



Research Paper

Teacher quality factors and pupils' achievement in mathematics in primary schools of Kyondo Sub-county, Kasese District, Uganda

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ABSTRACT

According to the National Assessment Program in Education (NAPE) report (2015), pupils' proficiency (achievement) level in mathematics (numeracy) is low at primary six. Also teachers are essential to pupils' achievement in mathematics; their characteristics such as commitment, qualification, teaching abilities are significant to pupils' levels of achievement. The success or failure of any academic program depends largely on the teacher ability to deliver which is a function of teachers' qualification, experience and commitment. This study examined the teachers' quality factors that are thought to affect pupils' achievement in mathematics in primary six. The study used teachers and pupils, to obtain data, a total of 70 respondents were randomly selected from five primary schools of Kyondo sub-county, Kasese district. Basing on the findings of the study, it was revealed that first, the teachers' qualification and experience are not significant to pupils' level of achievement in mathematics. While teachers' level of commitment is highly significant to the pupils' level of achievement in mathematics. Therefore the low level of pupils' achievement in mathematics at primary in Kyondo sub-county is mainly as a result of low levels of teacher commitment to classroom activities.

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Key words: Achievement, quality factors, commitment, qualification, experience, proficiency.

INTRODUCTION

In Uganda, as in most countries, Mathematics is one of the compulsory core subjects in primary and lower secondary levels of education. This is intended to improve mathematical literacy, and steer the country towards economic growth and development.

According to Kasirye (2009), pupils' achievement in mathematics is low in Uganda as compared to the rest of the east African countries as indicated in Table 1. Teachers' quality factors are defined according to the advanced learners' dictionary as- the complex of characteristics that distinguishes a teacher or a group; especially: the totality of an individual's behavioral and emotional characteristics. This study adopts the definition of teachers' quality factors as characteristics or traits exhibited by the teacher. It is

assumed that these traits have an effect on the teacher's role of teaching. Characteristics such as teachers' commitment in teaching, teachers' qualification and experience (Adeniyi and Ayinla, 2012) were also considered in this study.

Achievement in Mathematics in this study measures the amount of mathematical concepts a pupil learns in a prescribed amount of time. Each grade level has learning goals or instructional standards that teachers are required to teach. It is indicated by the grade levels of pupils, pupils' level of participation in mathematics class and pupils' ability to apply mathematical reasoning. In addition, achievement is used interchangeably with proficiency level; a pupil who reaches the required proficiency level is also

Table 1: Pupils' achievement in mathematics in East and South African countries.

Country	Mathematics score*	Rank
Seychelles	554	3
Kenya	563	2
Tanzania	522	5
Mauritius	584	1
Swaziland	516	6
Botswana	513	7
Mozambique	530	4
South Africa	486	9
Uganda	506	8
Zanzibar	478	10
Lesotho	447	11
Namibia	431	14

*The mathematics score was based on all test items.

Table 2: Percentage of P.6 and P.3 pupils rated proficient (achievers) in mathematics (Numeracy) in the year 2007 to 2015.

Year	2007	2008	2009	2010	2011	2012	2014	2015
P.6	41.4	53.5	53.3	54.8	45.6	45.2	39.4	46.2
P.3	44.7	71.4	71.3	72.8	63.0	69.9	72.7	71.8

Source: (NAPE report, 2015).

assumed to have achieved.

Main objective

The main objective of this research is to establish the effect of teacher quality factors on the pupils' achievement in mathematics at primary six.

Research hypotheses

There is no correlation between teachers' qualification and pupils' achievement levels in mathematics. The research hypotheses are:

H₁: There is no relationship between teachers experience and pupils' achievement levels in mathematics;

H₂: There is no correlation between teachers' commitment and pupils' achievement in mathematics.

MATERIALS AND METHODS

The study used respondents who included 18 mathematics teachers and 52 primary six pupils. The sample was randomly selected from five primary schools in the sub-county. The achievement levels of primary six pupils were measured using a standard mathematics test adopted from the international benchmark tests for English, mathematics

and science. A quantitative design was used and the study was based on three hypotheses which were related to teacher quality factors; the teachers' qualification, teachers' level of commitment and teachers experience. The qualification was measured in terms of education, while experience was measured in terms of years spent while teaching mathematics and commitment measured in terms of the amount of time spent on teaching mathematics, number and frequency of evaluation, preparation and dealing with individual pupils. A closed ended questionnaire consisting of aspects about teacher quality was developed, tested and administered to the mathematics teachers. The analysis was done using the Statistical Package for Social Scientists (SPSS) and Microsoft excel. Pearson correlation measure was used as a basis of analysis and testing of the null hypotheses stated for the study.

RESULTS AND DISCUSSION

Descriptive statistics for achievement levels in mathematics at primary six

According to the National Assessment Program in Education (NAPE) report (2015), pupils' proficiency (achievement) level in mathematics (numeracy) is low at primary six (Table 2). Table 3 illustrates that the mean achievement level is 35, the mode is 40, the median is 36, while the standard

Table 3: Descriptive statistics for achievement levels in mathematics at primary six.

Statistics	Value
Mean	35
Median	32
Mode	40
Standard deviation	0.29
Kurtosis	0.23
Skewness	0.13
Range	63

Table 4: Descriptive statistics for achievement levels in mathematics by gender.

Statistics	Female	Male
Mean	31.8	38.6
Median	32	36
Mode	24	32
Standard deviation	11.5	11.9
Kurtosis	0.97	-0.77
Skewness	-0.06	0.52
Range	55	44
Minimum	1	20
Maximum	56	64

Table 5: Pearson correlation coefficient for teacher's qualification and pupils' level of achievement in mathematics at primary six in Kyondo sub-county.

Variable	Level of achievement	Teachers qualification
Pearson correlation	1	0.192
Sign. (2 tailed) (p)		2.353
Test statistic (t)		0.34
Sample schools (5)		5

deviation is 12.1. The skewness is 0.13, while the kurtosis is 0.16 and the range is 63. Table 4 shows the statistics of test scores (achievement levels) by gender. It indicates that the mean score is 31.8 for females and 38.6 for males. The minimum score is 1 for females and 20 for males, while the maximum score is 56 for females and 64 for males. These results have a relationship with the NAPE report (2015).

Teacher's qualification and experience and level of pupils achievement in mathematics

The first objective of this study was to establish the relative effect of teachers' qualification and experience on pupils' achievement levels in mathematics.

The teacher's qualifications were looked at over different levels as Graduate, Grade five, Grade three, S.6 and S.4, while the teachers experience was looked at in terms of years in-service and activities that develop teachers

experience such as involvement in curriculum interpretation, joint teaching, professional training/workshops and lesson observations.

Two null hypotheses were stated for this objective: (1) there is no correlation between teacher's qualification and pupils' level of achievement in mathematics; (2) there is no significant relationship between teachers experience and pupils' achievement levels in mathematics.

The Pearson correlation coefficient between the average qualification of teachers and pupils' mean test scores was calculated and results are shown in Table 5. Similarly, Pearson correlation coefficient between the experience of teachers and pupils mean test scores was calculated and separate analysis was made (1) for the number of years in-service with pupils mean test scores; (2) for the level of participation in the activities that develop teachers' experience. The results are shown in Tables 6 and 7.

According to Table 5, the Pearson correlation coefficient r is 0.192. Being positive suggested a positive correlation,

Table 6: Pearson correlation coefficient for teachers' average years in service and pupils' level of achievement in mathematics at primary six in Kyondo sub-county.

Variable	Level of achievement	Teachers' average years in-service
Pearson correlation	1	0.59
Sign. (2 tailed) (p)		2.353
Test statistic (t)		1.22
Sample schools (n)		5

Table 7: Pearson correlation coefficient for teachers' Level of participation in the core experience building activities and pupils' level of achievement in mathematics at primary six in Kyondo sub-county.

Variable	Level of achievement	Level of participation in the core experience building activities
Pearson correlation	1	0.22
Sign. (2 tailed) (p)		2.353
Test statistic (t)		0.39
Sample schools (n)		5

Table 8: Pearson correlation coefficient for teacher's commitment and pupils' level of achievement in mathematics at primary six in Kyondo sub-county.

Variable	Level of achievement	Teacher's commitment
Pearson correlation	1	0.88
Sign. (2 tailed) (p)		2.353
Test statistic (t)		3.21
Sample schools (5)		5

that is, pupils' level of achievement rose with increased level of teacher qualifications. The test statistic, t for r is 0.34 which is numerically less than the p -value 2.353. This suggests that the null hypothesis for hypothesis (1) is accepted. Therefore, there is no significant effect between the teachers' qualification and pupils' achievement levels in mathematics at 10% level of significance.

According to Table 6, the correlation coefficient is 0.59. This indicates a moderate positive correlation which means that pupils' level of achievement in mathematics rose with increased level of teacher average year in service. The test statistic, t for r is 1.22 which is numerically less than the p -value 2. This suggests that the null hypothesis (2) is also accepted. Therefore, there is no significant effect between the teachers' years in service and pupils' achievement levels in mathematics. Likewise, there is a positive but moderate correlation between teachers' level of participation in activities that develop teachers' experience and pupils' level of achievement in mathematics. However, the effect is not significant at 10% level, (as in Table 7). These results partially contradicted the results of both Ukeje (1970) and Adesina (1981). However, Pearson coefficient between teachers' qualification and pupils' achievement suggests that there is a positive weak relationship

between these two variables which congers with Farrant (1980).

Teacher's level of commitment and pupils' level of achievement in mathematics

The second objective was to establish the relationship between teachers' commitment and pupils' achievement in mathematics. The level of commitment of the mathematics teachers was measured in terms of timely preparation of lesson plans, teaching all assigned lessons, providing assessments and handling individual pupils. Also, the level of commitment was measured in terms of time spent on specific school and classroom activities.

According to Table 8, the Pearson correlation coefficient (between teachers' level of commitment and pupils' level of achievement in mathematics) r is 0.88. This suggest a high positive correlation between teachers' level of commitment and pupils' level of achievement in mathematics, which means that pupils' level of achievement in mathematics rose with increased level of teacher qualifications. The test statistic, t for this r is 3.21 which is numerically greater than the p -value 2.353. Thus, the null hypothesis set for this

objective that stated that there is no significant relationship between teacher's level commitment and pupils' achievement in mathematics was rejected. Therefore, there is a significant effect between the teachers' level of commitment and pupils' levels of achievement in mathematics at 10% level of significance. This result is similar to the results of Tella (2008) and Armstrong et al. (2009).

Conclusion

Based on these findings, the teachers' qualification and experience have no significant effect on pupils' level of achievement in mathematics. Secondly, the teachers' level of commitment is highly significant for pupils' level of achievement in mathematics. Therefore, the study suggests that the existing low pupils' achievement levels in mathematics in Kyondo sub-county is as a result of low level of teachers' commitment to classroom activities to a large extent.

Recommendation to solve the existing problem

There is need to improve teachers' commitment levels by school managers and Government in terms of attendance to class, preparation of schemes of work and lessons plan, assessment and guiding of pupils. This will improve the level of pupils' mathematics achievement.

Recommendations for further research

The results of this study reveal the following further areas of research:

- 1) The factors that affect teachers level of commitment in Kyondo sub-county;
- 2) The relationship between class room practices and pupils achievement in mathematics.

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