Influence of Pupil-Teacher Ratio on Students’ Formative Evaluation Practices; a Case of Public Primary Schools in Mwingi North Sub-County – Kenya

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Abstract
This study investigated influence of pupil-teacher ratio on students’ formative evaluation; a cases of public primary schools in Mwingi north sub-county – Kenya. The study used a descriptive survey design with a sample of 135 respondents comprising of 44 head teachers, 88 teachers and 3 education officers. The study used questionnaires for head teachers and teachers and interview schedules for the three education officials; Sub-county Director, Teachers Service Commission, Sub-county Quality and Standards officer and the Chief Education officer. Validity of the instruments was ascertained through expert judgment at the school of education while reliability was determined using Pearson’s Product Moment correlation coefficient. Quantitative data was analyzed using descriptive statistics and presented in percentages, frequencies, means and standard deviation. The null hypotheses were tested using the chi-square analysis at the .05 level of significance. Qualitative data was analyzed based on the themes emanating from the study objectives. The findings of the study revealed that at the 5% level of significance; that Pupil-Teacher Ratio had a significant effect on formative evaluation process at 0.085. This study concluded that schools in the area under study had a higher pupil to teacher ratio which significantly affected academic performance negatively.

Keywords: Formative Evaluation, Pupil Teacher Ratio, Continuous Assessment Tests, Pupils’ Progress
Pupil school attendance rates have been on a steady upward trend globally over the past years. As the World moves closer to the goal of education for all, the issue of pupil teacher ratio attracts an increasing attention (Huebler, 2008). One measure of education quality is the pupil-teacher ratio. This refers to the number of pupils per teacher in a school. Teachers of a large class can dedicate less time to each pupil than in a case of a small class while high pupil – teacher ratio makes it difficult to concentrate on the content and learn. United Nations Educational Scientific and Cultural Organization puts emphasis on individual tested subjects which allows students to focus on deep analysis in solving problems (United Nations Educational Scientific and Cultural Organization region circle, 2006).

Brian (2014) in a study on standardized testing and students of Master of Education found that teachers have to focus on preparing students for tests on the individual tested subjects. Since critical thinking leads to problem solving and improved academic grades in the national examination, high Pupil Teacher Ratio (PTR) hinders critical thinking leading to poor individual subject performance as a requisite for overall grading in an academic performance. Sharon (2011), in a study titled ‘Singapore is cracking down in education revealed that examinations determine a student’s future. Sharon further explains that in Singapore students are placed in subject based bands (small groups) at the age of 10 and their individual subject scores determine whether they will join a junior college or not.

Campbell, Jay & Kristin (2006), in their study titled ‘the impact of class size on teacher workload conducted in the United States of America, found that measuring students in science and mathematics progress towards higher achievement had been the purpose of national assessment of education progress. Students were assessed in various subject areas regularly to provide a context from improving results. The study revealed that effective assessment was achieved from low PTR. In Cambodia pupil-teacher ratio stood at 48:1 and 21:1 in 2012 for primary and secondary schools respectively (World Bank, 2012). The school enrolment had increased during 2000s in Cambodia according to United States of America International Development - USAID, (2011) while enrolment reached 90% of the child population as the state enhanced guaranteeing all citizens to have equal rights to education. In secondary schools, students ‘teacher ratios were lower as compared to primary schools. UNESCO (2015) indicates that out of 189 countries worldwide, 24 countries had fewer than 10 pupils per teacher, 107 countries had 10 to 19 pupils per teacher, 41 countries had 20 to 129 pupils per teacher, 13 countries had 30 to 39 pupils per teacher, and 4 countries had more than 130 pupils per teacher (UNESCO, 2012).

According to Huebler (2008), the Highest pupil-teacher ratio exists in: Philippine 65:1 Malawi 45:1, Pakistan 41:1 and Nigeria 40:1, Eretia 65:1, Nicaragua 39:1 and Nepal 37:1. The Lowest pupil teacher ratios are found in Bermuda 6:1, Portugal 7:1, Croatia 7:1, Georgia 7:1, Sudan 7:1 and Russia 7:1. The high PTR in Philippines of 65:1 had been caused by the government policy in the implementation of Millennium Development Goals (MDG) and Education for All (EFA) goals (Perez, 2010) and students’ performance in class tests had gone from bad to worse or stagnated. In Nepal student-teacher ratio in secondary schools is going high while the ratio in primary schools has already been higher than the UNESCO standard of 40:1. The education policy in Nepal aims at 30:1 while UNESCO sets it at 40:1, but the situation is different with PTR in primary being 50:1 and secondary 36:1 (UNESCO Annual sector performance report, 2014). Such a high pupil-teacher ratio makes it impossible for teachers to adopt competency
based teaching and evaluation approaches in classrooms leading to poor performance (Rasheda 2012).

In Bangladesh the 50:1 ratio in government primary schools and 36:1 in secondary schools were realities on average. In one of the government schools, Naber Berbagh primary in Mirpur, there were 8 teachers against 800 students, taking the pupil per teacher ratio 100:1 (UNESCO, 2012). As a result teachers could only concentrate on only a few classes and the scenario was quite acute and severely compromising academic performance on national examinations. This study explored whether similar situations affects the learning processes in schools in Mwingi north sub-county of Kenya. According to Luca (2010) in a study on the effect of attendance on academic performance, class attendance has a significant impact on academic performance. The overall results indicate that low PTR improves the morale for both teachers and learners to attend lessons. He adds that statistically attendance has a significant and quantitative relevant effect on student’s academic achievement.

According to Vernwimp (1999) in Ethiopia on a study measuring the quality of education in two levels found that both teachers supply and the quality of academic performance is a big issue. Following the increase in enrolment since the year 2000, Ethiopia needed to increase the number of teachers to match the continuing increase in enrolment otherwise academic performance continue to deteriorate as a result of high PTR. In Rwanda PTR is 64:1 and double shift is also practiced. Particularly in Rwanda the teacher shortage is acute partly as a consequence of the internal war and genocide (Hazel & Eric, 2008).

Howie (2003) in South Africa in a study on factors affecting secondary student’s performance in Mathematics revealed that proficiency in English for Mathematics and science was a strong predictor in their performance. South Africa attempted the third international mathematics and science and pupils were given Mathematics, Science and English to write in large and small classes. Pupils in small classes scored high grades in the three individual subjects and highly in the overall results. Moyoso (2015) in Nigeria in a study on formative assessment and mathematics achievement among students in different class sizes found that when formative tests are administered to students in groups 1, 2 and 3 (small, medium and large), the small group scored highly in terminal scores.

In Kenya PTR shot up highly to 60:1 and above since 2003 after the primary and day secondary education was made free and compulsory (Ministry of Education Science Technology, 2004). This was prompted by the Kenya government’s commitment to such international declarations and protocols on education as the 1990 World Conference on Education for All (EFA) in Jomtien and the 2000 Dakar declaration. Notable in this regard include implementation of Free Primary Education (FPE) by the Kenya government in 2003 with increased enrolments from 6.06 million pupils in 2002 to 7.18 million pupils in 2003, an increase of 18%. None school going children enrolled in schools and increased the enrollment, leading to high PTR. Since then academic performance on national examination has kept on gradually deteriorating (Ministry of Education Science and Technology, 2009).

Njiru (2015) in his study on formative evaluation on learner performance in mathematics in secondary schools in Embu county Kenya argues that formative evaluation is effective with low PTR. On the same note Wakoli (2016) in a study on effects of workload on the teachers
performance in Kanduyi - Kenya, revealed that low PTR leads to low work load on teachers and exerts less demands on them leading to good teaching, learning and evaluation environment. High workload among teachers directly stresses and strains teachers at their work place and compromises evaluation methods used at class room level.

Although the government of Kenya through the Ministry of Education Science and Technology and the Teachers Service Commission had pledged for employment of more teachers, only replacement is done to those who exit teaching through natural attrition. As a result the number of teachers compared to students enrolment was really wanting (Sifuna & Swamura, 2008). The increased students enrolment should be marched with similar increment for teachers to bridge the PTR gap. The reduced number of teachers could lead to difficulties in dealing with the overcrowded classrooms and lead to poor performance. According to UNESCO (2008) & Weston (2014), whenever the PTR is ideal teachers spend more time in order to improve teaching and learning, lesson planning, sourcing for and creating resources, one to one feedback and collaborative time with colleagues.

According to UNESCO (2015) in its report on the challenge of teacher shortage and quality, it was revealed that the pupil-teacher ratio has become worse since the inception of the Free Primary Education in Kenya due to financial constraints. Wanjala (2017) in a study on level of teachers’ efficiency in work performance in secondary schools in Wajir Sub-County-Kenya, indicated that teachers’ utilization of time has correlation to PTR. He further stated that Kenya has not been able to meet the international PTR standard of 40:1. The study also revealed that low PTR leads to good level of time utilization and preparedness which are critical to high academic performance. To achieve good quality education and performance the government should provide well qualified teachers and meet the UNESCO standard PTR of 40:1.

**Statement of the problem**
The introduction of FPE in the year 2003 by the Kenya government led to increased enrolment in public primary schools without a corresponding increase in the number of Teachers (MOEST, 2009). In a survey conducted by the Government of Kenya, it was found that there was a difference in student’s achievement as a result of varied PTRs in different public primary schools across the country, (Government of Kenya, 2012). According to the survey, the pupil-teacher ratio in public primary schools on average was 52.1 in 2007 and 46.1 in 2013. In recent years, Mwingi North Sub-County has had a significant drop in academic performance. Most of the public primary schools in Mwingi North Sub-County had a very high PTR of up to 125 pupils against one teacher soon after the introduction of FPE in 2003 (MOEST, 2004), thus affecting the curriculum implementation approaches by the teachers. Consequently the academic performance has been on the decline. According to records from the sub-county education office, academic performance in terms of KCPE mean scores has been on a declining trend since the year 2011 (Edu/kyu, 2015). The records further revealed that all subjects scored a mean score of below 50 in KCPE consecutively for five years since 2011. It is against this backdrop that this study was conducted.

**Specific Study Objectives**
The study was guided by the following objectives;

1) To assess the influence of pupil-teacher ratio on the number of continuous assessment tests given to students
ii) To determine the influence of pupil-teacher ratio on teachers’ ability to mark class assignments

iii) To assess the influence of pupil-teacher ratio on teachers’ ability to monitor pupils’ academic progress

**Research questions**

How would pupil teacher ratio influence the number of CATS given to students?
To what extent does PTR influence the ability to mark class assignments?
Does PTR influence the ability to monitor pupils’ academic progress?

**Significance of the study**

Head teachers who would use the findings of the study to determine the ideal (PTR) which in turn enhances ideal time utilization resulting to good academic performance. Schools’ subject panels could use the study findings to analyze individual subject performance within their departments with a view to improving performance. The Mwingi North Sub-County Education officers could also use the findings during academic results analysis to compare performance trends within a given period of time and recommend strategies for improving performance. The County Education Board of Management could also use the findings to make appropriate planning, management and supervision of education within the county. The TSC could use the findings to employ more teachers and post them in places where there is understaffing. The MOEST could also use the findings of this study to formulate and draw education policies and distribute resources equitably. Donor partners in education (World Bank, United Nations Children Education Fund, International Monetary Fund, British Council and USAID) could use the findings of the study to advise the Kenyan government on proper PTR in schools and also identify educational gaps which might need their intervention. Finally, but not the least the study could be used by semi-autonomous government agencies (SAGAS) like, Kenya Institute of Curriculum Development, Kenya National Examination Council and the Kenya Literature Bureau to review curriculum and develop appropriate teaching and evaluation materials.

**Summary of the Study**

The study is organized into parts and sections. Part one is the study background which is giving the current PTR situation globally, regionally and nationally. The second part is a statement problem which provides the backdrop against which this study is conducted. This is followed by the specific study objectives, research questions, summary of the study and the significance of the study. Part four of the study presents review of the related literature under two sections; pupil teacher ratio on students’ formative evaluation and the study theory. Part five presents study methodology and the study findings. The study findings has the current school’s enrolment, pupil teacher ratio in schools, Kenya certificate of primary education (kCPE) performance for the last five years, effect of PTR on formative evaluation practices, Head teachers view of effect of PTR on formative evaluation, teachers view on effect of PTR on formative evaluation practices and tables 1-9. Lastly is the study discussion, conclusion and recommendations of the study.

**Review of related literature**

Globally, 27 countries out of 194 have 40 or more pupils per teacher (UNESCO Institute for statistics Data Centre May, 2008). The highest pupil-teacher ratio is found in Sub-Saharan African countries with an average teacher-pupil ratio is 46:1 compared to 14:1 as found in
developed countries (UNESCO region circle, 2006). UNESCO (2006) estimated that over 84 percent of classrooms had over 40 pupils per teacher and that school enrolment has outnumbered the number of teachers in schools regardless of their teaching assignments. According to UNESCO (2012) the number of pupils enrolled in schools divided by the number of teachers (PTR) is high thus significantly affecting academic performance as measured in national examination results.

**Pupil teacher ratio on students’ formative evaluation**

Black and William (2009) opine that assessment refers to all those activities undertaken by teachers and their students in assessing themselves. It is that which provides information to be used as a feedback to modify teaching and learning activities. However such an assessment becomes formative assessment when the evidence is actually used to adapt the teaching to meet student’s needs. They further observed that students who frequently receive formative assessment perform better in a variety of achievements than those who do not. Formative assessment is linked to academic performance of student even for summative test scores.

Low PTR in Indiana State enabled teachers to diagnose students’ needs through regular assessments than in the case of high PTR which improved final academic performance (Simpson & Weiner, 1996). In Rwanda teacher shortage was acute and such a high PTR made it impossible for teachers to adopt competency in assessment and evaluation leading to poor performance in national examinations (Hazel & Eric 2008). Further Haze and Eric contorts that frequent assessment enables students attain high performance standards. It is further argued that the higher the frequency of formative evaluation, the greater the performance (Barret, Sarama & Clement, 2011).The authors continued and revealed that student’s performance in any subject depends on the type and rate of assessment used. Consequently assessment must closely match the learning objectives. For assessment to be truly effective it should be formative, identifying and responding to student’s needs. According to a study by Kalawole (2016) in Kenya, the essence of tests and other evaluation instruments during the instructional process is to guide, direct and monitor students learning progress towards attainment of a good performance. According to a survey on organization for economic co-operation and development on formative assessment and improvement of learning in secondary classroom, it was found out that formative evaluation not only measure progress made by students but also identify their learning needs and respond to them. In a study by Njiru (2015) in Embu County on formative evaluation and learner performance in Mathematics, it was found that formative continuous assessment tests provide evidence concerning students’ achievements which when interpreted helps the assessors’ measure for further improvement and performance. This study sets out to establish the effect of PTR on students’ frequency of formative evaluation practices in Mwingi north Sub County and its overall impact on academic performance.

**Study theory**

This study was anchored on the social learning theory as proposed by Albert Bandura (1986). According to him, social learning occurs within social situations and contexts. The theory therefore considered how people learnt from each other including related social learning concepts; such as observational learning, imitation and behavioral modeling. Bandura further says that human learning and self-regulation involves a complex interplay between the cognitive-affective aspect, behavioral, and environmental determinants in the learners’ immediate
environment. According to Social Learning Theory (SLT), learners are more likely to engage in certain behaviors when they believe they are capable of executing them appropriately with minimum effort. In SLT, the role of the teacher is likely to be that of providing the essential teaching/learning materials, facilitating active participation of all the learners, providing varied, challenging but creative tasks, taking care of the individual learner differences and enhancing active participation in experimental work in classroom instruction. Provision of this environment has an implication on the pupil teacher ratio which was the main variable under the study. Teachers being the custodians of knowledge need to evaluate the school prevailing condition and the role of the learners in their holistic development when choosing strategies to use as well as the overall benefit of the entire society.

**Methodology**
This study adopted a descriptive survey design. The study adopted this design because it was considered appropriate for the study as it seeks to describe the effect of PTR on curriculum implementation practice and their overall impact on learners' performance at the end of education cycle (Paul & Diana 2012). The target population for this study involved 217 public primary schools spread in nine sub-county educational zones. Schools in Mwingi north sub-county were stratified according to the 9 educational zones. Simple random sampling was used to select 20% of schools from each zone, according to Borg and Gall (2003). Therefore on the basis of this argument; a sample of 44 schools was selected representing 20% of the total 217 schools, and 88 teachers representing 20% of the 1302 teachers spread over the 9 educational zones. Therefore the study chose randomly 2 teachers from each of the 44 schools selected. Thus a total of 88 teachers were selected to participate in the study. The SCD-TSC, CEO and the SCQASO were purposively selected by virtue of their office relevance to participate in the study. The total sample size therefore was 135 respondents. This study used questionnaires and interview schedules as tools for data collection. The study yielded both qualitative and quantitative data. The quantitative data was ordered, organized and analyzed using mean, standard deviation and frequency tables through the Statistical Package for Social Sciences (SPSS) version 21 computer program. The system was commanded to generate the required data. All the hypotheses were tested using Chi square at 0.05 level of significance. No interviews were recorded whatsoever as was necessitated the ethical considerations.

**Study Findings**

**Current school enrollment**
Head teachers were asked to state the current levels of school enrollment. Enrollment levels were measured in three discrete mutually exclusive categorical scales such as less than 250 pupils, 250- 500, 500-750 and above 750 pupils. Analysis of these data is presented in Table 1.

<table>
<thead>
<tr>
<th>Enrollment</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 250</td>
<td>9</td>
<td>20.5</td>
<td>20.5</td>
</tr>
<tr>
<td>250-500</td>
<td>32</td>
<td>72.7</td>
<td>93.2</td>
</tr>
<tr>
<td>500-750</td>
<td>3</td>
<td>6.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
From the findings as shown in Table 1 majority of the head teachers (72 percent) reported that they have an enrollment of between 250 and 500 pupils while about 21 percent had pupil population of less than 250. Only 7 percent of the head teachers said that they had a pupil population of between 500 and 750.

Pupil Teacher ratio in school

Teacher- pupil ratio, being a critical independent variable, was of paramount significance worthy of study consideration. In this case, the measure of pupil to teacher ratio followed the conventional guidelines as laid by UNESCO (2006). According to this UN body, a teacher pupil ratio of 1: 40 is considered ideal. Therefore, on the basis of this criterion, three mutually exclusive response categories for teacher to pupil ratio i.e.,1:<40; 1: =40 and 1: > 40; representing 1 to less than or equal to or more than ideal ratios were generated by the researcher and analyzed as shown in Table 2.

Table 2 Pupil Teacher Ratio (PTR)

<table>
<thead>
<tr>
<th>Teacher-Pupil Ratio</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:&lt;40</td>
<td>9</td>
<td>20.5</td>
</tr>
<tr>
<td>1: =40</td>
<td>3</td>
<td>6.8</td>
</tr>
<tr>
<td>1: &gt; 40</td>
<td>32</td>
<td>72.7</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Clearly from Table 2, majority of the schools (73 percent) as reported by the respective head teachers had high pupil to teacher ratio meaning that there were more than 40 pupils in a class being served by one teacher. Similarly, about 21 percent of the schools had a low pupil to teacher ratio implying that one teacher was handling an average of less than 40 pupils in a class. Finally, about 7 percent had an ideal ratio of 40 pupils to one teacher implying that one teacher was handling only 40 pupils in a class which is the ideal population as per the UNESCO standards. Similarly, teachers were asked a related question on the number of pupils that they handle in their classes as they go to teach. Analysis of these results is shown in Table 3.

Table 3 No of pupils taught in class by individual teacher

<table>
<thead>
<tr>
<th>Number of Pupils</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40</td>
<td>2</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>40 pupils</td>
<td>8</td>
<td>14.5</td>
<td>18.2</td>
</tr>
<tr>
<td>more than 40 pupils</td>
<td>45</td>
<td>81.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

It can also be seen from Table 3 that about 82 percent of the teachers who in this case constitute the majority felt that they handle more than 40 pupils in their respective classes. About 15 percent of the teachers argued that they handled only 40 pupils while about 4 percent handled less than 40 pupils in their classes. Clearly, considering the views of head teachers and the teachers with regard to the parameter of pupil teacher ratio, it can be inferred that the pupil to teacher ratio is undeservedly high against the UNESCO standards. This could imply teachers are overworked as they are understaffed and consequently this may lead to poor curriculum
implementation in schools. To achieve the required teacher to pupil ratio, education officers who were interviewed however advised that head teachers and the county education officers should be sending requests regularly to TSC to employ more teachers and post them to the area until the shortage is completely minimized.

**Kenya certificate of primary education performance for the last 5 years**

Head teachers were asked to supply information concerning the KCPE performance trends of their school for the last five years before the study period. In this case performance results between 2012 and 2016 were sought and analyzed as shown in Table 4.

Table 4 KCPE performance results in schools

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>KCPE Average Score-2012</td>
<td>165</td>
<td>264</td>
<td>218.26</td>
<td>21.121</td>
</tr>
<tr>
<td>KCPE Average Score-2013</td>
<td>157</td>
<td>289</td>
<td>218.09</td>
<td>30.616</td>
</tr>
<tr>
<td>KCPE Average Score-2014</td>
<td>171</td>
<td>252</td>
<td>210.28</td>
<td>20.343</td>
</tr>
<tr>
<td>KCPE Average Score-2015</td>
<td>178</td>
<td>271</td>
<td>213.09</td>
<td>20.684</td>
</tr>
<tr>
<td>KCPE Average Score-2016</td>
<td>126</td>
<td>284</td>
<td>212.70</td>
<td>25.718</td>
</tr>
</tbody>
</table>

From Table 4, it can be noticed that in the year 2012, the lowest performing school in the study area had a mean performance index of 165 while the highest had a mean performance index of 264 marks out of a possible cut off points of 500 marks. During the same year, the mean KCPE performance index was 218.26 with a standard deviation of 21.12. Similarly, in the year 2013, the lowest performing school had an index of 157 representing a negative deviation of 8 points from the previous years while the highest performing school had a performance index of 289 showing a positive deviation of 25 points from the previous year. However, the mean KCPE performance index for schools in the sub county was 218.09 thus showing a marginal negative deviation of 0.17 from the previous year. Clearly, the score range between the lowest performing and best performing school in the sub county was wide as shown by the standard deviation of 30.62.

Table 4 also shows that in 2014, the lowest performing school had a mean performance index of 171 while the highest performing had a score index of 252. These results show that whereas there was improvement in terms of the lowest performing school from the previous year by a positive deviation of 14 points, the highest performing school had dropped from the previous year’s performance indicating a negative deviation of 37 points. Overall, the mean performance index for the sub county was 210.28 with a standard deviation of 20.34 thus showing a significant drop from the previous year’s results.

The performance scores in 2015 also depict similar trend as reported in the previous years. Specifically, the lowest performing school in the particular year had an average KCPE performance index of 178 while the best school had a performance index of 271. The mean performance index for all the schools in the sub county was 213.09 with a standard deviation of 20.68 thus representing some marginal improvement from the previous year.

Finally, the performance indices for the year 2016 shows a very negative high deviation in terms of the performance index for the lowest performing school with a mean of 126 while the best
performing school had an index of 284. The mean KCPE performance index for all the sub county schools during the year was 212.70 with a standard deviation of 25.71.

Overall, a critical look at the KCPE performance indices for the years 2012-2016 depicts that the sub county never registered a mean score of more than 220 marks. Clearly the performance is even below the average of 250 marks out of a possible total of 500 marks.

When asked about other factors that contributed to the poor performance, majority of head teachers indicated in their open responses to this question that the said performance was as a result of several factors including but not limited to: understaffing (few teachers); fewer teacher contact hours; transfer of teachers; negative attitude on education, large classes, poor lesson attendance, poor teaching methods, absenteeism by both teachers and learners, poor infrastructure and ignorance by parents.

Teachers were also asked to rate the schools KCPE average performance indices on a scale of mutually exclusive nominal sub ranges. The mean index ranges were converted into descriptive nominal ranges which were assigned as follows: Very Poor below 100 marks Poor= 100 -199 marks; Average = 200-299 marks; Very Good = 300- 399 mark; Excellent = 400 marks and above; Analysis of this parameter is as shown in Table 5.

**Table 5: Performance of schools as indicated by teachers**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>1</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Average</td>
<td>22</td>
<td>40.0</td>
<td>41.8</td>
</tr>
<tr>
<td>Very Good</td>
<td>31</td>
<td>56.4</td>
<td>98.2</td>
</tr>
<tr>
<td>Excellent</td>
<td>1</td>
<td>1.8</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

It can be seen from Table 5 that most schools had either average or very good performance according to the teachers. In particular, majority (56.4%) of the teachers said that performance in their schools could be described as very good meaning that they had an average performance index of between 300-399 marks. About 40 percent of the teachers could describe the performance of their schools as average implying that the mean performance index was between 200 and 299 marks. Only 3 percent of the teachers could describe the performance as either poor (less than 100 marks) or excellent (more than 400 marks).

**Influence of Pupil-Teacher Ratio on students’ formative evaluation practices**

The study sought to investigate the effect of PTR on formative evaluation practices in public primary schools in Mwingi North Sub-County. Data was collected from both teachers and head teachers measuring the extent of the effect of PTR on each of the predetermined indicators of formative evaluation. Analysis of the findings in view of the head teachers and teachers responses in line with this objective are presented in sections 4.5.2.1 and 4.5.2.2.

**Head Teachers View of the Effect of Pupil-Teacher Ratio on formative Evaluation practices**

Views of head teachers were sought regarding the effect of PTR on implementation of formative evaluation practices in schools. The bottom-line was to find out whether high pupil to teacher
ratios could affect the teachers in terms of giving assignments and marking students’ assignments among others. Measurement of the effect of PTR on the formative evaluation was done on a five point scale in the head teachers’ questionnaire where numerical indices were assigned various meanings as follows: 5 = Very great extent; 4 = great extent; 3 = Moderate Extent; 2 = Little Extent; 1= No Extent at all. Analysis of this parameter is presented in form of percentages and mean indices in Table 6

Table 6: Head teachers’ views on the effect of Pupil-Teacher Ratio and Formative Evaluation practices

<table>
<thead>
<tr>
<th></th>
<th>Very great extent</th>
<th>Great extent</th>
<th>Moderate extent</th>
<th>Little extent</th>
<th>No extent at all</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools’ formative evaluation policy</td>
<td>75</td>
<td>25</td>
<td>_____</td>
<td>_____</td>
<td>4.75</td>
<td></td>
</tr>
<tr>
<td>Regular assessment of pupils through CATs</td>
<td>70.5</td>
<td>27.3</td>
<td>_____</td>
<td>2.3</td>
<td>4.66</td>
<td></td>
</tr>
<tr>
<td>Decisions on the conduct of weekly tests</td>
<td>61.4</td>
<td>31.8</td>
<td>4.5</td>
<td>_____</td>
<td>4.50</td>
<td></td>
</tr>
<tr>
<td>PTR affects supervised classroom assessment</td>
<td>54.5</td>
<td>34.1</td>
<td>9.1</td>
<td>2.3</td>
<td>4.41</td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td>6.8</td>
<td>40.90</td>
<td>43.2</td>
<td>6.8</td>
<td>3.43</td>
<td></td>
</tr>
<tr>
<td>Setting of internal tests</td>
<td>25</td>
<td>56.8</td>
<td>13.6</td>
<td>4.5</td>
<td>4.02</td>
<td></td>
</tr>
<tr>
<td>buying test materials from vendors to evaluate our pupils</td>
<td>6.8</td>
<td>15.9</td>
<td>52.3</td>
<td>20.5</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>Participation in interschool formative evaluation contests</td>
<td>6.8</td>
<td>20.5</td>
<td>47.7</td>
<td>25</td>
<td>3.09</td>
<td></td>
</tr>
<tr>
<td>Performance in county mock examinations performance</td>
<td>25</td>
<td>52.3</td>
<td>18.2</td>
<td>4.5</td>
<td>3.75</td>
<td></td>
</tr>
<tr>
<td>To what extent does PTR affect formative evaluation of pupils in your school?</td>
<td>9.1</td>
<td>79.5</td>
<td>6.8</td>
<td>4.5</td>
<td>3.93</td>
<td></td>
</tr>
</tbody>
</table>

Results from Table 6 show that PTR affected the schools’ formative evaluation policy to a very great extent at a mean = 4.75. This view was supported by majority (75%) of the head teachers who said it affected to a very great extent while 25% of them said it affected to a great extent. Similarly, pupils assessment through regular CATs was affected by PTR to a very great extent at a mean = 4.66. In particular, about 71 percent of the head teachers and 27 percent of them said that PTR affected regular assessment through CATs either to a very large extent or to a great extent respectively. In addition, PTR affected decisions by the school to conduct weekly tests to a great extent as shown by mean = 4.50. In view of this, 61 percent and 32 percent of the head teachers respectively reported that PTR affected decisions on the conduct of weekly tests to either a very large extent or to a large extent.
As to the effect of PTR on supervised classroom assessment, majority of the head teachers said that PTR affects supervised classroom assessment to a very large extent. About 34 percent of the head teachers held that it affected to a large extent while about 2 percent of the head teachers had the view that PTR affected supervised class assessment to a little extent. Indeed it can be inferred that PTR affects supervised classroom assessment to a large extent at a mean = 4.41.

Regarding the effect of PTR on homework, majority (43%) of the head teachers said that PTR affected homework moderately while about 41 percent said it affected to a large extent and 7 percent held that it affected to a very great extent. However based on the mean index, it is easier to see that PTR affected homework to a moderate extent at as shown by mean = 3.43.

Further, the study sought to determine the effect of PTR on setting of internal tests. From the findings it is noticeable that about 57 percent of the head teachers held the view that PTR affected setting of internal tests to a large extent and 25 percent of the head teachers held that it affected to a very large extent. From the mean index, it can be deduced that PTR affected the setting of internal examination to a great extent as shown by mean = 4.02.

Most head teachers held the view that PTR affected the purchase of test materials from vendors to evaluate pupils to a moderate extent as shown by mean = 3.00. In this regard, 52 percent of the head teachers supported to a moderate extent, while about 22 percent of them said it was to a great extent while about 21 percent said that it affected to a little extent. As to the participation in interschool formative evaluation contests, PTR affected to a moderate extent to mean =3.09 with about 48 percent of the head teachers supporting this view while 28 percent of them averred that it affected to a great extent.

Further, PTR affected the performance of schools in county mock examinations to a great extent as shown by mean =3.75 as supported by about 52 percent of the head teachers who said it affected to a great extent and 25 percent who held that it affected to a very great extent. However 18 percent of the head teachers were of the opinion that PTR affected performance in mock examinations to a little extent. Indeed from the responses of the open ended questions, head teachers agreed that the high pupil to teacher ratio led to understaffing and it affected teaching workload. As a consequence, there is no time for several assessments. Equally the PTR affected timely marking; setting of subject panels and teacher devotion.

**Teachers View of the Effect of PTR on Formative Evaluation practices**
The teachers’ views were also sought with regard to formative evaluation practices and how these practices could be affected by the PTR. The teachers questionnaire was structured to measure levels of agreement on a five point continuum scale wherein 5 represented strongly agree; 4= agree; 3= undecided; 2= disagree and 1= strongly disagree. The teachers were required to indicate their level of agreement to the statements given based on the number of pupils they handled in their respective classes/schools. Results in view of the indicators used to measure formative evaluation practices as given by the teachers are presented in Table 7 using percentages and means.
Table 7: Teachers view on Effect of PTR on Formative Evaluation practices

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>disagree</th>
<th>undecided</th>
<th>agree</th>
<th>Strongly agree</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>I conduct formative evaluation on a regular basis through CATS</td>
<td>1.8</td>
<td>7.3</td>
<td>10.9</td>
<td>67.3</td>
<td></td>
<td>3.82</td>
</tr>
<tr>
<td>I ensure all my classes do weekly tests</td>
<td>1.8</td>
<td>25.5</td>
<td>41.8</td>
<td>29.1</td>
<td>1.8</td>
<td>3.04</td>
</tr>
<tr>
<td>I ensure all assignments given are marked on time</td>
<td>1.8</td>
<td>14.5</td>
<td>36.4</td>
<td>45.5</td>
<td></td>
<td>3.31</td>
</tr>
<tr>
<td>I monitor the examination readiness of my pupils by conducting regular surprise tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>I ensure the pupils homework has been checked by parents</td>
<td>12.7</td>
<td>25.5</td>
<td>47.3</td>
<td>12.7</td>
<td>1.8</td>
<td>2.65</td>
</tr>
<tr>
<td>I monitor the progress of my pupils in class always</td>
<td>1.8</td>
<td>3.6</td>
<td>18.2</td>
<td>67.3</td>
<td>9.1</td>
<td>3.78</td>
</tr>
</tbody>
</table>

As shown on Table 7 based on the number of pupils that they handled, majority of the teachers agreed that they conduct formative evaluation on a regular basis at a mean = 3.82. This view was supported by majority (67%) of the teachers who agreed with the statement while about 8 percent of them disagreed with the statement. Similarly, on the basis of the PTR in their schools majority of the teachers were undecided as shown by mean =3.04 as to whether they will ensure their classes do weekly tests. In this regard, about 42 percent of teachers remained noncommittal as to whether they can ensure weekly tests are done considering the pupils they handle in class. About 29 percent of the teachers agreed with the statement and about 27 percent disagreed with the statement. Teachers were also undecided with regard to marking assignments on time considering the number of pupils they handle as shown by mean = 3.31. Specifically, 46 percent of the teachers agreed that they ensure assignments are marked on time while 36 percent of them remained undecided as to the marking of assignments on a timely basis given the numbers of pupils they handle.

Similarly majority of the teachers were undecided as shown by mean = 3.20 with regard to the statement as to whether they monitor examination readiness of their pupils by conducting regular tests. In this regard, about 42 percent of the teachers were undecided while 36 percent of them agreed with the statement and about 20 percent of them disagreed. As to whether they ensured pupils homework is checked by parents, most teachers disagreed that with the current number of pupils they handle, it was difficult to ensure that pupils assignments are checked by parents as shown by mean = 2.65. This view was supported by about 37 percent of the teachers who disagreed with the statement, 47 percent undecided and about 13 percent agreed.
In general, the collated views from both the head teachers and teachers indicate that PTR affected implementation of formative evaluation practices to a great extent. To ascertain the level of relationship, the second null hypothesis for the study which stated that: “There is no significant relationship between PTR and formative evaluation practices in public primary schools in Mwingi North Sub County was tested”. This hypothesis held the assumption that pupil to teacher ratio and the formative evaluation processes were statistically independent. In view of this, a contingency table showing the descriptive statistics in percentages for teacher workload and formative evaluation practices was generated as shown in Table 8.

Table 8: Pupil Teacher Ratio and formative evaluation of pupils.  
Cross tabulation

<table>
<thead>
<tr>
<th>Teacher-pupil ratio</th>
<th>Formative evaluation of pupils</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Little extent</td>
<td>Moderate extent</td>
</tr>
<tr>
<td>1:&lt;40</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1: =40</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1: &gt; 40</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4</strong></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>

From Table 8, it is important to note that most (80%) head teachers of schools described the extent to which PTR effects formative evaluation as great while 9 percent of the schools described the extent as very great. However 7 percent however described it as moderate while 4 percent described it as little. In order to establish the effect of PTR on formative evaluation, a chi square analysis was run on the contingency Table 8 at the 0.05 level of significance to test the null hypothesis that had been formulated. Results of the chi square statistics were as presented in table 9.

Table 9: Chi square Test for PTR and formative evaluation practices

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>15.531</td>
<td>6</td>
<td>.005</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>44</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From Table 9, it can be seen that PTR had a statistically significant effect on formative evaluation practice $\chi^2 = 15.53, df = 6; p \leq .5$. This therefore means that the two variables are not statistically independent of each other. Therefore the hypothesis that “there is no significant effect between PTR on formative evaluation practices in public primary schools in Mwingi North Sub County” was rejected in favor of the alternative form.

Education officers view on the effect of PTR on formative evaluation practices

The study adopted a face to face interview with the three education officers, namely; sub county director teacher’s service commission, chief education officer and the sub county quality assurance and standards officer. On an interview with the sub county director TSC, he had the view that low PTR provides the necessary environment for teaching and learning leading to good academic performance and vice versa. He further averred that, the frequency at which formative evaluation was conducted was influenced by PTR. The SCD TSC said that high PTR affected the
rate of formative evaluation process in the public primary schools in said area of study. He further argued that setting, processing, testing, marking, compiling and analyzing examinations for large classes was a tedious exercise with fewer teachers. As a matter of fact, as a result examination results were delayed and released the following term hence loss of remedial impact.

Similarly the chief education officer held that high PTR negatively affected regular setting, administering, marking and analyzing of results. He however, indicated that if PTR was low, formative evaluation could have regular and as a result yield good academic performance. On the other an interview conducted with the SCQASO revealed that PTR affected evaluation of learners as it was not done as per the syllabus coverage. This led to poor determination of exact academic performance and eventually poor end of cycle academic performance. However, he was quick to indicate that schools over lied on commercial exams which do not go in tandem with the content covered thus leading to poor academic performance. On average interviewing each officer lasted between 25-30 minutes. As it is observed from the three education officers views it is clear that the two variables PTR (independent) and formative evaluation (dependent) are not independent of each other. The rate at which formative evaluation is conducted depends on the pupil teacher ratio. There will be high frequency of formative evaluation with low PTR and vice versa.

Discussion of findings
The study also established that Pupil to Teacher Ratio had a statistically significant effect on formative evaluation practices $\chi^2 = 15.53, df = 6; p \leq .5$. hence the null hypothesis that “there was no significant effect of PTR on formative evaluation practices in public primary schools in Mwingi North Sub- county was rejected. As was established, the high pupil to teacher ratios in most schools affected the way schools conducted their formative evaluation. In particular, most of the head teachers held high pupil teacher ratios affected regular assessment of pupils through Continuous Assessment Tests; it also affected greatly the conduct of supervised classroom assessment and setting of internal tests besides performance in examinations as shown in Table 6. According to the teachers, the high number of pupils handled by them affected their decisions in terms of timely marking of assignments, monitoring the progress of their learners besides regular assessment of the pupils to monitor their readiness for national examinations as shown Table 7. As per the head teachers, the high PTR means that there is no time for several assessments. Equally the PTR affects timely marking; setting of subject panels and teacher devotion. Education officers on the other hand said that evaluation of the learners was affected as it was likely not to be done as per the syllabus coverage. This concurs with the SLT theory by (Bandura, 1986).

Teachers being custodians of knowledge need to evaluate the school prevailing conditions and the role of learners when choosing strategies to use during the evaluation. The findings of this study agree with those of Hazel & Eric (2008) in a study conducted in Rwanda. They found that a high PTR made it impossible for teachers to adopt competency in assessment and evaluation thus leading to poor performance in national examinations. They further argued that frequency of formative evaluation increases with low PTR. Similarly, Simpson and Weiner (1996) argued that low PTR enables teachers to diagnose students’ needs through regular assessments than in the case of high PTR. According to Wakoli (2016) high PTR has a negative effect on examination results by lowering the mean scores. Too (2005), also supports this claim that high PTR leads to poor academic performance. The Sub-county SCD TSC agreed that low PTR provides the
necessary environment for teaching and learning leading to good academic performance and vice versa. He further averred that, the frequency at which formative evaluation was conducted was affected by PTR. The CEO held that, high PTR negatively affected regular setting, administering and marking of exams and analyzing of the results. He however indicated that, if PTR was low, formative evaluation could have been regular and as a result yielded good academic performance. Similarly, on teacher lesson attendance, the SCQASO averred that high PTR greatly affected the teachers’ decisions and ability to attend classes and supervise lessons in the classrooms. It was notable that high PTR made teachers to be present but not attending lessons - that was being at school but teaching. This could have been due to fatigue and demotivation caused by overworking.

Conclusion

Formative evaluation plays a critical role in the final evaluation of educational outcomes of a learner. Though formative evaluation is affected by different factors, it concluded in this study that PTR significantly affects the formative evaluation practices in public primary schools in Mwingi North Sub County. It is important to note that the frequency of formative evaluation increases with low pupil to teacher ratios and vice versa. It is also easy to conclude that timely marking of assignments and submission of students’ grades is greatly affected by the PTR. Therefore the higher the PTR the slower the formative evaluation processes.

Nevertheless, this study finds that teachers adopt other means of formative evaluation instead of overreliance on CATs which may take time to mark and grade. In this regard, formative evaluation can be done using either group assignments, projects work and through panel discussions and interview protocols. On the other hand Parents should be encouraged to check their children’s work on a regular basis to supplement the efforts made by the teacher. This can be achieved through sensitization during parents and teachers association meetings.

Limitations of the Study
The study was limited to the level at which the study would satisfy the defense panel South Eastern Kenya University. Secondly the study was limited to the use of descriptive survey design.

LIST OF ABBREVIATIONS
CATS - Continuous Assessment Tests
CEO - Chief Education Officer
DF - Degree of Freedom
IMF - International Monitory Fund
GOK - Government of Kenya
KCPE - Kenya Certificate of primary Education
MOEST - Ministry of Education Science and technology
P - Probability Value
PTR - Pupil Teacher Ratio
SAGAS - Semi-Autonomous Government Agencies
SCD-TSC - Sub-county Director Teachers Service Commission
SCQASO - Sub-county Quality and standards officer
SLT - Social Learning Theory
TSC - Teachers Service Commission
References
Luca, S. (2010). Effect of attendance on academic performance . panel data evidence for Introductory microeconomics 37 issue 3 pg. 251-266 @ https://doi.org/10.3200/JECE.37.3.3.251-266.