The Determinants of Learning Achievement of Public Primary School Pupils in Kenya
by
Professor Lucy Wairimu Kibera[1]
and
Professor Francis Ndungu Kibera[2]

Abstract

The Government of Kenya (GoK) initiated Free Primary Education (FPE) programme effective January, 2003. The purpose of FPE was to accelerate the realization of GoK's commitment to achieving Universal Primary Education (UPE) by 2005 and Education For All (EFA) by 2015. The introduction of FPE increased enrolment by 25% from 5.9 million in 2002 to 7.4 million in 2004.

The objectives of the Study were to establish the adequacy of human and physical resources to implement FPE; assess learning outcomes in terms of competency levels; examine the application of knowledge; and measure problem-solving skills. The review of related literature indicated that quality of education is correlated to, but not limited to learner, teacher and schools factors.

The pertinent data were obtained from a national stratified random sample of 24,119 pupils in public primary schools in standards 2, 4 and 6, and 985 teachers. A self-administered questionnaire gathered data from the teachers while the learning achievement levels were measured by pupil performance in tailor-made English, Kiswahili, Mathematics and Science tests.

The Study results revealed that school factors explained 22.5% of the variation in test scores, followed by teacher and pupil characteristics with 17.4% and 4.6% receptively. The results also revealed that pupils performed better in *knowledge* items compared to those that measured *application* and *problem-solving* abilities although overall, the pupils scored less than 50% of the recommended minimum learning achievement.

Introduction

There is substantial research evidence that a minimum of educational attainment among the majority of a country's population is pre-requisite to national development. For instance, Colclough and Lewin (1993) noted that compared to the post-primary sub-sectors, investment in primary education yields higher returns for individuals, households and society compared to post-primary sectors. This is because primary schooling improves economic productivity in the formal and informal sectors and has many positive social outcomes including reduction in fertility and infant mortality, improvements to family health and nutrition, and increased awareness of and participation in civic affairs. The Government of Kenya (GoK) recognised this fact on attainment of independence when it identified its development priorities as fighting the three social evils of ignorance, disease and poverty (GoK, 1965).

To fight the three social evils, GoK has, among other strategies, developed several educational policy frameworks. These frameworks are contained in the Kenya Education Commission (1964), The National Committee on Educational Objectives and Policy (1976), Report of the Presidential Working Party on Second University (1981), and Report of the Totally Integrated Quality Education and Training (1999). The educational policies especially those formulated soon after independence emphasised increasing enrolments at all levels of the educational hierarchy. There has, however, been occasional hue-and-cry concerning falling educational standards which tend to be attributed to the over-emphasis on quantity and curricula that are said not to be relevant to development needs.

[1] *Professor Lucy Wairimu Kibera, PhD, is Associate Professor, Sociology of Education, School of Education, University of Nairobi.*
[2] *Professor Francis Ndungu Kibera, PhD, is Professor of Strategic Marketing, School of Business, University of Nairobi.*

Since January 2003 GoK has been implementing the Economic Recovery Strategy for Wealth and Employment Creation (2003-2008). According to this blueprint, education provides an exit route from poverty which is one of the key targets of the Millennium Development Goals for 2015 (MDGs, 2003).

The Millennium Development Goal on education aims at achievement of universal primary schooling for both boys and girls. More recently, the Sessional Paper No. 1 of 2005 and the Kenya Education Sector Support Programme. However, mainly because of scarcity of resources, the issue of quality and relevance are yet to be fully addressed. Kenya educations Sector Support Programme (KESSP) (2005-2010) emphasize the strategic role that primary education is expected to play in the social and economic development of the country. The role of education in the country's development has also been identified in Sessional Paper and Vision 2030 one of the strategic pillars.

According to the Sessional Paper No. 1 of 2005, the policy of the Government on primary education is to achieve universal primary education (UPE) by 2005 and to attain the Education For of All (EFA) by 2015. The policy of the Government on primary education as per the sessional paper is to achieve universal primary education (UPE) by 2005 and the education for all (EFA) by 2015. In achieving these targets the stakeholders should also ensure quality at all levels of the education system. This pursuit would be consistent with the spirit of the Master Plan in Education and Training (1997-2010) which embraces attainment of literacy and numeracy, and nurturing scientific and social skills including service to others and to the society. The UNESCO (2005) has also asserted that quality is at the core of any education development system.

A review of the relevant literature has revealed that only a few rigorous empirical studies have attempted to measure quality and the learning achievement of primary school pupils in Kenya and the relative importance of learner characteristics and institutional factors that impact the learning process Southern Africa Collaboration for Monitoring Education Quality (SAGMEQ, 1998; and 2000), United Nations Education Scientific Cultural Organisation (UNESCO 2001), Educational Commission of Zambia (ECZ 2001). These studies have, however, assessed learning achievement in two subjects namely, Mathematics and Literacy for one class and have not covered in-depth the achievement of various levels of the cognitive domain. The study reported herein is wider in terms of subject scope, number of class levels, and in the levels of the cognitive domains.

Objectives of the study

The primary objective of the current study was to establish the extent to which the goals of primary education and particularly those related to acquisition of numeracy, literacy and problem solving skills are being achieved. These skills were assessed through content subjects namely, Kiswahili and English (literacy), mathematics (numeracy) and science (problem solving) skills. These were measured in terms of cognitive skills embracing knowledge, comprehension and application which were hypothesized to be influenced by pupil and teacher characteristics and school factors.

The specific objectives of the study were to:
- determine the overall learning achievement of pupils in public primary schools in English, Kiswahili Mathematics and Science subjects;
- establish the influence of pupil characteristics of public primary schools on learning achievement in English, Kiswahili, Mathematics and Science subjects;
- assess the influence of teacher characteristics on learning achievement of pupils in public primary schools; and
- determine the effects of school-related factors on learning achievement.

Conceptual framework

A review of the literature has revealed that a multiplicity of factors infuence quality of education, teaching and learning achievement in primary schools. The three broad categories of the factors that are

said to influence learning achievement and other outcomes are the *antecedents* (contextual factors, learner characteristics and school-related factors), and the *mediators* (learning time, teaching approaches, assessment, feedback and incentives). A brief discussion of each category of factors is given hereunder.

Contextual factors and learning achievement

National educational policies, socio-economic parameters and cultural factors provide the context in which teaching and learning take place and ultimately the learning achievement levels attained by the pupils. For example, resources available in a community are likely to influence the quality of education provided. Schools without teachers and teaching materials are unlikely to provide suitable environments for effective teaching (Elimu Yet Coalition, 2003).

Learner characteristics

The way pupils learn is influenced by their capabilities and background experience. Therefore in assessing education output it is important to understand the pupils' socio-economic background, health and nutrition status. The other learner characteristics that may affect learning outcomes and levels of achievement include gender, age, aptitude, emotional stability and motivation, attitudes towards schooling, and their home background (UNESCO, 2001).

School-related and mediating factors

Quality education involving acquisition of knowledge skills and value systems through the syllabus content is expected to teach children how to learn, solve problems, make sound judgment and apply them in flexible and innovative way. The principal factors likely to influence negatively on quality of Primary Education are inadequate preparation by teachers, supervision and support of teachers to cope with changes in education (GoK, 2005). Somerset (1974) found that unavailability of adequate teaching/learning resources, physical facilities, inadequate mechanisms for assessing learning achievement and feedback, and limited reading materials all affect the quality of education offered in schools.

However, although teaching and learning are closely related to inputs and contextual factors, their impact to a large degree is felt on the curriculum programme if pupils are motivated to participate in the learning process in and out of the classroom. The analysis of teaching and learning in the classroom includes the subject content and its interpretation and implementation by teachers, their qualifications, age, gender, and level of motivation, classroom organization, class discipline, homework policies, teaching and learning approaches, monitoring and assessing pupils' progress and achievement levels by teachers, among others.

Further, teaching/learning resources and support systems which were expected to influence learning achievement were measured in terms of desks for pupils, playing field, chalk/chalkboard, teaching aids, pens/pencils, erasers, mathematical sets, rulers, wall maps, exercise books, teaching guides, library books and classroom space. The influence of the variables discussed hereabove, were used to examine learning achievement levels by class, gender, region and province.

Criteria for quality of education

Studies on learning achievement such as the United Nations Education Scientific Cultural Organisation / United Nations Children's Education Fund (UNESCO/UNICEF) Monitoring Learning Achievement Minimum Learning Achievement (MLA, 2000) programme and Southern Africa Collaboration for Monitoring Education Quality (SACMEQ) *Studies on the Conditions of Schooling and Quality of Education (1999)* have provided educational planners with the technical information required to monitor educational development and the general conditions in which schooling takes place for the purpose of

planning improvements in education system. In addition to providing this pertinent information, the current study focused on issues that would assist in establishing levels of achievement in various levels of cognitive domains.

A number of classifications of educational objectives have been developed. The most dominant among these is the Taxonomy of Educational Objectives developed by Bloom et al (1956). The taxonomy classifies learning into three domains: cognitive, affective (teaching values) and psychomotor (manufacture skills). The taxonomy has a hierarchy of capabilities within each domain. This taxonomy is mainly intellectual and is widely used in assessment of learning achievement at different levels of education system.

The taxonomy of educational objectives in cognitive domain was adopted for use in the current study, as it clearly articulates learning domains, and because the inclusion of other domains would have made the scope of the study unnecessary wide. The taxonomy of educational objectives classifies the cognitive domain into six (6) levels, namely, knowledge of facts, comprehension, application, analysis, synthesis and evaluation. The current research focused on the first three categories. The rationale for this is that the targeted learners were Standard 2, 4 and 6 pupils within the age bracket of 6 and 13 years by which time the cognitive skills are expected to be mastered (Piaget, 1950).

The importance of establishing the extent to which various aspects of cognitive domain have been achieved at primary level is that this level lays the foundation for all the other levels of education. In addition, it has been claimed that most educational systems in less developing countries load their recipients with knowledge which lacks in understanding and application. Indeed Peters (1966) described such bodies of knowledge as lacking "cognitive perspective" because recipients do not see the relationship of the knowledge that they possess with other fields of knowledge including its application to solving socio-economic, moral and political problems. School leavers like these are described by Nyerere (1979) as "creatures and not creators". They are said to be unable to be self-reliant and productive even when they are unemployed partly because they have not sufficiently understood the bodies of knowledge acquired and their application and challenges to real life problems (MoEST, 2005). Instead they look for salaried employment even though they have been declining since late 1960's (Stabler, 1969).

Approach and methodology

Research design

The current study used a correlational descriptive research design. The objective in a descriptive study is to learn the: who, what, when, where, the how, of a topic. The second objective is study relationships among the relevant variables.

Target population

The study targeted the population of over 18,000 public primary schools in Kenya. Each of the eight (8) Provinces produced a sample of districts and schools. The study units (schools) produced a sample of respondents from Standard 2, 4 and 6 who included pupils, teachers, and headteachers. The target population captured essential characteristics in teaching and learning including their gender, academic and professional qualifications, and other socio-economic characteristics.

Sampling frame and sample size

The sampling frame was the official list of the 18,232 public primary schools maintained by the Ministry of Education, Science and Technology. Excluded from the sampling frame were special education units and private and non-formal schools. All the names of the eligible schools were keyed into computer software (SPSS Version 12.0).

In order to generate a representative sample, a random sample of 30 (40%) out of 75 administrative districts and 7 Local Education Authorities was computer generated. Thereafter another random sample of 250 primary schools was selected from within the 30 randomly selected districts. The selection of the sample of 250 public primary schools was done in such a way that all the eight provinces were represented proportionally to their pupil population. The schools were further stratified into geographical dimensions of agricultural/rural areas; arid and semi-arid areas (ASAL) and urban areas. Table 1 shows the sampled schools by province and geographical/ecological characteristics (Annex 1).

A sample of 30,000 pupils was targeted from the 250 public primary schools. Some 120 pupils were therefore randomly selected from each school; 40 each from Standard 2, 4, and 6. This sample was considered large enough for a study to establish learning achievement levels (literacy, numeracy and problem-solving skills) for pupils in the specified classes in Mathematics, Science, Kiswahili and English subjects. Other respondents targeted for the study included 250 headteachers from the sampled schools, and three (3) class teachers per targeted school, one each for Standards 2, 4, and 6.

Data collection instruments

The data collection questionnaires tapped information on the prevailing conditions in schools in terms of teaching/learning environment and learning achievement. The study collected both quantitative and qualitative data. The quantitative data on school teaching and learning environment data were collected using questionnaires while the qualitative data on learning achievement were collected by learning achievement tests and focus group discussions (FGDs). Focus group discussions (FGD) were held in 65 (26%) out of the 250 sampled schools.
The questionnaires elicited data relating to school, teacher and pupil characteristics. The study questionnaires were administered to Standards 4 and 6 only because of the low level of literacy of Standard 2 pupils.

The headteachers' questionnaire elicited information on personal data, school teaching staff details, school operations, and school facilities. The teachers' questionnaire covered factors relating to classroom teaching, learning, and learning assessment. Demographics and socio-economic characteristics were also included in the pupils', teachers', and headteachers' questionnaires. A teaching/classroom observation schedule was completed for each of the three classes in all the 250 schools.

Learning achievement benchmarks

To provide a basis for analysis and comparison, the study performance benchmarks at the score of 50% and 70% as minimum and desired learning achievement levels respectively were set. The concept of minimum learning achievement level (MLALs) is derived from the desire for mastering learning, which is based on the belief that as pupils go through a prescribed course, they attain a defined level of mastery and therefore learning achievement. The World Conference on Education For All and the African countries participating in the UNESCO Monitoring Learning Achievement (MLAL) Project in 2000 agreed on a score of 50 % as the score for minimum learning achievement level (MLAL) and a score of 70% as the desired learning achievement level (DLAL). It was also agreed that 80% of each age cohort should attain the desired learning achievement level.

The curriculum areas tested in all the sampled schools were Mathematics (numeracy), English and Kiswahili (basic literacy) and Science (life/problem-solving skills). All the 4 subjects were tested in Standards 2, 4, and 6. In all, there were twelve (12) tests administered to different classes in the four subject areas. The pupils were expected to read the texts and respond to the questions in a paper-pencil format. The tests consisted of multiple-choice items. The pupils had to select the correct answer from the four options provided. The test items in the targeted subjects covered the syllabus in the first term of the school year (2005) as defined by the Ministry of Education, Science and Technology.

The test items were designed by subject content areas and cognitive domains as outlined by Bloom (1959) taxonomy of educational objectives, namely, knowledge, comprehension and application. The items on knowledge domain evaluated pupils' ability to define, describe, identify, name, select and outline specific facts while those on comprehension required pupils' understanding of subject content learnt. At this cognitive level, pupils were expected to distinguish, explain, summarize, and give examples of the issues being discussed. To demonstrate ability to apply what is learnt, pupils were expected to perform such tasks as compute, discover, modify, operate, relate issues and solve everyday problems using available information.

Data analysis

The data analyses yielded results in terms of frequencies, tabulations, percentages, mean scores and standard errors. Percentages were calculated to show different features and characteristics of the sampled pupils, teachers, and the learning environment. Test performance percentages were obtained for national, provincial, district, regional and gender variables. To assess the relative importance of various factors that impact learning process, multiple regression analyses were carried out. The results were interpreted against the UNESCO-UNICEF (2000) recommended standards, the minimum learning achievement level (MLAL) at the score of 50% and the desired learning achievement level (DLAL) at 70% for each subject respectively.

Study Findings

Pupil's Profile

The achieved sample had a total of 24,119 pupils (80.4%) of the targeted group. The pupils' bio-data in terms of age showed that a large proportion of pupils were older than they should have been at class 4 and 6 respectively. Thus only 42.4% and 9.11% of pupils in classes 4 and 6 were ideally of age and 11 years as they should have been. The presence of large numbers of older children in primary schools can be explained by the fact that pupils who could not otherwise have been able to access education were able to do so when the Government of Kenya launched the Free Primary Education in 2003.

The socioeconomic background for pupils was assessed through parent's level of education, presence of both parents in the family, number of siblings, availability of food in the family, and the ecological region of the domicile. The relevant results revealed that fathers were more educated than mothers irrespective of the region. This is consistent with the national statistics on literacy levels of males and females in Kenya by ecological zone.

In assessing whether pupils had sufficient food to enable them learn properly, they were asked to indicate whether they had enough breakfast, lunch and supper. Some 74% of the sample pupils said they ate adequate breakfast; 83% ate lunch and 87% ate supper. However, only a relatively low proportion (29.3%) indicated their schools offered the lunch. In terms of adequacy of meals by region, the majority of pupils from the urban areas, followed by ASAL said they did not have enough breakfast, lunch and supper. This means that the parents, as expected, are still very much involved in facilitating learning of their children through provision of food. Further, it was observed that majority of pupils come from large families since at least 72% of the sample pupils said they had 1-3 brothers while the same percentage stated that they had 1-3 sisters. The implication is that the available resources are shared among many children, a situation which is likely to have a negative impact on learning.

Results of school-related factors on learning achievement

The school-related factors that influence pupils' learning include textbooks, writing materials, class attendance, teacher characteristics and pupil motivation. These factors have been examined in relation to the location of schools and gender. The textbooks that were covered by the study were those for Kiswahili, English, Mathematics and Science. Among all the pupils covered by the study, 90.6% said

they had Kiswahili books; 91.8% had English books; 90.3% had Mathematics books; and 85.9% had Science books. This information shows that textbooks are adequately available for all the four subjects.

The pertinent results revealed that a majority of the sample pupils, irrespective of gender and region, indicated they had textbooks for all the four subjects. However, higher proportions of girls than of boys reported possessing the textbooks in all regions. Overall the results imply that the Simba Account instituted by the Ministry of Education since the launching of the Free Primary Education Programme (2003) is "properly" being utilized to buy textbooks.

However, further scrutiny revealed that for Standard 4 about half (50%) of the pupils mentioned that each of the four books is shared with another three (3) pupils. Only about a quarter (25%) of Std 6 pupils said that they share each of the books with three other pupils. This implies that up to now the provision of textbooks is still below the benchmark ratios of 1:2 for Std 6 and 1:3 for Standards 2 and 4. This information was collaborated by the responses on contextual factors by the headteachers.

Learning achievement levels by class and subject

The overall test performance scores were analysed by class and subject as indicated in Table 1.

Table 1: Test performance mean scores by class and subject

Class	English		Kiswahili		Mathematics		Science	
	Mean Score	S.E	Mean Score	S.E	Mean Score	S.E	Mean Score	S.E
Std 2	54.38	0.256	56.44	0.289	68.17	0.234	63.01	0.236
Std 4	45.11	0.190	55.61	0.186	52.55	0.199	42.08	0.165
Std 6	56.04	0.175	55.65	0.129	54.84	0.136	40.45	0.157

Note: *Standard Error (SE) of measurement can be regarded as an index of test scores reliability. In fact the SE of measurement can be determined directly from the reliability coefficient and the standard deviation of the test scores.*

The results contained in Table 1 show that Standard 2 pupils performed better in Mathematics and Science than in the languages and that all their mean scores were above MLAL of 50%. The mean scores for Standard 4 in English and Science were below MLAL whereas those of Kiswahili and Mathematics were above MLAL. Further, performance by Standard 6 pupils was higher than MLAL benchmark except in the case of Science. It is also worth noting that the test performance mean scores at the national level were all below the desirable learning achievement (DLAL) at 70%. Further data analysis by various variables of investigation as measured by mastery of various dimensions of cognition therefore was deemed necessary in order to reveal any underlying differences that may have been hidden in the "national" mean scores.

Mean test scores of learning achievement levels by selected pupil demographics and cognitive domain

Analysis of the data by class, subject, gender and mastery of cognitical levels of understanding was undertaken for the purpose of showing the extent to which the pupil characteristics influence learning achievement levels in schools.

Learning achievement of pupils demographics by cognitive domains

The assessments of cognitive skills in this study therefore were collapsed into three broad categories that cover this age level: knowledge, comprehension and application. According to Piaget (1950) primary

school pupils have to some degree mastered the first three levels of cognition, namely knowledge, comprehension and application. Table 2 presents test performance scores by class, subject, gender and the cognitive domains.

Table 2: Learning achievement test mean scores by class, subject, gender and cognitive domains

C	Gender	English				Kiswahili				Science				Maths			
		Knowledge	Comprehension	Application	Total	Knowledge	Comprehension	Application	Total	Knowledge	Comprehension	Application	Total	Knowledge	Comprehension	Application	Total
2	B	27.04	18.84	6.94	**52.82**	35.09	9.72	9.83	**54.64**	38.45	18.84	4.69	**61.98**	38.07	24.47	5.06	**67.6**
	G	28.65	20.12	7.15	**55.92**	37.60	10.26	10.46	**58.32**	39.74	19.34	4.79	**63.87**	38.70	24.89	5.12	**68.71**
4	B	17.63	15.37	11.35	**44.35**	27.77	17.14	9.91	**54.82**	17.37	15.78	8.68	**41.83**	23.24	20.24	9.70	**53.18**
	G	18.34	15.93	11.68	**45.95**	28.30	17.55	10.08	**55.93**	17.16	15.67	8.63	**41.46**	22.64	19.69	9.39	**51.72**
6	B	27.37	13.64	14.09	**55.1**	28.34	13.75	12.36	**54.45**	18.78	13.38	8.97	**41.13**	19.97	17.53	5.96	**43.46**
	G	28.21	13.99	14.60	**56.8**	28.66	13.91	12.53	**55.1**	18.10	12.95	8.66	**39.71**	19.14	17.20	5.52	**41.86**

Key: Ge = Gender   C = Class   B = Boy   G = Girl

The results in Table 2 indicate that in Standard 2, girls performed better than boys in all subjects and cognitive domains. However, Standard 4 and 6 boys performed better than girls in Science and Mathematics in all the domains while girls performed better than boys in languages in all the domains. This performance is consistent with pupils' performance in the Kenya Certificate of Primary Education (Kenya National Examination Council, 2007).

Learning achievement by ecological zones

The study also sought to assess whether there were differences in the test mean scores across the Arid and Semi Arid Lands (ASAL), rural/agricultural and urban areas. The relevant results are summarized in Table 3.

Table 3: Overall test performance mean scores by region and cognitive domains

Region		Knowledge	Comprehension	Application	Total	MLAL	DIAL
ASAL Areas	Mean Score	28.10	17.23	9.41	**54.74**	50	70
	S.E	.087	.048	.030	**0.165**	50	70
Agricultural/rural Areas	Mean Score	25.0	16.03	8.33	**49.36**	50	70
	S.E	.049	.029	.018	**0.096**	50	70
Urban Areas	Mean Score	26.97	16.72	8.96	**52.65**	50	70
	S.E	.041	.024	.015	**0.08**	50	70

The results in Table 4 show that the test mean scores across the three cognitive domains were highest in the ASAL region and lowest in the agricultural/rural areas. Further analysis by subject, class and region was carried out in order to unearth any performance differences that might be explained by contextual and school-related factors. The relevant results showed that all pupils, irrespective of the region, scored highest in the knowledge domain. For Standard 2 the highest mean score attained, irrespective of the region, was for Mathematics; for Standard 4 it was Kiswahili; and for Standard 6, English.

Standard 2 pupils in agricultural/rural areas achieved higher mean scores in Science and Mathematics than in literacy subjects while Standard 4 and 6 pupils performed much better in Kiswahili and English than in the quantitative subjects. The scores of ASAL pupils were similar to those of pupils of agricultural areas. Urban area pupils performed better in knowledge domain of language subjects than the pupils in the other two regions.

The final part of this analysis involved comparison of test scores by region, class, subject and gender. The relevant results show that, although there are variations in test performance within a region, there are no substantial differences in performance between regions across cognitive domains. That is, test performance by region, by subject, gender and domains is similar to the test performance for provinces with girls performing much better than boys in Standard 2. Girls also did better in languages than boys in Standard 4 and 6. On the other hand, boys did better than girls in Science and Mathematics in Standard 4 and 6.

(a) *Contribution of pupil characteristics to learning achievement test scores*

In determining the relative importance of pupil characteristics on learning achievement a regression analysis was used to carry out the relevant computations. The results showed that the identified pupil characteristics (age, class of the pupil, parental level of education, index family size and gender) explained only 4.6% of the variation in the learning achievement in public primary schools. The relative importance of the various pupil characteristics are presented in Table 4.

Table 4: *The relative importance of pupil characteristics in influencing learning achievement*

Pupil Characteristics	B	Standard error	Standardized Coefficients (Beta)	t-value	Significance Level
Constant	61.662	5.042	-	12.231	0.000
Age of the pupil	-.329	1.452	-0.020	-.227	0.821
Class of the pupil	-.714	1.922	-.033	-.0372	0.711
Parents education index	.517	1.629	.028	.317	0.751
Family size (No. of brothers and sisters)	-2.463	1.752	-.122	-1.406	0.162
Gender	-.3112	1.622	-.166	-1.919	.057
Dependent variable: Overall School Mean Scores					

As shown in Table 4, the most important predictor of the learning achievement test mean scores in relative terms is gender (Beta = -1.66 and α =0.057) of the pupil followed by the size of the pupil's family which is an inverse proxy measure of resource availability at home. Further analysis showed that the pupil characteristics had highest impact in urban schools (76.2%) followed by schools in the ASAL region (17.0%) while in agricultural region they had only (0.03%). These results are consistent with those of other studies which have shown that in urban schools, the facilities are not as important as pupil characteristics. Indeed family size (number of brothers and sisters) has the greatest impact in the urban areas. This is followed by gender in the ASAL and rural schools. The class (standard) was ranked second in the urban areas and third in ASAL and agricultural/rural area based schools.

The effect of teacher characteristics on learning achievement

According to the survey results a majority (76.9%) of the teachers have college education and teaching experience of over ten years (73.5%). This implies that they are highly conversant with the technical and practical aspects of teaching. The analysis of teacher characteristics to learning achievement in terms of the assignments and tests they gave to pupils, remedial teaching, attitudes toward work, involvement in co-curricular activities, their levels of motivation, class indiscipline, and their perceptions on the adequacy of teaching-learning explained 17.4% of variants in test performance scores.

This suggests that the teacher-related factors explain about four times the variation of the test performance scores explained by pupil characteristics. To establish relative contribution each of these teacher-characteristics on learning achievement further analysis was carried out. These results are contained in Table 5.

Table 5: The relative importance of teacher related factors on the learning achievement tests scores.

Teacher related factors	Unstandardized Coefficients		Standardized Coefficients	t-value	Significance level
	B	S.E	Beta		
(Constant)	70.947	5.923	_	11.978	.000
Gender of the teacher	-5.551	1.371	-0.274	-4.050	.000
Highest Professional Qualification of the teacher	-1.433	.963	-0.100	-1.489	0.138
Teachers' experience	-.168	.788	-.014	-.214	.831
Teachers involvement in co-curricular activities	-.967	.682	-.102	-1.417	.158
Teachers' in-service training	-1.308	.567	-.155	-2.307	.022
Extent of teachers indiscipline	-.525	1.039	-.035	-.506	.613
Number of assignments given by the teacher	.212	.398	.037	.531	.596
Adequacy of school learning/ teaching resources	-1.222	1.305	-.067	-.937	.350
Teacher/ school inspection	-.960	.497	-.166	-1.933	.055
Distance of teacher's residence from school	-.024	.418	-.004	-.056	.955
Teacher's level of motivation	1.152	1.490	.054	.773	.440
Extent of syllabus coverage by teachers	-.742	.741	-.068	-1.001	.318

The study results presented in Table 5 indicate that teachers' gender, teacher/school inspection, and in-service training are, in absolute terms, the most important factors. Other important factors are involvement in co-curricular activities, adequacy of teaching/learning resources, and the extent of syllabus coverage. The policy implication in this case calls for continued in-service training of teachers; enhanced teacher/school inspections by the Directorate of Quality Assurance and Standards; and provision of additional teaching/learning resources.

c) *The influence of school-related factors on learning achievement*

The influence of school-related factors data were captured as educational qualifications of headteachers, their experience, school homework policies, the availability of textbooks, other teaching/learning materials and the region in which the school was located. The analysis of school related factors by region revealed that school resources in influencing learning achievement test scores is depicted in Table 6.

Table 6: Relative importance of school resources on test mean scores by region

School-related factors	ASAL		Agricultural/Rural Areas		Urban areas	
	Constant / Beta	Significance level	Constant/ Beta	Significance level	Constant/ Beta	Significance level
Constant	95.624	.000	50.842	.000	71.377	.012
Textbooks accessibility	-.263	.173	-.005	.952	-.208	.368
Timeliness with which resources reach school	-.017	.922	-.030	.717	.320	.261
Adequacy of learning/Teaching resources	-.171	.365	-.079	.424	.125	.765
Condition of school facilities/structures	.013	.945	.105	.294	.410	.131
Number and condition of toilets	-.151	.345	-.132	.146	.175	.465
SMC participation index	-.351	.064	.013	.872	.188	.525
Adequacy of financial and material resources	-.010	.957	.320	.000	.601	.114
Resources/interventions from GoK	-.580	.003	-.005	.958	-.585	.170
Adequacy of funds provided for textbooks/ teaching materials	.398	.048	-.056	.519	-.388	.202
In-service training of teachers	-.077	.637	.107	.167	-.274	.488

Quality of teachers	.255	.135	-.199	.165	-.506	.128
Number of homework assignments	.021	.897	.070	.382	.304	.370
a. *Dependent Variable: School test mean scores*						

The results in Table 6 show that adequacy of financial and material resources is most important in agricultural/rural and urban areas while Resources/interventions from GoK, adequacy of funds for textbooks/teaching materials and SMC participation are important in the ASAL areas.

Summary, conclusion and suggestions for further research

A key factor in the study of learning achievement was the establishment of the proposed and operationalization of learning achievement benchmark levels. These are 50% for the minimum learning achievement level (MLAL) and 70% for the desirable learning achievement level (DLAL).

The study results show that overall test performance mean scores were highest for Standard 2 class followed by those of Standard 4 and 6 in that order. In addition, the mean scores for girls in Standard 2 and 4 are higher than those of boys whereas the mean scores for boys in Standard 6 are higher than those of girls.

In addition, the study results revealed that pupils in Standard 2 obtained higher performance levels than Standard 4 and 6 in Kiswahili, Mathematics and Science. However, the performance mean scores for Standard 4 were lower than those of Standard 6 except in Science. In terms of performance by subject and gender, the results indicated that Standard 2 girls' performance in all the four subjects was higher than that of boys. In addition, the girls in Standard 4 and 6 performed better than boys in languages (English and Kiswahili). However, boys in classes 4 and 6 performed better than girls in Mathematics and Science. *Pupils irrespective of gender and subject examined attained highest mean scores in knowledge domain followed by comprehension and application in that order.*

Further analysis of the test scores by Standard revealed that in Standard 2, girls performed better than boys in all subjects and corresponding cognitive domains. In the case of Standard 4 and 6 boys performed better than girls in Science and Mathematics in all domains but girls performed better than boys in languages in all domains. This strongly suggests that teacher education should be re-engineered so that it is able to equip teachers in pre-service with pedagogical skills that nurture and enhance development of higher levels of cognitive domains. In-service courses which equip the serving teachers with the same knowledge should be intensified.

In terms of regions the results revealed distinct differences in learning achievement levels. The urban areas attained the highest mean score (52.65%) followed by agricultural/rural areas (46.36%) and the ASAL region (45.45%). Further, the pupils scored best in knowledge domain irrespective of the region. For Standard 2 the highest mean score attained, irrespective of the region, was Mathematics; for Standard 4 Kiswahili had the highest mean score; and for Standard 6 English was the best-performed subject. The study's regression analysis results revealed that five *pupil characteristics*, namely gender, age, class, family size, and index of parents' education explain a mere 4.6% of variation in the learning achievement test scores. In relative terms the most important factor was gender followed by family size which is an inverse proxy measure of resource availability at home.

In addition, the study results revealed that pupil characteristics had highest impact on learning achievement in urban area schools followed by the ASAL schools. Family size had the highest impact on pupils performance in both urban and ASAL schools. In the agricultural/rural-based schools, gender was found to be the most important factor. The regression analysis results also showed that teacher-related characteristics explain 17.4% of variations in the test mean scores. Teachers' gender, teacher/school inspection, and in-service training are the most significant factors. The policy implication here calls for continued in-service training of teachers; enhanced teacher/school inspections by the Directorate of Quality Assurance and Standards; and provision of additional teaching/learning resources.

The regression analysis further revealed that *school resources explained 22.5% of the variation in learning achievement test scores.* Provision of financial and material resources, adequacy of school facilities/structures, and interventions from GoK and quality of teachers are the four most important school-related factors that impact on learning achievement. Finally, the school-related factors had highest impact on the test mean scores of urban pupils followed by pupils in the ASAL region.

On the basis of the analysis summarized hereabove, it can be concluded that pupil characteristics, teacher-related factors and school-related resources impact the learning achievement of primary school pupils in terms of literacy, numeracy, and problem solving skills. Therefore, all public primary school stakeholders should enhance and/or introduce the relevant intervention measures in order to improve the learning achievement. It should, however, be noted that the three sets of factors jointly explain a total of 44.5% of the variation in the test mean scores. This means that other factors also account for the learning achievement. Such factors may include pupils' psychological (internal) factors such as intelligence, personality, attitudes and personal motivational factors. Future research should therefore assess the relative importance of psychological factors of both pupils and teachers among other factors.

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