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Teacher commitment and mathematics performance in primary schools: A meeting point!

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Abstract

This study examined the phenomenon of teacher commitment and its relationship with pupil's academic performance in primary school mathematics. The study was conducted in western region of Kenya where 280 class 8 pupils and 74 mathematics teachers participated. The researchers made use of causal-comparative research design. Stratified, random and purposive sampling techniques were used to get the sample for the study. Data collection was done using a self constructed questionnaire which had been validated and subjected for a pilot study and its reliability determined. Each subscale of the questionnaire yielded a Cronbach's alpha reliability coefficient of 0.60 and higher and data analysis was done using descriptive and inferential statistics (t-test). The study revealed that the majority of mathematics teachers in public day primary schools of western region of Kenya were trained with a teaching experience of between 11–20 years. However, there was an average rating on the following variables believed to be related to teacher commitment: teacher preparations, teachers' use of learning resources, teaching strategies and assessment methods. Further, teachers from high performing schools rated assessments in mathematics, teacher preparations, teachers' use of learning resources and teaching strategies, higher than the low performing schools.

Keywords: Teacher commitment, Teacher preparations, Assessment, Academic performance, Mathematics, Kenya

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1. Introduction

Mathematics study is recognized worldwide as the most important subject in most fields of human endeavors. Its usefulness in science, technological activities, commerce, economics, education and even humanities is almost at par with the importance of education as a whole (Tella, 2008). This implies that for one to function well in the society and in this era of technological age, he/she must possess relatively good mathematics knowledge. Salau (2000) points out that there exists an impregnable link between mathematics performances and students' overall outcomes. That is to say, a student who is performing well in mathematics is most likely to have high scores in the overall outcomes. Learners' competency in numeracy and literacy in early grades affects their academic achievement more generally in later years and affects how they master other subjects (Oketch et al., 2010). Aminu (1990) argues that mathematics is an essential nutrient for thought, logical reasoning and progress. It liberates the mind and also gives individuals an assessment of the intellectual abilities by pointing towards the direction of improvement. Further, mathematics is the basis of all human endeavors and its application cut across all areas of human knowledge. He concludes that despite the wide applicability and importance of mathematics, many pupils and students still do not find their feet in the subject.

In Kenya, mathematics is a compulsory subject in both primary and high school. It is also a prerequisite subject to many major higher courses like medicine, pharmacy, and business courses such as accounting and finance. One has to score high in mathematics a grade of C+ (65%) and above for him or her to be allowed to pursue any of the above careers (University of Nairobi, 2008). Kimani and Mwita (2010) claim that a large part of bad performance in national examinations in Kenya is contributed by poor performance in mathematics. In their study which covered six districts and where 72 schools were involved, the findings revealed that the pupils mean percentage score in mathematics for four consecutive years (2005-2008) was 46.89%, which is below the pass mark of 50%. The results further showed that performances in Kenya Certificate of Primary Education (KCPE) dropped since 2003 when the government introduced free primary education, which attracted higher enrolment. The cause of the drop in performances was attributed to low teacher –pupil ratio. This is an indication that teachers play a significant role in the performance of students during national examinations.

According to Baldacchino and Farrugia (2002), the quality of education cannot be seen or improved by simply providing physical resources like books, extending duration of learning, and providing other learning resources. Instead teachers are responsible in the interpretation of learning to the pupils and appropriately being committed to the use of suitable teaching methods, establishing the right climate for learning, using learning resources and appropriately assessing their learners more often and discussing the questions. Onwuakpa and Nweka (2000) stated that mathematics learning largely depends on the teacher. The job of a teacher is to impart knowledge, skills, attitudes and mathematical concepts into the learner. To achieve this, teachers are advised to give assignments, projects and test to evaluate their pupils and discuss the results with them. These, according to (Helsby et al., 1997) are qualities of a committed teacher.

Performance in mathematics has remained of a global concern. Studies conducted by American Institute for Research (AIR) to investigate mathematics performance on USA students – 4th and 8th grades as compared

with their peers around the world and another by National Assessment of Education Progress (NAEP) assessed the progress in mathematics of students in grades 4, 8, and 12 and results showed that grade 4 pupils performed below the average mark consistently from 1996-2007. The survey also revealed that teachers are the major cause of poor mathematics performance in the US (AIR, 2007). In another study, Schmidt et al. (2002) found out that teachers in USA follow text books which are too wide because publishers produce elementary mathematics text books that cover a variety of topics so that they can sell in different states. As a result, teachers do not develop in their pupils a deep conceptual understanding of mathematics topics and their application (Schmidt et al., 2002).

Since the late 1990s to date, performance of mathematics in primary schools in Britain has been so disgraceful despite the department's strategy to raise performance by spending £2.3 billion each year on teaching of the subject (House of Commons Public Accounts Committee, 2009). The report further states that over one-fifth of pupils are still leaving primary school without a secure grasp of essential mathematical skills, and that, as a result, only one in ten of these children are likely to attain the expected standard by age 16. In 2008, the report showed that some 5% of 11-year olds (30,000 pupils) left primary school with mathematical skills that were, at best, at the level of those expected of a seven year old.

In Kenya, poor performance in mathematics at Kenya Certificate of Primary Education (KCPE) has been and still is a subject of much debate among politicians, teachers, parents, educational experts, and other stake holders. In the year 2009, while releasing Kenya Certificate of Secondary Education (KCSE) results, the Minister of education then, Prof Ongeri expressed shock at the dwindling performance in mathematics and sciences."The decline was worrying, given the fact that Kenya's Vision 2030 is anchored on the sound performance in mathematics and science subjects," he said (Oduor, 2011). In the year 2005, 671,417 pupils sat for KCPE exam in Kenya, and the mathematics raw mean was 46.9%. In the year 2006, 660,531 pupils sat for the exam and the mathematics raw mean was 53.94%, while in the year 2007, 698,364 pupils did the exam and obtained a percentage raw mean of 49.24% (Ministry of Education, 2010)

Nandi Central District in western region of Kenya registered 4,779 candidates for the year 2009 KCPE and mathematics mean score was 52.71. In 2008, 4,673 candidates were registered and they attained a mathematics mean score of 53.27, while in the year 2007, 4,566 candidates sat for the exam, and attained mathematics mean score of 53.25%. In 2006, there were 4,398 candidates and they got 53.78%, and in 2005, 4,269 pupils sat for the exam and obtained a mean score of 52.49. This is an indication that mathematics is poorly performed in the district (DEO, Nandi Central, 2010).

It was therefore necessary to assess and compare teacher commitment- related variables associated with primary school pupils' performance in mathematics in order to discover whether there exist any differences between the ratings of teacher commitments related variables in high and low performing primary schools in Nandi Central District in western Kenya region.

The following null hypothesis was tested: There is no significant difference between the evaluation ratings of mathematics teachers of high performing schools and low performing schools in Nandi Central District in each of the following teacher commitment-related variables:

- Teacher preparations
- Teachers' use of learning resources
- Teaching/instructional strategies
- Evaluation/assessment methods

2. Theoretical framework

This study was guided by the Newell & Simon's theory of human problem solving (Newell and Simon, 1972).This theory was adapted by a Canadian scholar John Mighton, who applied the theory to achieve significant success in improving mathematics performance among elementary and high school students (Anderson et al., 2000). The theory provides a step by step means on how humans should respond when they are confronted with un-familiar tasks. It provides core sets of processes that could be used to solve a variety of different types of problems, (Newell and Simon, 1972). Early works of Newell & Simon's theory focused on abstract problems like proving theorems in propositional logic but educational researchers like John Mighton adapted the framework to improve on the performances of mathematics. He applied the theory to reject a belief that there are natural, wide bell curves in students' achievement (Andersonet al., 2000). He indicated that real competence in mathematics only comes with extensive practice. Mathematics teachers should give their students an opportunity to practice on any taught concept. This calls upon committed and dedicated teachers to prepare extensively their lessons, use teaching resources and plan enough exercises to assess their students on taught mathematics concepts. This implies therefore that teachers who are committed to their duties actively involve their learners in the learning process to give them an opportunity to practice on concepts they have learnt. According to Anderson et al. (2000), denying the critical role of practice to learners is denying children the very thing they need to achieve real competence in mathematics. The instructional task is not to 'kill' self motivation by demanding drill and practice, but to find tasks that provide practice while at the same time sustaining interest (Anderson et al., 2000). And also this theory as applied by Mighton, to bring success in mathematics views the learner as an active individual who should be actively involved in the learning process.

3. Literature review

3.1. Teacher commitment

The strength of any profession depends upon the degree of commitment of its members to the goals and purposes of that organization, teaching being no exception (Fox, 1964).Numerous authors and researchers agree that teacher commitment is central to the work of teaching and functioning of education system. Firestone and Pennell (1993) pointed out that teacher commitment has since 1980's become a topic of interest in education discourse. The word has been Interchangeably used to mean quality teachers or

dedicated teachers (Abd Razak et al., 2010). Elliott and Creswell (2002) argue that teacher commitment and engagement have been identified as amongst the most critical factors in the success and future of education. It contributes to teacher's work performance, absenteeism, burnout, and turnover as well as having an important influence on student achievement.

Becker (1999) defines commitment as the investment in a particular career, in this case, teaching. Lortie (1995) regards commitment as the willingness an individual enacts in investing personal resources to the teaching task. Nias (1991) looks at teacher commitment like an organizational commitment, which is conceptualized as being multidimensional.

Joffress et al. (2001) wrote that teachers' commitment is a crucial factor to an effective school, teacher satisfaction, and retention. They claim that low levels of teacher commitment results into decreased student achievement tests, than in areas where teachers were found not to be committed to their responsibilities, learners performed poorly. It is important to note that teachers' commitment to their duties is quite significant to pupils' performance. Committed teachers tend to produce good results at national examinations. Truman et al. (2008) in the study entitled "primary teacher commitment and attractions," claims that teacher commitment takes three forms, with the most important one being professional commitment. They argue that a professionally committed teacher rates their teaching abilities very highly and are committed to their professional advancement.

Day et al. (2005) argue that there are different forms of commitment to teaching. According to them, the nature and intensity of commitment to teaching depends on factors derived from personal and professional lives. Commitment is a word they use to distinguish those who are caring, dedicated, and who take their job seriously from those who put their own interest first. The professionally committed teachers take their job seriously and they get enjoyment from it (Elliott and Croswell, 2001). Nias (1991) and Tyree (1996) observes that teachers who are committed are those who see their students' welfare; they care for, responding to, and meeting students' needs. They strived to improve on their practice and look at pedagogies and research. They also talk and listen to their children, at the same time they work as a team with others, appropriately prepared for their lessons, and are reflective practitioners. Another view shared by committed teachers is that teaching is not just a job. Teachers invest their personal time even outside school contact hours. They have made teaching as a lifestyle. They often contemplate on their class programs and students while engaging in a range of personal activities like in shower, shopping, or watching television (Tyree, 1996).

However, there are multiple objects of commitment for a teacher and teachers' commitment objects may also change across different life and career phases and in different contexts (Leithwood et al., 1999). A teacher, who is committed to students and makes efforts to create a supportive learning climate in the classroom, prepares his/her lessons well. Choi and Tang (2009) indicate that a teacher who is highly dedicated to student affairs evaluates/assesses the acquisition of subject matter well and prepares well for the lessons.

3.2. Teacher preparation

Teacher commitment has been studied in relation to teacher preparations. Fox (1964) illustrated characteristics of a committed teacher as one who prepares well the content he/she is going to teach. Tella,

(2008) defined quality teaching as teaching that maximizes learning for all students. It entails engaging pupils as active learners to induce positive, comprehensive changes in their pre-existing knowledge, skills, and attitudes. These are achieved by committed teachers who are able to prepare well their lessons by taking into consideration learners' experiences, abilities, interest, motivation and skills.

Armstrong et al. (2009) pointed out that in order to provide quality learning experience for all students, lessons must be well planned and prepared effectively. They describe responsibilities and characteristics of the 21st century committed teachers as: matching instructions and programs to learner's characteristic, conducting task analysis to identify an appropriate beginning point, and a logical sequence for instruction, specifying learning intentions. Lessons should be well prepared to suit the learners' capabilities and interests. Lessons must stimulate learners to want to learn the new information. Armstrong et al. (2009) further confirms that as one plans for a group of learners he/she needs to engage in what is called "task-analysis activities." Task analysis requires that one takes the content that is to be taught and first, identify the desired results from learning of the content; secondly, break the content into smaller components or sub- tasks that logically build towards the desired results; and finally, define appropriate teaching approaches for each of the components and specify lesson objectives.

Once task analysis has been done satisfactorily, then follows lesson presentation. Effective lesson presentation, according to Armstrong, has several key elements that include stimulating and maintaining of interest. Content presented should interest and motivate individual learners. The teacher has to use a variety of approaches to motivate learners. Variety is essential because each learner's needs are unique. Motivation should be at the beginning of the lesson, during learning sequence, and finally, at lesson conclusion.

Finally, on sequencing of lessons, a lesson presentation follows a logical sequence. Information is presented in an organized manner, regularly checking pupils' understanding, providing an opportunity for practice, giving frequent feedback, and concluding lessons by reviewing main points (Armstrong et al., 2009). A plan is an arrangement or a method for doing something. Planning is a requirement for any program to succeed. It is a future intention to act in a certain way in order to achieve set objective. It is a process of arranging and organizing how to do something carefully in advance (MoEST, 2001).

A scheme of work is a key planning document for all teachers. It is a personal plan to cover the syllabus, taking into account variables like time allocation, pupils' ability levels, and pupils' previous experience, available resources and putting content in a logical sequence. Other considerations involved in planning the scheme of work include scope to be covered, sequence, objectives, learning activities, learning resource and evaluation. Learning activities refer to the experience you give learners to support the learning of mathematics. They should be well thought out and planned in advance. The activities should be varied involving the child in a practical work, watching demonstration and problem solving and reinforcement activities. Mathematics lesson plan is a short, carefully developed and written outline designed to help the teacher achieve the objectives of a specific topic, skill, or idea (MoEST, 2001).

Indimuli et al. (2009) claimed that teacher preparation is vital for effective teaching and learning process. Effective teaching include: preparation, implementation, and evaluation. In preparation, the teacher refers to the syllabus so as to make the scheme of work and lesson plans. In implementation, the teacher is involved in

the actual teaching of the content, class management and uses teaching/learning materials to achieve the specified lesson objectives. Evaluation is administered in form of continuous assessment, and end-of-course examination. They further describe teacher preparation to include class management. They define class management as involving the creation of a stimulating learning environment in which effective teaching/learning can take place. In order to achieve this, they say that it is advisable to consider grouping of pupils, observing class routine and class organization. On classroom organization, they say that seating arrangement needs to be done in groups. At the same time equipments specific to mathematics lessons should be placed in positions which are easily accessible (Indimuli et al., 2009).

3.3. Assessment/evaluation in mathematics

A useful way to gauge a teacher's commitment and effectiveness and the comprehension levels of students in the classroom is through assessment (Stiggins et al., 2007). Traditionally, teachers and students were assessed and analyzed through standardized tests to evaluate achievement goals, progress or gaps. However, a new twist to the assessment strategy has taken form. Student-involved classroom assessments help get the students engaged in their own learning targets so that they are able to keep track of their achievements. Each student is involved in the assessment process, student-involved in record keeping and student is involved in communication process (Stiggins et al., 2004). Black and William (1998) observe that research classroom assessments that provide accurate, descriptive feedback to students and involve them in the assessment process can improve learning. Classroom assessment that involves students in the process and focuses on increasing learning can motivate rather than merely measure students' performance. At the same time, both the teacher and student use classroom assessment information to modify teaching and learning activities.

Accurate assessment of students' academic abilities has been identified as one of the most crucial variables related to effective instructional planning and positive student outcomes (Shinn, 1998). It has been argued that without a valid assessment of students' academic skills, instructional decision making is unlikely to promote academic competence (Martens and Witt, 2004). According to Stiggins et al. (2007), there are two kinds of assessment during instruction: assessment for and assessment of learning. Assessment for learning involves use of homework assignments, quizzes, and self assessment drafts. This kind of assessment is child centered and gives the learner an opportunity to find information about areas of strengths and areas of further learning. Assessment of learning is a periodical assessment like midterms and final examinations which are teacher centered and judgmental for they are meant to inform the final grade of the learner.

Stiggins et al. (2007) further describe four fundamental questions that teachers need to address whenever he/she plans for what they call accurate assessment and effective use which include the purpose of assessment, the learning target, the assessment methods and the ways of reporting the results. Ballard and Johnson (2004), in their educational research on mathematics assessment, confirmed that frequent quizzes do yield benefits. They compared test results of students who were exposed to quizzes with a control group who experience no quizzes. They found significantly higher scores for students who experienced quizzes and concluded that frequent quizzing influences learning performance. The mean scores for these students were significantly higher than for students in the control group who experienced no quizzes.

MoEST (2001) describes how assessment helps a teacher. A teacher is able to identify pupils' achievement, pupils' needs, weaknesses, and strengths. A teacher can carry out assessment either informally or formally. Informal assessment involves listening to pupil's explanations, demonstration or questioning pupils deliberately, while formal assessment is timed, marked and invigilated by external person. According to Indimuli et al. (2009), evaluation is a process of determining the extent to which the stated educational objectives are being achieved. Evaluation is done in order to: identify the knowledge, skills and attitudes that pupils have acquired, find out weaknesses and strengths of teaching strategies and learning resources used, motivate pupils as they prepare for a test or examination, help pupils to know their progress in specific areas, and provide a basis for promoting pupils from one level to another.

3.4. Teacher's use of teaching/learning resources

Teachers highly dedicated to student affairs make effort to create a supportive learning climate in the classroom (Choi and Tang, 2009). A supportive learning classroom is one which is student centered and involves use of a variety of teaching learning resources. Teaching/learning resources are tools that classroom teachers use to help their students learn quickly and thoroughly (Indimuli et al., 2009). A teaching /learning resource, also known as teaching aid can be as simple as a chalkboard or as complex as a computer program. Because every individual learns in a different way, teachers rely on these tools to explain concepts to students with a wide variety of learning needs. Teaching resources are crucial for educators as they are the key in differentiating instruction for all types of learners (Li, 2005). According to Garrison and Terry (2003) of the Association for Educational Communications and Technology (AECT), learning/teaching resources are materials intended to supplement or reinforce teaching learning process ,examples may consist of outlines, diagrams, charts, and maps.

Committed teachers are said to be spending a lot of time on activities related to students' affairs, such activities include collection and improvising teaching learning resources (Choi and Tang, 2011). Centre for Mathematics, Science and Technology Education in Africa, CEMASTEA-Kenya (2012), reported a study carried out in 2010, where 12 districts, class 6, 7, 8, pupils and 55,000 science and mathematics teachers participated in the study. The findings showed that 37% of the teachers prepare appropriate and effective teaching/ learning resources. CEMASTEA (2012) recommended that teachers should use teaching/learning resources because they emphasize information, stimulate interest, and facilitate the learning process of science and mathematics. They range from simple to sophisticated and can be aural, visual, or increasingly more frequently, computerized.

4. Methodology

This study employed causal-comparative and descriptive research designs. Causal-comparative research design is a non-experimental research method that provides better evidence of cause and effect relationship. According to Gay (2006) causal-comparative research design determines reasons or cause for the current status of the phenomena under study.

Descriptive research design attempts to collect data from members of a population in order to determine the current status of that population in respect to one or more variables. According to Gay (2006) descriptive research determines and reports the way things are. It is intended to produce statistical information about aspects of education that interest policy makers and educators. It involves collecting numerical data to answer questions about the current status of the phenomena under study.

Descriptive method was used because it can tell what actually exists and helps to record, analyze, and interpret the current status (Mugenda and Mugenda, 2003) of the variables. The causal-comparative method was used in order to describe how teachers and pupils in each category of schools may differ in their evaluation of teacher-related factors hypothesized to be associated with performance in mathematics.

4.1. Population

The population in this research comprised of the mathematics teachers of public day primary schools in Nandi Central district of western Kenya region. In Nandi Central, there are 129 public day primary schools with over 640 mathematics teachers. The mathematics teachers were targeted because they were involved in the actual teaching and guiding the learning of mathematics in schools. They are responsible for planning and implementing the process of teaching of mathematics in schools.

4.2. Sample and sampling techniques

To obtain the desired sample in this study, purposive, stratified, and simple random sampling techniques were used. For the purpose of the study, the researchers chose to study public day primary schools. The researchers obtained a list of KCPE Examination analysis from the DEO for the last 5 years. They stratified them into two groups-high performers and 54 low performers. There were a total of 18 high performing schools and 31 low performing schools. The researchers obtained 30% of 49 schools to constitute a sample of 14 schools, seven from high performers which have maintained top position for the last five years and seven bottom low performers. The high performing schools in this study comprised of schools which had maintained a mathematics percentage mean score of above 60% and low performers being those schools which had scored a percentage mean score of below 50% in the K.CP.E for the last five years. The KCPE mean percentages for each school are shown in Table 1. Since only 14 schools were under investigation, all mathematics teachers were involved in responding to the questionnaire; thus thirty eight (38) teachers from high performing schools and 36 from low performing schools participated.

4.3. Research instruments

The researchers made use of the theoretical framework and the review of literature to construct the questionnaire. The self-constructed questionnaire was used to collect data from mathematics teachers. The questionnaire had the following items: teacher commitment, teacher preparations, use of learning resources, and assessment and evaluation using the four-point scale of (4) Strongly agree (3) Agree (2) Disagree (1)

Strongly disagree; (1) as well as (4) Often (3) Sometimes (2) Rarely (1) Never. The teachers circled the appropriate number to indicate their agreement or disagreement to the given statements.

Table 1: Mean Percentages in KCPE (2005-2009)

School Code	*High Performing*	*Low Performing*
1	67.4	39.8
2	64.2	45.3
3	69.7	38.2
4	66.1	46.3
5	70.1	40.9
6	71.4	37.7
7	64.9	46.0

To verify the instruments for content and face validity, the researchers consulted with a working group of scholars at the School of Education, University of Eastern Africa, Baraton. Content validity here is the degree to which the content of the instrument really measures teacher commitment and mathematics performance in primary schools. Face validity refers to the likelihood that a question will be misunderstood or misinterpreted which was done by pre-testing the questionnaire and amending by deleting the ambiguous items as advised by Fraenkel and Wallen (1996).

4.4. Reliability of research instruments

Cronbach's alpha coefficient was employed to determine the internal consistency of the instrument. This is based on the relationship among the scores derived from the individual items or subsets of items within a test (Ary et al., 2002). A computed alpha coefficient varies between 1 (denoting perfect internal consistency) and 0 (denoting no internal consistency).

A pilot study was carried out in a neighboring district. The questionnaires were administered to 20 mathematics teachers from four schools. The reliability coefficient for each section of the questionnaire addressing different variables was computed based on the responses of the teachers. The cut-off value for the reliability coefficient was set at 0.60. The sub-scales that had reliability coefficients lower than 0.60 had statements that were deleted. In the sub-scales on teachers' attitude and teaching methodology, one statement each was deleted, while in the sub-scale on teachers' use of learning resources, one statement was modified. The reliability coefficients were re-computed using the data in the final study and the new reliability coefficients were determined as shown below.

4.5. Data gathering procedures

After the establishment of the reliability of the instruments, the researchers secured permission from the National Council of Science and Technology, Ministry of Education to collect data from the teachers of public

day primary schools. Also, a letter from the District Education Office (DEO) of Nandi Central District of western Kenya was solicited to introduce the researchers to the sampled schools in the district.

Table 2. Cronbach's Alpha Reliability Coefficients

SUB-SCALE	TEACHERS		PUPILS	
	Original	****Modified/ Recomputed***	***Original***	****Modified/ Recomputed***
Teachers' use of Learning Resources	0.659		0.546	*0.899
Teacher Commitment	0.667		0.615	
Teacher Preparation	0.776		0.651	
Assessment and Evaluation	0.739		0.436	*0.807

**Reliability coefficients after selected statement was deleted or modified and re-computed.*

The researchers started to collect data from the concerned schools from April 13, 2010. The head teachers introduced the researchers to the teachers, requesting them to fill the questionnaire. The researchers assured the teachers that their responses were for purposes of research and would be treated with strict confidence. Seventy four (74) questionnaires were filled by the teachers.

4.6. Statistical treatment of data

Inferential statistics (t-test) was used to specifically determine if there was any significant difference between the ratings of mathematics teachers of high performing schools and low performing schools in each of the following teacher-commitment attributes:

- Teacher preparations
- Teachers' use of learning resources
- Teaching/instructional strategies
- Evaluation/assessment methods

5. Results and discussion

5.1. Comparison on teachers' use of learning resources

Table 3 shows the t- test analysis on teachers' use of learning resources in mathematics based on teachers' self-evaluation.

Table 3. T-test on teachers' use of learning resources (teachers' rating)

Group Statistics (Teachers' Ratings)

Group Statistics (Teachers' Ratings)					
Category		***N***	***Mean***	***Std. Deviation***	***Std. Error Mean***
Use of learning resources	High-performing	38	3.4895	0.21659	0.03514
	Low-performing	36	2.0556	0.38429	0.06405

Independent sample tests

		Levene's test for equality of variances		T-test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean differences	Std. error differences	95% confidence interval of the difference	
									Lower	Upper
Use of Learning Resources	Equal variances assumed	6.90	0.01	19.90	72	.00	1.43	0.072	1.29	1.57
	Equal variances not assumed			19.62	54.56	.00	1.43	0.073	1.28	1.58

The group statistics table reveals that high performing school teachers sometimes used learning resources in mathematics as indicated by a mean of 3.489 while teachers in low performing schools rarely used learning resources in mathematics as shown by a mean of 2.0556. This suggests that teachers in high performing schools used teaching resources more often than the low performing schools. The t-test yielded a t-value of 19.628 with a p-value of 0.011, which implies that we rejected the null hypothesis and therefore, there was a significant difference between the self-evaluation ratings of mathematics teachers of high and low performing schools in the use of learning resources. The mathematics teachers in high performing schools often used learning resources reflected on the questionnaire than their colleagues from low performing schools.

5.2. Comparison on Teacher Preparation

Teachers' Self-evaluation on Teacher Preparation: Table 4 shows the mean comparison (group statistics and independent samples t-test) on teacher preparations based on teachers' self-rating.

Table 4. T-test on teacher preparation (teachers' ratings)

Group Statistics (Teachers' Ratings)

Group Statistics (Teachers' Ratings)					
Category		***N***	***Mean***	***Std. Deviation***	***Std. Error Mean***
Use of learning resources	High-performing	38	3.8070	.27544	.04468
	Low-performing	36	1.6389	.61914	.10319

Independent sample tests

		Levene's test for equality of variances		**T-test for equality of means**						
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean differences*	*Std. error differences*	*95% confidence interval of the difference*	
									Lower	*Upper*
Use of learning resources	*Equal variances assumed*	22.78	.00	19.63	72	.00	2.168	.11	1.94	2.38
	Equal variances not assumed			19.28	47.76	.00	2.16	.11	1.94	2.39

It is noted that teachers from high performing schools often prepared before going to teach than teachers in low performing schools as supported by a mean of 3.8070 and 1.6389, respectively. The t-test yielded a t-value of 19.281 with a p-value of 0.00, which implies that we reject the null hypothesis and say that there was a significant difference between the self-evaluation ratings of mathematics teachers of high and low performing schools on teacher preparation. This finding is supported by Armstrong et al. (2009) who wrote that in order to provide quality learning experience for all students, lessons must be well prepared and planned effectively. He wrote that the 21st century teacher has to specify his objective for the lesson well, conduct task analysis and match instructions to learners' characteristics. Indimuli et al. (2009) also agrees that teacher preparation is vital for effective teaching and learning process.

5.3. Comparison on teaching methodology

5.4. Table 5 shows group statistics and independent samples t-test on teaching methodology based on teachers' self-evaluation ratings.

Table 5. T-test on teaching methodology

Group Statistics (Teachers' Ratings)

Group Statistics (Teachers' Ratings)					
Category		***N***	***Mean***	***Std. Deviation***	***Std. Error Mean***
Use of learning resources	High-performing	38	3.6349	.22583	.03663
	Low-performing	36	2.3438	.47615	.07769

Independent sample tests

		Levene's test for equality of variances		**T-test for equality of means**						
									95% confidence interval of the difference	
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean differences*	*Std. error differences*	*Lower*	*Upper*
Use of learning resources	*Equal variances assumed*	21.63	.00	15.28	72	.00	1.29	.084	1.12	1.45
	Equal variances not assumed			15.03	49.95	.00	1.29	.085	1.11	1.46

Group descriptive statistics showed that teachers from high performing schools often used teaching methodologies as shown by a mean of 3.6349 as compared to low performing schools which shows that teachers rarely used stated teaching methods as indicated by a mean of 2.34. The t-test yielded a t-value of 15.031 with a p-value of 0.000, which implied that the null hypothesis was rejected and therefore there was a significant difference between the self-evaluation ratings of mathematics teachers of high and low performing schools in terms of teaching methodology in mathematics. The mathematics teachers in high performing schools agreed more on the use of teaching strategies reflected on the questionnaire than their colleagues from low performing schools.

5.5. Comparison on assessment/evaluation

Table 6 shows group statistics and independent samples t-test on evaluation and assessment based on teachers' self-rating.

Table 6. T-test on evaluation and assessment

Group Statistics (Teachers' Ratings)					
Category		***N***	***Mean***	***Std. Deviation***	***Std. Error Mean***
Use of learning resources	High-performing	38	3.7368	.18072	.02932
	Low-performing	36	1.9667	.33295	.05549

Independent sample tests

		Levene's test for equality of variances		**T-test for equality of means**						
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean differences*	*Std. error differences*	*95% confidence interval of the difference*	
									Lower	*Upper*
Use of learning resources	*Equal variances assumed*	15.75	.00	28.63	72	.00	1.77	.06	1.64	1.89
	Equal variances not assumed			28.20	53.33	.00	1.77	.06	1.64	1.89

The group statistics table reveals that high performing school teachers often used assessment and evaluation as shown by a mean of 3.7368 while the low performing schools rarely used assessment and evaluation as shown by a mean of 1.9667.

The t-test yielded a t-value of 28.205 with a p-value of 0.00 which implies that we reject the null hypothesis and conclude that there was a significant difference between the self-evaluation of mathematics teachers of high and low performing schools on assessment and evaluation. The mathematics teachers in high performing schools often use assessment and evaluation than their colleagues from low performing schools. Accurate assessment of students' academic abilities has been identified as one of the most crucial

variables related to effective instructional planning and positive student outcome. Without a valid assessment of students' academic skills, instructional decision making is unlikely to promote academic (Shinn, 1998; Martens and Witt, 2004; Stiggins et al., 2007).

6. Conclusions and recommendations

From this study, it was noted that teacher commitment is very vital in the performance of mathematics. Teachers who demonstrate high level of commitment to their profession teach effectively, thus bringing about good performances amongst their students. Teachers from high performing schools in Nandi-Central District public primary prepare their lessons well before going to teach, they make use of relevant teaching resources, and they involve their learners in teaching process by using interactive teaching strategies. At the same time they engaged their learners through intensive drills and practice while carrying out assessments.

Effectiveness in mathematics teaching calls on teachers of mathematics to use clear questioning technique, creation of an effective climate for learning, planning for individual child's interests, being a reflective practitioner, encourage practical teaching in mathematics and inquiry learning styles. Mathematics teachers should be encouraged by Quality and Standards Office to make use of quizzes and tests to give pupils an opportunity to practice what they have learnt. Frequent exercises, assignments, home works and projects help to develop deep understanding of mathematics ideas and concepts.

Teachers' commitment is vital in the teaching and learning of mathematics. All mathematics lessons have to be attended, punctuality in mathematics should be enhanced, and workbooks are promptly marked and returned to motivate pupils' interest in the subject.

The following points will be found useful by any mathematics teacher. First, learning to do mathematics in school, given the ways in which it is typically taught, may not equip even the successful student with adequate or appropriate knowledge of or about mathematics. Second, knowing mathematics for oneself may not be the same as knowing it in order to teach it. While tacit knowledge may serve one well personally, explicit understanding is necessary for teaching. Finally, subject matter knowledge does not exist separately in teaching, but shapes and is shaped by others. Further studies may include classroom arrangement as a factor in mathematics attainment.

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