of student learning provides evidence so that educational decisions can be made. The assessment evidence can help in evaluation of a teaching programme (UNESCO, 2000). Assessment can also be used to make decisions about the next aspect of teaching for particular students.

The choice of what to evaluate, the strategies of assessment and the modes of reporting depend upon the intentions of the curriculum, the importance of different parts of the curriculum and the audience needing the information. The audience may include both those who will be making decisions and those who wish or need to know what appropriate decisions have been taken.

Educational decisions which require information about the success of learning programmes, or which require information about which students have reached particular levels of skills and knowledge, depend upon valid (and therefore reliable) measures to inform those who make decisions. The type of information will depend upon whether the decisions are being made at the personal, school, regional or national level.

In order to measure progress assessment, therefore, evaluation need to be carried out more often so that changes can be identified. For example to assess that impact of new programmes to improve schools, baseline measures are needed to describe the effectiveness of the teaching provision before the innovation, so that subsequent measures can be used to judge the effectiveness of the implemented innovation.

5.1 Student and Teacher Assessment Needs

At the student level, there is need for each and everyone of them to know their performance to that of a reference population. Teachers and parents also need to know a students performance to that of his mates. Moreover, intervention measures can be put in place for individual or groups of students based on the examination analysis. To a student and the teacher, examination analysis serves as a form of justice. Were then no marks or grades, there would be no valid basis for assessing programs or reward of student performance.

Marks or grades help determine promotion, college or university admission and certification. Colleges and universities will hesitate in allowing students with poor academic records to transfer to their institutions. This way a student is bound to work hard in order to improve their grades. For students who are still in school and awaiting to sit for the national examinations, the most current examination analysis act as a measure for them as they get to know the market trends. This way, room is created for more effort both on the students and teachers.

5.2 School Level Assessment Needs

Examination analysis will help individual schools to evaluate the students achievements in various areas e.g. in science or arts subjects, mathematics or English and so on. At this level the analysis is subjected to larger areas as opposed to that of the individual student.

One school could find its placement within the other schools within a region. For private schools, good performance translates into wider markets and higher student population.

Every year, after the release of KCSE, you find private schools which perform well advertising themselves in the local newspapers. For public schools, good performance calls for higher demand on students wanting to join them.

Currently, the Kenya National Examinations Council is no longer ranking schools based on their performance at both primary and secondary levels. But these notwithstanding you find regional schools still ranking themselves so as to determine their standing within the given region. At school level, examination analysis also provokes the interest of the local community. With the current quota system of admission in local schools in Kenya, i.e. where about 80% of candidates in secondary schools comes from the schools locality, parents, sponsors and other stakeholders would want to maintain the high standards in their school that is performing well as opposed to the schools performing poorly.

5.3 National Level Assessment Needs

At the regional and national level, examination analysis information required must relate more to policy issues, planning and resource implications. It is particularly important for national officials to be sensitive to long term trends in their education systems capacities.

Kenya is divided in eight administrative provinces. The top most education officer is each of these provinces is a Provincial Director of Education (PDE). Apart from the international education goals, national goals and intervention are initially gotten from these administrative blocks. For example North Eastern province is one administrative block located in a hardship area. Here, gender disparities are very much diverse. Moreover, in the public examinations analysis, this province has lagged behind all the other six provinces in performance for a very long time.

Students are forced to walk very long distances to get to school. In most schools, the environment may not be conducive to the girl child. This way the government through

the Kenya Education Section Support Programme (KESSP) has intervened to provide more schools within reach and also trying to make the school environment friendly to all. The government has also embarked on providing teaching materials to schools in this part of the Country. This way, there could be a higher retention of student in primary schools and also a higher transition of both boys and girls to secondary schools.

Another region Nyanza province, through the Provincial Education board, commissioned a taskforce in 2005 to investigate the causes and effects of poor performance in national examinations by schools in the province. This is a province that initially used to produce academic heavy wrights.

Under the chairmanship of Professor Gilbert Ogutu, some of the causes of poor performance were established as:-

- Non-participation of elected leaders in education programmes
- Poor supervision of schools
- Politicisation of education

After these issues were addressed, the region performance improved and in KCSE, the number of students scoring B plain and above increased from 4,800 in 2005 to 5,477 in 2007.

This shows the reaction of the region to examination analysis in the year 2005 and the impact it created.

From public examination analysis, it has nationally been established that Mathematics is a major stumbling block to many candidates at the Secondary School level. This way the Ministry of Education was able to intervene and from 2009 a Mathematics paper for those students, who do not intend to pursue science oriented courses at the University.

Globally, the examination analysis has a very big impact on the management of public examinations.

6.0 CONCLUSION

This paper has dealt with several issues on the impact of examinations analysis for improving the management of public examinations. In particular the paper has outlined that analysis of examinations has an impact on the students themselves, the schools, regions and also a country as a whole. With the analysis of public examinations, at the school level this has its own challenges in that it creates rooms for cheating as schools see themselves as teams in a competition.

Communities and other stakeholders react to examination analysis. Mostly, the reactions are positioned in that they want to be involved in the schools management and decision making. This way, the parent teacher association becomes even more strong and proactive on school issues.

On the larger scale, governments will also intervene on educational issues based on the statistics generated after the analysis of examinations.

Appendix 1

KCSE Examination Candidature by Gender for the last Nine Years

Year	Candidature Trends		
	Total	Male Total	Female Total
2007	276,239	150,127	126,112
2006	243,453	129,071	114,382

2005	260,665	141,256	119,409
2004	222,676	120,067	102,609
2003	207,730	111,589	96,141
2002	198,356	106,164	92,192
2001	194,883	104,911	89,972
2000	181,966	97,956	84,010
1999	172,883	93,487	79,396

Appendix 2

Candidates' Performance in the year 2006 and 2007 KCSE Examinations in all the Subjects

Subject Name & Code	2006				2007			
	Female		Male		Female		Male	
	No. Sat	Mean %	No. Sat	Mean %	No. Sat	Mean %	No. Sat	Mean %
English (101)	113,754	39.74	128,286	39.78	123,654	39.65	146,975	39.74
Kiswahili (102)	113,767	52.56	128,280	51.87	124,107	45.53	147,387	45.95
Mathematics (121)	113,802	15.78	128,323	21.87	124,874	15.74	148,260	23.10
Biology (231)	108,065	25.00	109,863	29.84	118,395	38.99	127,516	44.70
Physics (232)	21,376	39.07	51,123	40.82	23,767	39.04	59,506	42.23
Chemistry (233)	111,969	22.56	124,932	27.01	122,532	22.65	144,229	27.69
Biology for the Blind (236)	-	-	-	-	11	24.17	25	25.16
History & Govt. (311)	66,228	46.72	78,206	54.04	72,602	46.31	91,308	54.60
Geography (312)	41,929	38.16	56,088	44.38	42,398	42.74	60,451	49.66
CRE (313)	82,613	55.63	61,678	55.40	92,586	62.40	71,699	62.39
IRE (314)	2,257	56.74	3,848	59.60	2,576	59.83	4,443	62.58
HRE (315)	8	57.44	5	62.60	3	64.67	4	36.25
Home Science (441)	9,856	49.42	730	43.28	10,493	49.91	774	42.05
Art & Design (442)	358	61.26	750	61.93	337	60.00	641	57.95
Agriculture (443)	47,275	35.96	58,888	41.09	50,350	40.54	66,401	46.06
Aviation Tech. (450)	-	-	46	65.80	-	-	53	54.08
Computer Studies (451)	1,874	52.09	2,309	56.87	2,147	51.66	2,590	57.61
French (501)	1,397	40.88	862	42.85	1,328	46.28	790	48.97
German (502)	222	60.99	94	63.76	304	60.20	111	56.32
Arabic (503)	311	64.26	663	69.07	327	64.58	748	68.73
Music (511)	746	52.20	553	51.03	734	53.79	559	52.13
Business (565)	51,340	43.19	59,359	48.86	52,349	51.49	64,402	58.11

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