

Influence of Facilities on Performance in Prevocational Subjects in the 8-4-4 Education System: Lessons for the Proposed Competence Based Curriculum in Kenya

Grace Nyagah

Senior Lecturer, University of Nairobi, Kenya

Abstract: *This paper is based on a study about the 8-4-4 education system Art and Crafts in Embu District to determine pupils' performance in relation to the available facilities and draw lessons for the new competence based curriculum. The research design was ex-post facto. Twenty schools, 500 pupils, and 62 Art and Crafts teachers were selected through stratified and simple random sampling. The Chi-square test results for the theory performance were; $X^2(4), N = 408 = 38.89, P < .05; X^2_{critical}(4) = 9.49, P < .05$; Cramer's V value = 0.17; with similar results for practical's component: $X^2(4), N = 408 = 52.05, P < .05; X^2_{critical}(4) = 9.49, P < .05$; Cramer's V value = 0.26. Thus, there was a significant but weak relationship; but slightly stronger for the practical component. It is recommended that the Government should avail adequate financing for resources and adequate preparation of the teachers for effective implementation.*

Keywords: Competence Based Education, Facilities, Art and Crafts, Performance, Prevocational

1. Introduction

Continuous and periodic curriculum reforms are necessary in every society globally, to ensure education remains relevant. Kenya is in the process of instituting curriculum reforms to be relevant to the fast-changing global trends in education and the economy. This paper examines the proposed competence based curriculum innovation and restructuring of the education system in reference to the Art and Craft curriculum, in the outgoing 8-4-4 (8 years primary, 4 years primary and 4 years university) system of education.

Curriculum reforms are not a new phenomenon in Kenya. For instance, the Ominde Commission was formed to review the education system in 1964. The commission recommended that primary education provide training in basic skills. Special emphasis was laid on science education and training in social and manipulative skills. Secondary education was supposed to include practical training and to provide outlets into the production side of industry and agricultural inputs and workshops were part of the equipment required.

The Mackay Commission of 1981 changed the system of education from 7-4-2-3 (7 years primary, 4 years secondary, 2 years A-Level and 3 years of university education) to 8-4-4. This new system (8-4-4) was aimed at producing all-rounded graduates with practical skills and competences to enable learners become self-reliant individuals at the end of every education cycle and more emphasis was put on vocational subjects which could instill practical skills. In order to achieve this, the curriculum content was changed and realigned with the end objectives (Republic of Kenya, 1981). The curriculum introduced vocational subjects such as Art and Crafts, Agriculture and Home Science.

Presently, a new competence-based curriculum is in the process of being piloted. It aims at producing a self-reliant and creative population which will reduce the unemployment rate in Kenya among the youth. (Currently the unemployment rate stands at 39.1% which is quite high even by global standard, [Sunday, 2017]). The aspirations of this system are, to some extent, similar to those that were advocated by the 8-4-4 curriculum.

Art and Crafts subject was singled out as a point of reference to provide a basis for lessons that can be applied towards shaping and implementing the new curriculum.

The research objective was, "To investigate pupils' art and crafts performance in relation to the extent to which the schools were equipped, for both theory and practical components of the subject. Analysis was done separately for the 2 components to assess the extent to which the facilities impacted on performance.

1.1 Hypotheses

Based on the above objective, the following hypotheses were proposed for examination:

- H₁: There is a significant relationship between the pupils' theory performance in Art and Craft and the extent to which schools were equipped to offer the subject.
- H₂: There is a significant relationship between pupils' practical performance in Art and Craft and the extent to which schools were equipped to offer the subject.

2. Literature Review

Curriculum reforms towards competence based and outcomes based education have been tried out in many countries worldwide. For instance, in Mexico, the implementation of competence-based approach curriculum

began in 2009 through a number of reforms on basic education and national education policies in which competence was defined as application of knowledge, skills, attitudes and values (Secretaria de Education Publica, 2011). The competence-based approach was aimed at stimulating students in order to attain optimum academic performance. The knowledge, skills, values and attitudes were to be applied in daily life situations and the learners were expected to reflect them in their endeavours.

In 2015, Finland shifted from a subject-based to outcome-based way of structuring vocational studies. This was aimed at increasing the relevance of education in the labour market, imparting students with lifelong skills and shifting the focus of education and teaching from instruction of contents towards learning competencies. There was also transfer from the dichotomy of theory and practice to competence entities. The system is based on competences needed in one's work life, flexible, holistic approaches, individual learning and qualification pathways which is similar to Kenya's new competence-based curriculum.

According to Grethe and Sten (2005), in Norwegian schools, four practical subjects and artistic subjects were made compulsory for all pupils up to grade ten and they include; art and crafts, music, home economics and physical education. These are similar to what the 844 curriculum has, as well as the proposed new curriculum in Kenya.

Rwanda shifted to a competence-based curriculum in 2015 in order to deal with scarcity in skills in the Rwandan education system with a particular emphasis on science and technology. The impetus was Rwanda's desire to build a knowledge-based society in meeting the regional and global demands in the job market and develop their full potential and relevant skills, knowledge and desired attitudes that would help them fit in the society and the job market (Republic of Rwanda, 2015).

Often practical subjects have had challenges during implementation. For instance, in Zimbabwe, lack of interest in practical subjects was evidenced in 1996 with very low enrolments for practical subjects compared to academic subjects. (Mufanechiya & Mufanechiya, 2011). Similarly, Nleya, (2014) observed the same pattern for the 2013 cohort in the same country. This contributed to high unemployment of youths in Zimbabwe forcing the government to call for a review of the country's education system.

Nigeria on its part has made quite a number of education reforms but the impact of these educational changes has not yet been felt. Many reasons have been given by scholars why such curriculum reforms fail yet they are initially received with a lot of enthusiasm that wanes shortly after. Some of the reasons given for unsuccessful implementation is the inconsistent and lack of political will, lack of adequate manpower both in quantity and quality, poor funding, poor monitoring policies and most of these problems centre on the fact that the implementers who are the teachers are not adequately or are seldom involved in the formulation of change policies (Yusuf & Yusuf, 2009).

The 8-4-4 system has been termed as inadequate in driving Kenya's economy towards Vision 2030. To address the concerns raised, the 2012 report by a task force chaired by Prof. Douglas Odhiambo proposed the scrapping of the 8-4-4 system of education and instead recommended a 2-6-3-3-3 system (2 years of pre-school, 6 years primary, 3 years junior secondary, 3 years senior secondary and 3 years university education) which it is said would ensure learners acquire competences and skills to meet the human resource aspirations of the Vision 2030 blueprint. This new system offers a choice of pathways at the end of the elementary school phase and is meant to ensure 100% transition rate from primary to secondary hence reducing wastage (Republic of Kenya, 2012).

According to the vision and mission of the Basic Education Curriculum Framework (BECF), (Republic of Kenya, 2017), as well as the results of a needs assessment study by KICD, there are 3 pathways proposed: Arts and Sports Science, Social Sciences, Science, Technology, Engineering and Mathematics (STEM) (Republic of Kenya, 2017).

The pathways in Career and Technology Studies (CTS) schools are envisioned to endow learners with opportunities to acquire skills and knowledge needed for workforce in trades, crafts and careers at various levels (Republic of Kenya, 2017). Career prospects include tailoring, mechanics, beauticians, tour guides, chefs, electricians, welders, plumbers, catering and fire fighters. According to Petrilli (2016) career and technical education programmes are a solution to failures of traditional academic programmes. Career and technical studies equip learners with practical and relevant skills that increase employment prospects of the graduates. This was a key focus of the 8-4-4 system as well.

3. Methodology

Both qualitative and quantitative approaches were used in the study. The research design was ex-post facto while the target population consisted of 261 primary schools; 1,800 class eight pupils in 261 primary schools, both rural and urban, and the Art and Craft teachers in Embu District. A total of 20 schools, 500 pupils, and 62 Art and Crafts teachers were selected for the study, through stratified and simple random sampling techniques.

The instruments used for data collection were: pupils' questionnaire, teachers' questionnaire, an assessment schedule for the practical projects, and an observation schedule for the status of Art and Craft facilities and the availability and state of teaching and learning resources including the workshops, tools, equipment and materials in the school.

The assessment schedules on performance were; the KCPE Art and Craft theory examination and the Continuous Work Assessment (CWA) schedule from the Ministry of Education. The assessment was done by technical experts to provide data for this study.

To facilitate hypotheses testing the variables were operationalized as follows:

- 1) Performance for both the theory and the practical components, which was based on actual marks pupils achieved, was categorised as follows: 60 – 100 percent - Above Average; 50-59 percent-Average; while 0 - 49 percent was considered to be below average.
- 2) The extent to which Schools were Equipped was established by comparing the available resources with the expected status as per the Ministry of Education guidelines. The categories used were:
 - a) Very many/sufficient - more than the recommended minimum number of equipment allowing for sharing between five (5) pupils per group during practical's;
 - b) A few - teacher to carry out demonstration lessons, or have large groups of at least ten (10) pupils to share one piece of equipment;
 - c) Very few or none.

Descriptive and inferential statistics were used in the analysis of the data. Specifically, the Chi-square test was used to establish the relationships between variables in the hypotheses. To determine the strength of the relationships, the Cramer's measure of association was used. The value of Cramer's Statistic ranges from "0" to "1", where "0" indicates that the two variables are not related, while "1" represents a perfect relationship between the variables (Evans, 1992).

4. Results and Discussion

The summary of the status of facilities in the schools is provided in the table below.

Table 1: Categorization of Schools with regard to Facilities

Category of School	No. of Schools	Percentage
1: "Very few" equipment and tools / None	10	50.0
2: "A few" equipment and tools	7	35.0
3: "Sufficient / very many" equipment and tools (Well-equipped)	3	15.0
Total	20	100.0

Out of the twenty (20) schools in the sample, only three (3) of them, 15.0 percent, were found to have been well equipped. Two out of the three schools were located in the urban areas within the Municipality and were assisted financially by a donor agency, the Plan International Organization, in the construction and equipping of the workshops. Half of the schools, (50.0 %) had very few equipment and tools or none at all. Thus, more than half of the schools were not in a position to carry out practical work using school facilities, and were dependent mainly on improvisation and efforts from the pupils and teachers in tapping resources from their homes and the local environment.

4.1 Overall Performance in Art and Craft

Scores for the practical performance were obtained from two sources: the Continuous Work Assessment (CWA) that used to be organised by the Ministry of Education and the assessment by the technical experts deployed to assess the practical projects in Art and Craft, specifically for this study.

Table 2 summarizes the scores in terms of range, means and standard deviations of the scores.

Table 2: Summary of Pupils' Performance for the Three Categories of Scores: Theory, TE and CWA
N=408

Scores	Theory	Category	
		TE	CWA
Maximum Score	100	100	100
Highest score obtained (%)	80.0	83.0	92.0
Minimum score (%)	27.0	26.0	57.0
Mean Score (%)	55.3	54.8	76.7
SD	10.3	11.2	6.9

The table shows major differences between the CWA scores on one hand and the TE and theory scores on the other. First, the CWA scores were generally higher than the TE and theory scores, with means of 76.7 percent, 54.9 percent, and 55.3 percent, respectively. The CWA scores are more clustered compared to those of the technical experts and theory scores, as shown by the standard deviations. Table 3 presents a summary of performance and the number of pupils.

Table 3: Summary of the Theory, TE and CWA Categorized Scores and Percentage of pupils in Each Performance Category

No. and % of pupils in Each Performance Level							
Range of		Theory		TE		CWA	
Scores	Performance	N	%	N	%	N	%
60 – 100	Above Average	162	39.7	97	23.8	404	99.0
50 – 59	Average	144	35.3	183	44.8	4	1.0
0 – 49	Below average	102	25.0	128	31.4	-	-
Total		408	100.0	408	100.0	408	100.0

The table shows that an overwhelming majority (99%) of CWA scores were above average. It appears that the CWA scores may not have been valid because, for such a large sample of pupils the pattern of performance scores is expected to approximate a statistically normal curve (Roscoe, 1975). This was the case for the other two sets of performance data, the theory and the TE scores.

4.1.1 Differences between CWA and TE Sets Scores

From the range of scores, mean scores and standard deviations shown, the high values of the CWA scores may be explained by the following:

First, some of the pupils did not present genuine work. For example, in one of the sample schools, all items for the metal work project were clearly bought from the local market, as assessed by the technical experts and the researcher. It is expected that if assessors feel that a project item was not genuinely the work of a given pupil, they would disqualify the item. It was evident that the CWA panels did not disqualify such items, given that the items disqualified by the technical experts were scored very highly according to the CWA mark records. This resulted in the higher CWA scores.

Secondly, differences in the competencies of the two assessment panels. The Ministry of Education CWA assessment panels were constituted from among teachers. A panel from one educational zone or division would be used to assess pupils from a different one. The technical experts

on the other hand were tutors from a Primary Teachers training college, trained in Art and Crafts who had taught the subject at primary school level earlier. In addition, they were examiners with the KNEC for the teachers' examinations in Art and Craft. It is likely that the tutors were more competent than the members of the Ministry CWA panels.

Thirdly, it was presumed that probably the CWA panels compromised the expected standards of assessment since they were composed of school teachers who had interests in their own pupils. Perhaps the teachers were lenient with the pupils they assessed in the hope that those assigned to assess their own pupils would do likewise. On the contrary, the technical experts had no vested interests in the pupils' projects since they were not teaching them and were therefore likely to be more objective in their assessment compared to the school teachers.

From the analysis, the CWA scores were, on the whole, considered unreliable and not valid. The scores were therefore, not used for further analyses and discussions of the pupils' performance.

4.2 Hypotheses Testing

To test hypothesis 1, the categorized performance data was cross-tabulated against the categorized data on the status of facilities in the schools; and the chi-square test applied. Results are shown in Table 4.

Table 4: Relationship between Theory Art and Craft Performance and Status of Facilities in schools

Performance	Status of Equipment and Tools								
	Very Few/None		A Few				Sufficient/Very many		Total
	N	%	N	%	N	%	N	%	
Above average	49	12.0	64	15.7	49	12.0	162	39.7	
Average	60	14.7	46	11.3	38	9.3	144	35.3	
Below Average	65	15.9	34	8.3	3	0.8	102	25.0	
Total	174	42.6	144	35.3	90	22.1	408	100	

$\chi^2(4)$, $N = 408 = 38.89$, $P < .05$; $\chi^2_{critical}(4) = 9.49$, $P < .05$; Cramer's V value = 0.17

The chi-square value obtained at four (4) degrees of freedom was 38.89, while the critical value was 9.49 at 0.05 level of significance. Since the obtained chi-square value was larger than the critical value, the hypothesis was accepted.

To determine the strength of the relationship, the Cramer's measure of association was used. For this hypothesis, the Cramer's value V was 0.17. This value is quite low in the scale of 0 - 1 for the statistic, indicating that the relationship was not strong. Therefore, although facilities for teaching Art and Craft are positively related to performance in the theory examination, this relationship is a weak one.

4.2.1 Practical Performance Versus the Extent to Which Schools Were Equipped

The investigation on practical performance with regard to facilities was guided by Hypothesis 2 (H_2) to test this hypothesis; the categorized scores on pupils' performance from the technical experts' assessment were cross-tabulated

against the status of the facilities in the schools. The results are shown in Table 5.

Table 5: Relationship between pupils' practical performance and status of facilities in schools

Performance	Status of Facilities in schools							
	Very Few/None		A Few		Sufficient/Very many		Total	
	N	%	N	%	N	%	N	%
Above average	50	12.3	43	10.5	4	1.0	97	23.9
Average	74	18.1	95	23.3	14	3.4	183	44.8
Below Average	52	12.8	36	8.8	40	9.8	128	31.4
Total	176	43.2	170	42.6	58	14.2	408	100.0

$\chi^2(4)$, $N = 408 = 52.05$, $P < .05$; $\chi^2_{critical}(4) = 9.49$, $P < .05$; Cramer's V value = 0.26

The χ^2 value obtained of 52.05 is greater than the critical value, and therefore the hypothesis was accepted. There was a significant relationship between the extent to which schools were equipped and practical performance. The relationship was found to be stronger than for that of the theory scores, given that the Cramer's V value was 0.26, compared to only 0.17 for the theory scores. Thus, practical performance was more dependent on availability of facilities than theory performance. However, the relationship was still a weak one.

This study shows that performance in both the theory and practical components of Art and Crafts was related to the status of facilities in schools, but the relationship was not strong. The weak relationships can be explained from the fact that several other factors come into play in ensuring success in the learning process, including teachers' interests and commitment. In one of the very well-equipped schools in the area of study, the equipment and tools were found to have been generally under lock and key for most of the time, and the Art and Crafts teachers explained that there was very little time for practical work due to pressure of the Kenya Certificate of Primary Education (KCPE) examination and teachers' lack of interest in the subject. They also confessed that they had inadequate knowledge and expertise in the use of some of the equipment. Hence, the facilities were hardly ever used, leading to the type of situation that Mosha (1988) warned about when he cautioned that it is not just the amount of resources that counts with regard to performance; more important is how they are used. The availability of facilities makes practical work possible, all other factors being equal.

The issue of practical work and its effect on theory performance at KCPE has been studied by the Kenya National Examinations Council since the first examination in 1985. For instance, in the 1988 newsletter, the research team observed that:

There are indications that much of the (art) syllabus is being covered in a theoretical way, unrelated to practice. There were several instances this year when candidates gave answers which betrayed their lack of practical work (KNEC, 1988, p. 151).

Similarly, the newsletter of 1987 had observed that "they (pupils) are not being provided with sufficiently rich links between theory and practice" (p. 128). In addition, further research by KNEC established that those exposed to the

various equipment, tools, and practical situations perform better than those taught theoretically (KNEC, 1991). This suggests that even for the theory paper, the performance would improve substantially if pupils were more exposed to practical work.

These findings are in agreement with studies elsewhere. One of the problems highlighted by Talabi (1979) in his study on the teaching of Art in Nigeria was the lack of specialized rooms and facilities for the teaching of Art, rendering the learning process difficult.

Earthman (2002) from Virginia Polytechnic Institute examined several studies done related to conditions of school facilities as well as his own studies. He observed that the condition of facilities had an important impact on student performance as well as teacher effectiveness. He noted that there was a strong positive correlation between the overall conditions and student achievement. This further supports the premise that for the new Kenyan Curriculum to succeed, the facilities must be monitored regularly to ensure they remain in good working conditions. (Penn State University, 2015)

In another study, Hopeland (2013) carried out an investigation of school facilities and student achievement in industrial countries. The study covered eight countries including Australia, the Netherlands and Japan. He found that school facilities seem to have different impact across countries. In some cases, poor facilities had adverse consequences on student achievement, while in others, they appeared not to affect in the same way. The author suggested that further research is necessary in that area.

Achieving the goal of providing Kenyan schools with adequate facilities for practical subjects is no mean task due to the costs involved. These sentiments were expressed from various sectors of the society, including the media, church organizations and various other forums, since the commencement of the 8-4-4 system.

To counteract the effect of inadequate facilities for Art and Craft and other practical subjects in the schools in the area of study, it was established that there were great efforts to improvise from both the teachers and the pupils, particularly in the poor schools. The current government appears highly committed to supporting the new curriculum. It is important to keep focused on the cost of the programme amidst other development priorities in the country.

5. Conclusions

The overall performance was such that both the theory and the technical experts (TE) scores for the practical projects displayed fairly normal statistical curves. However, the Continuous Work Assessment (CWA) scores obtained by the Ministry of Education officials were highly skewed to the left, with 99.0 percent of the pupils in the sample obtaining A and B grades, that is, above average performance. In addition, the mean score for the CWA assessment was 76.7 percent compared to 54.8 percent for the TE scores, and 55.3 percent for the theory scores. The excessively high CWA grades raised questions and doubts concerning the reliability

and validity of the assessment process. Hence, the CWA scores were not used for further analysis and discussion in the study. The TE scores, therefore, represented the practical performance for this study. Given that the new curriculum is emphasizing on continuous assessment, the quality of teachers needs to be of high calibre for the grades to be authentic.

With regard to adequacy of facilities, the study found that there was a significant but weak relationship with performance, for both the theory and the practical components of the subject. The weak relationship between performance and status of facilities was attributed to other factors that influence the teaching-learning process, including teachers' interests and commitment, as well as pressure of the KCPE Examination. Consequently, in general, the available facilities in schools were found to have been underutilized, as teachers concentrated on drilling pupils to pass the (KCPE) Examination. The new curriculum is expected to have 100% transition rate to secondary school. This is positive and will hopefully ease pressure from teachers and assist in devoting more time to developing competencies intended by the curriculum.

It was also found that many of the schools that had good facilities did not use them adequately due to; shortage of time, lack of knowledge and skills on how to use some of the equipment and tools, and sometimes lack of interest on the part of teachers. Hence, availability of facilities did not guarantee good performance in Art and Craft. It is however important to provide these facilities, while working on the other factors that impede good performance in Art and Craft.

Some of the teachers also reported that they felt ill-prepared to teach Art and Craft, and were unable to use some of the equipment and tools. This is a pointer into what the authorities have to do before embarking on the implementation process.

6. Recommendations

- 1) Good performance in Art and Craft was found to be dependent on adequacy of facilities to some extent, although there was underutilization of the already available facilities. It was therefore recommended that improvisation be encouraged in schools. In addition, teachers' ability to improvise must be enhanced by preparing the teachers better for the teaching of the practical subjects, both at pre-service level and in-service levels.
- 2) It is also recommended that supervision and inspection of schools by the Ministry of Education be intensified, so that schools with Art and Craft facilities actually make use of them, while those without facilities intensify improvisation. The improved use of facilities would ensure that efforts by parents, communities, the Government, and donor agencies which provide the facilities are not wasted due to underutilization. Additionally, there is need to ensure that teachers in the poorer equipped schools hold practical sessions through improvisation.
- 3) To enhance pupils' and teachers' interest in the Art and Craft subject, it was recommended that more exhibitions

in Art and Craft activities be organized and be made accessible to pupils. This would enhance the teaching and learning of the subject and consequently, improve performance by exposing the pupils to a variety of practical activities. In addition, visits to "Jua kali" (informal sector in Kenya) sheds and industry would be useful for making the subject more practical and interesting.

7. Lessons Learnt for the Implementation of the proposed Curriculum Reforms

- 1) For the current programme to be successful, adequate financial resources should be set aside to ensure the schools are adequately equipped. However, equipping the schools should be accompanied by thorough preparation of teachers to be able to utilise the facilities provided.
- 2) The Continuous Work Assessment (CWA) which is a focus of competency based curriculum must be handled with a lot of caution. The CWA in the 8-4-4 System was not handled objectively.
- 3) There is still room to emphasise on Improvisation as much as possible. Many of the rural schools which did not have adequate facilities relied heavily on improvisation and the pupils' performed reasonably well in the practical work.

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Author Profile



Grace Nyagah is a holder of a PhD degree in Curriculum Studies. The immediate former Chair of the department of Educational Administration and Planning, University of Nairobi, Kenya, she is also a Senior Lecturer in curriculum studies and research methods. She has supervised several graduates for their doctorate and master's degrees. She is an external examiner for some universities. Dr. Nyagah has authored several articles in refereed journals. She has also participated in several conferences, seminars/workshops, research projects and consultancies in education, locally and internationally. She has a wealth of experience in the education sector including participation in curriculum development and other national activities.

