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Effects of Teacher Quality Appraisal Scores on Students' Academic Achievement in Secondary Schools in Baringo North Sub-County, Kenya

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Abstract:

Stakeholders from various sectors in Baringo North Sub County, Kenya while attending a conference raised the concern over the possible cause of the downward trend in KCSE performance in Sub County. This was against a backdrop of the Teachers Service Commission in Kenya reporting improving teacher quality following introduction of Teachers Performance Appraisal and Development (TPAD) system in 2016. In the absence of empirical data, this study sought to establish if teacher quality as expressed by TPAD score had an effect on student academic achievement as expressed by KCSE performance in Baringo North. Guided by Lev Vygotsky's Socio-cultural theory, this study used quantitative descriptive survey incorporating ex-post facto correlation design. Stratified simple random sampling was employed to arrive at a sample size of 174 comprising of principals, deputy principals and assistant teachers drawn from a target population of 306. Primary data was collected using questionnaires. A pilot study was conducted where test retest method was applied that returned a Pearson's product correlation coefficient ($r_{xy} = 0.85$) on the principals and deputy principals' questionnaire and $r_{xy} = 0.87$ on the teacher's questionnaire. Data collected was analysed and hypothesis tested whereby the results revealed a statistically significant difference between the teacher quality and student academic achievement $\{F(27, 57) = 3.038, p = .000\}$. No significance difference between teacher characteristics and teacher quality i.e. gender ($t_{88} = -.835, p > .05$); age, $F(3, 86) = 1.714, p > 0.05$; academic qualification $F(1, 88) = 1.049, p > 0.05$; teaching experience $F(5, 84) = 1.88, p > 0.05$. For school characteristics and teacher quality, there was no significant difference between school category and teacher quality ($F(2, 87) = 2.76, p > .05$) and school type and teacher quality ($F(2, 87) = 2.622, p > 0.05$). However, there was a significant difference between gender of students and teacher quality ($F(2, 87) = 11.992, p = 0.000$). The study concluded that teacher quality as reflected by the TPAD scores awarded to teachers in Baringo North had an effect on academic achievement of candidates in the national examinations. Consequently, it recommended that proper mechanism be adopted to ensure the high TPAD scores assigned to teachers reflect in KCSE results attained by learners. The study further recommends that stakeholders seek to have more single sex schools as gender of students seemed to have an effect on teacher quality and consequently on student achievement.

Keywords: Teacher quality, teacher performance appraisal and development, student academic achievement, teacher characteristics, school characteristics

1. Introduction

The Teachers Service Commission (TSC) in Kenya was established under Article 237(1) of the Constitution of Kenya. Among its assigned functions is reviewing the standards of education and training of persons entering the teaching service (GoK, 2010) and monitoring the conduct and performance of teachers in the teaching service (TSC ACT, 2012). Consequently, in January 2016, TSC introduced performance contracting (PC) and Teacher Performance Appraisal and Development (TPAD) as part of the transformative programmes towards delivery of quality education in public learning institutions (TSC, 2018). Since then, the TSC has reported less absenteeism, more teamwork and better preparedness by teachers (TSC, 2018). Indeed, the rationale behind TPAD appraisal was to enhance teacher quality (Rockoff & Speroni, 2010) and ultimately raise student academic achievement (Juerges, Richter & Schineider, 2004). However, despite the gains propounded by TSC since introduction of TPAD in Kenya, stakeholders in Baringo North raised a concern over the declining trend of performance at Kenya Certificate of Secondary Education in the Sub County (Kwarkwar, 2016). The Sub County mean score had declined from a high of 4.697 in 2015 to 3.69 in 2018 contrary to the County mean score trend which was on a positive trend.

Over the years stakeholders in Kenya have used KCSE examination results as a measure of a school's performance in relation to others and in extension an indicator of the quality of its teachers. Subsequently, mean scores have formed the

basis of awarding performing students, teachers and institutions during education or academic days in various sub counties. The significance of using nationalised student test scores as an objective measure in teacher appraisal is not unique to Kenya but instead has increasingly been popularised as part of the global testing culture (Smith & Kubacka, 2017). Despite other factors being pointed out as contributing to student achievement, the teacher's responsibility in learner academic achievement on nationalised tests has been put at 30% while only 50% of variation in academic performance being attributed to the student factors based on what they bring in terms of their socio-economic background, their motivations, family backgrounds and prior learning experiences (Whittle, Telford, & Benson, 2015). Indeed teachers themselves have attributed student performance to their own relationship with their students, their classroom practices (individual factors), faculty cooperation (social factors) and the students themselves (Ayres, Sawyer, & Dinham, 2004). The percentage of learner achievement attributable to the teacher makes it difficult to ignore teacher quality as factor when explaining student academic achievement. Indeed, Milanowski (2004) had earlier observed that when a proper teacher evaluation test is used, it could serve as a tool to predict student achievement. Consequently, for this study, the teacher performance appraisal and development approach initiated by the TSC formed the basis of establishing teacher quality. A similar approach was adopted by Sirait (2016) while seeking to examine the relationship between teacher quality and student achievement in Indonesia and Chen, Wang and Yang (2017) when they correlated teaching evaluation scores and students performance grades in a Taiwanese university.

2. Literature review

2.1. Teacher Quality and Student Achievement

Teachers have the primary responsibility to help students learn by creating and maintaining a positive, productive classroom atmosphere conducive for learning and managing the learning process. In so doing, teachers are placed at the centre of student achievement (Bechuke & Debeila, 2012). Unlike other entities where organisations goals are the standard of performance, in school set ups besides students capability to generally apply what is learnt student examination scores are viewed as a major indicator of performance (Muhoro, 2015). Globally success in public examinations is of great importance to students. For instance in China, achievement in public exams is highly valued and as a result, education is transmitted by only highly trained and qualified teachers. In Kenya, the quality of education tends to be evaluated in terms of the number of students passing national examinations (Eshiwani, 1993; Muhoro, 2015), while on the contrary in Tanzania education is perceived as a means to self reliance hence emphasis is not on the success in public examinations but on what should be acquired during the learning and teaching process (Muhoro, 2015).

Consequently, academic achievement of students in examinations has inspired a number of studies that have sought to identify possible determinants of academic success. Coulough (1993) conducted a study in 23 developing countries and identified learner's home background as a key determinant of success in school, Bukewa (2012) found that poor performance in Mathematics by students in Uganda was linked to poor grasp of the Queen's language. Akaranga and Simiyu (2016) found that student performance in CRE in Lelan, Kenya was influenced by the teaching of Social Education and Ethics (SEE), student teacher relationship, students self determination, adequacy of resources, teachers and students attitudes towards CRE and extent of teacher involvement in marking KCSE examination. Kalagbor (2016) in his study amongst Public and Private Secondary Schools in Rivers State-Nigeria identified teacher-student relationship, teacher welfare, principal- teacher relationship, teacher supervision, teacher quality, teachers' utilization of teaching periods and teacher discipline and teacher student ratio as factors that influence performance. Kiptum (2016) found a significant relationship between student achievement and teachers instructional leadership, experience and attitude towards teaching in Baringo.

Other more specific studies sought to determine if teacher quality had an effect on student achievement. Blomeke, Olsen and Suhl (2016) in a study covering 47 countries found teacher quality was significantly related to instructional quality and student achievement and identified teacher quality indicators as teacher qualifications, amount of experience in teaching, participation in professional development and personality characteristics. In California, USA Seebruck (2015) found teacher quality (credentialisation) had a positive effect on student achievement (test scores in reading and mathematics). In Indonesia, Sirait (2016) found that teacher evaluation score was statistically significant on senior level student achievement in all subjects (Mathematics, Chemistry, Biology and English language), However the relationship was not significant at junior secondary level which was attributed to academic qualification of the teachers. Chen, Wang and Yang (2017) found a significant positive correlation between an instructor's teaching evaluation score and the final grade of each student or the whole class average in the Taiwanese universities while Dan, Trevor, and Roddy (2016) found that the teachers basic skills licensure test scores were a modest and statistically significant predictor of student mathematics test score gains in elementary grades.

Morara (2019) in his study on the dependability of student learning outcomes on performance appraisal for teachers in public secondary schools in Kisii County, Kenya sought to establish the relationship between performance appraisal variants of teacher qualifications, professional development, appraisal ratings, student survey ratings with student learning achievement. found that TPAD minimally contributed to student achievement in public secondary schools in Kisii County, Kenya. Hence this study sought to find out if teacher quality as assigned by TPAD scores had an effect on student academic achievement in Baringo North.

2.2. Teacher Characteristics and Teacher Quality

According to DeNisi (1996) decision making during performance appraisal ought to go by the following steps; observation of educator behaviour, appraiser forming a cognitive (psychological) representation of the behaviour, such

representation being stored in memory, retrieval of such stored information from memory, integration of retrieved information to form a decision and formal evaluation assigned by the appraiser using the appropriate appraisal instrument. Where if a different process were to be followed then automatically rater biases would emerge. Kumar (2005) and Lunenburg(2012) identify the common causes of rater biases as; perceiving one factor as having paramount importance and giving a good rating to an employee based on the factor(Halo effect), giving an overall low rating because the employee has performed poorly in one area (Horns effect), perception differences on words used in the appraisal (standards of evaluation), undeserved high rating (leniency effect), unduly critical of employees work (strictness effect), rating employees on the basis of others performance (contrast effect), rating employee highly if viewed to be similar or have same traits with supervisor (similar-to-me error), consciously or unconsciously systematically rating certain employees lower or higher basing on their race, origin, gender, age or other factors (personal bias), putting a lot of emphasis on an employee's most recent behaviour due to lack of time to closely monitor the employees performance over a year or to make detailed notes (recency effect) and over rating employees with whom one has a high quality trusting relationship (relationship effect).

Consequently, the characteristics of raters and ratees have been found to be a determining factor when appraisal scores are assigned to appraisees. This is evidenced by Kraiger & Ford (1985) while conducting a review of 74 studies found that white raters assigned higher ratings to white ratees than to black ratees and black raters assigned higher ratings to black ratees than to the white ratees. Ren *et al* (2008) who found that there existed a positive effect of disability on performance evaluation of people with disabilities. Bowen *et al* (2000) found that where only males had served as raters, there was substantial pro male biases noted. While when raters were a mix of men and women, the female raters tended to rate their ratees slightly more than their male counterparts. Huang *et al*,(2013) observed that in other instances, employees deliberately or unconsciously try to influence their appraisers so as to achieve a high performance score (Dulebohn *et al*, 2004). Pesta *et al* (2005) noted that rating scores tended to be more lenient if performance appraisal was for administrative purposes such as pay rises or promotions as opposed to instances where appraisal was being undertaken for employee development purposes. Similarly, studies have shown that employee's organisational citizenship behaviour that is usually manifested as commitment and loyalty to the organisation (Allen & Rush, 2001) tends to draw favourable ratings for staff (Podsakoff *et al* 1993; Lefkowitz, 2000; Dulebohn *et al* 2005). Further, as was hypothesised by Taylor & Wherry(1951) the purpose for which performance appraisal is being carried out in an organisation tends to have a moderation effect on performance ratings by raters (Jawahar & Williams, 1997).

2.3. Teacher Experience, Age and Teacher Quality

A number of models have attempted to explain the professional growth trajectory of teachers from pre-service through to in-service (Berliner, 1994; Feinman-Nemser, 1983; Fessler & Christensens, 1992; Steffy, Wolfe &Enz, 2000; Asaf *et al*, 2008). However, despite these efforts, it is argued that the sequence and timing of growth stages may be variant, uniquely individual, recursive and spiraling rather than linear (Broad & Evans, 2006). Overall, scholars acknowledge that teachers can be categorized based on their teaching experience and that it is likely to have an effect on their performance. Rivkin, Hanushek, and Kain (2005) in West, Lunenburg & Hines III (2014) noted that between 3 to 8 years of teaching were adequate enough to yield positive experience, while Thelma *et al* (2017) found that in South Africa teachers with more than 15 years experience scored lower than teachers with less experience in all six teaching domains. An almost similar observation was made by Rubenstein (2000) who found that in the States of Massachussets, Texas, Virginia, Florida and Georgia, teachers with over 25 years teaching experience produced students with significantly lower National Assessment of Education Progress scores than teachers with between 6- 10years experience. Gonzalez and Gerri (2018) did observe that the experience one had could be a determining factor in success or lack of success in a subject they taught. In Kenya, Waseka, Simatwa, & Okwach (2016) established the existence of a moderate positive relationship between teaching experience and Kenya Certificate of Secondary Education(KCSE) performance. There's however very limited empirical data on the effect of teacher experience or age on performance appraisal scores given by raters.

2.4. Teacher's Academic Qualification and Teacher Quality

In many countries, a teacher's academic qualification tends to drive their certification or licensure journey that is majorly driven by two approaches. The 'public interest approach' guided by the thinking that teacher licensing is the best mechanism for ensuring quality when consumers are poorly informed or the 'capture theory' approach where restrictions are set on those intending to join the profession so as to push up the wages (Sass, 2012). In Kenya, entry into the teaching profession is pegged on professional pedagogical training (TSC Act, 2012) and thus the public interest approach is the guiding factor. For one to be registered as a teacher in Kenya, the TSC follows a predetermined criterion spelt out in Part III of the TSC Act (2012). It requires one to be of good moral character and be a holder of a relevant certificate issued to them under any law relating to education and training or regulations made under the TSC Act (2012). The recognized qualifications for one to teach in secondary school include diploma and degree certificates issued by accredited teacher training colleges and universities notably: Diploma in Teacher Education (DTE), Bachelor of Education (B.Ed.), Bachelor of Arts (BA), Bachelor of Science (Bsc), Post Graduate diploma in Education (PGDE), Master of Arts (MA); Master of Science (Msc), Master of Education (M.Ed) and Doctor of Philosophy (Ph.D.). Waseka, Simatwa and Okwach (2016); Katitia (2015) and Greewald, Hedges &Laine (1996) did find that indeed a teacher's higher academic qualification had an effect on their ability to perform effectively. The significance of establishing certification requirements by countries or teacher employers as a means of enhancing teacher quality has been variously acknowledged (Cochran-Smith *et al*, 2012; West, Lunenburg & Hines III, 2014).

Additional qualifications attained after employment have been appreciated as a necessity for teacher professional growth since the competence of a teacher may not be attributed to their academic degree alone (Goe, 2007; Hammond-Darling, 2010; Stewart, 2011). Literature presents various reasons as to why in-service teacher training should be undertaken, most common ones being; training for professional growth of the teacher (Feiman-Nemser, 2001), training to address deficits in pre-service training (Gall and Renshler, 1985); training to respond to changes in education (Fullan, Hill & Crevola, 2006; Little, 2012) and training to help teachers solve common but persisting problems (Joyce & Showers, 2002; McLaughlin & Zarrow, 2001). In Kenya, the TSC TPAD tool sixth competency area assesses teacher professional development, based on the expectation that teachers are to continuously develop their competencies during their teaching service for there to be an improvement in student learning achievement (Mogaka, 2019). Hence the score assigned by raters on teacher professional development was likely to affect the quality score of the teacher,

2.5. Teacher's Gender and Teacher Quality

The fairness of appraisal ratings has motivated researchers to look in the possible causes of variations in scores assigned (Shore and Thornton III, 1986). Campbell and Ronfeldt (2018) while explaining the role of other teacher characteristics on performance appraisal ratings raised a concern that sometimes appraisals may measure factors outside a teacher's performance and control. In deed it has been found that gender of the appraisee and appraiser may have an effect on the appraisal score assigned (Bauer and Baltes (2002); Drake, Auletto and Cowen (2019); Bailey, Bocala and Zweig (2016); Campbell and Ronfeldt (2018). These findings on subjectivity of appraisal rating were amplified by Kim, Dar-Nimrod & Mac Cann (2018) when they found that teacher personality predicted the subjective measures of teacher effectiveness as rated by their students. The limited literature comparing teacher characteristics and appraisal rating scores assigned to teachers by their supervisors especially in Africa and Kenya highlighted the existence of a knowledge gap this study sought to fill. Some of the reviewed studies examining patterns in appraisal scores and teacher characteristics interrogated evaluation systems where learners were involved in the rating. However this study reviewed a system where the rating score assigned is agreed upon by the appraiser and appraisee.

2.6. School Characteristics and Teacher Quality

(Haines III & St-Onge, 2012) asserted that the effectiveness of employee performance management is influenced by contextual factors such as organizational culture, climate and strategic integration of human resource management. Pulakos (2009) pointed out that the internal environment of an organization such as lack of equipment, lack of materials and the work place environment could determine levels of staff performance on appraisals. It is therefore important that methods applied to employee performance appraisal take into account these contextual circumstances of the organization (Rusu, Avasilcai & Hutu, 2016). In Kenya, schools have varying characteristics which may impact either positively or negatively on teacher performance. The Basic Education Act (2013) broadly categorizes schools as either public (government maintained) or private schools (owned and run by non-government entities but within set government guidelines). Further categorization is done based on the social setups (gender of students) to have single sex schools (boys only or girls only) and co-educational schools (mixed schools). In addition, categorization of secondary schools in Kenya is done based on where they draw their students from i.e. national schools (from all counties all over the country), extra county schools (from different counties but not necessarily all counties in the country), county schools (from all sub counties within a county) and sub county schools (from schools within a single sub county). National schools and extra county schools are generally better endowed in terms of physical resources, they attract better performing students from across the country, are mainly boarding schools and they perform much better than schools in the county and sub county categories. Each category therefore has a unique school climate due to the outstanding characteristics they possess.

Initially, school climate was restricted to observable characteristics, like the physical plant and the condition of the school (Anderson, 1982), however, it was later extended to include the actions of students, educators and families as they work together to develop, live and contribute to a shared school vision (Farrant, 1980). Consequently, the broader school environment including physical state especially of buildings and other characteristics affect its climate and the subsequent actions of its teachers (Luthans, 2011). Indeed, school climate does influence how teachers of a school rate themselves in sections of the TPAD tool that are dependent on adequacy of resources i.e. professional development, promotion of co-curricular activities and innovation and creativity in teaching (TSC, 2016). Performance appraisal in education has not been without controversy (Elliot, 2015; Kennedy, 2010). Indeed, conflict of interest between stakeholders' wants and the teachers' employer requirements are common place with the reliability of some evaluation practices being questioned (Darling-Hammond, Wise, & Pease, 1983; Danielson, 2001; Marshall, 2005). The different viewpoints held by institutions towards appraisal tend to influence the weighting of scores on the appraisal items especially when a unified appraisal system is being applied (Turk & Roolaht, 2007). In other words, the traditions of an institution will tend to have a bearing on the likes, dislikes and expectations of subordinates and supervisors which in turn informs their bias in appraisal rating. Odour (2018) observed that in Kenya, top performing schools had a habit of setting their own unique targets and as a result tended to disregard the TSC TPAD and only did fake figures at the end of the term to satisfy the employer's requirements. As a result, it is observed that implementing valid performance appraisal systems in schools presents a range of challenges (OECD, 2013).

Studies have been conducted on the effect of school climate on performance (Voight & Hanson, 2017), school and socio-demographic characteristics on performance (Thiele, Singleton, Pope, & Stanisheet, 2016) distance to school and performance (Taniguchi, 2017), school characteristics and academic achievement (Anditi, Okere & Muchiri, 2013), gender and school location on student academic achievement Olaitan (2017). However, very limited studies have sought to

establish the effect of school characteristics on teacher quality as described by the awarded appraisal score which this study intended to find out.

3. Materials and Methods

The study was conducted in Baringo North Sub County in Baringo County Kenya. The study employed the correlational ex post facto research design where it sought to determine if teacher quality had an effect on student academic achievement in Baringo North. The study sought to answer the questions; on the quality of teachers; academic achievement of students; the effect of teacher quality on student achievement; effect of teacher characteristics on teacher quality and effect of school characteristics on teacher quality. The study targeted all 312 teachers drawn from 29 public secondary schools in the sub county. Teachers were targeted because of their role in the preparation of the learners for national examinations, usually by handling learners in their subjects of specialisation. Deputy Principals and Principals were targeted because of their role in performance appraisal of teachers of all other teacher. All public schools participated in the study with stratified random sampling applied to ensure a representative sample from all designations. The sample comprised of 174 teachers. The data for the study was collected by use of questionnaires.

Validity of the research instrument results was initiated right from the design stage of the instruments through seeking valuable contributions from experts and practitioners in Education. They were requested to examine the questions therein for relevance and appropriateness (Ogula, Ogoti & Maithya, 2018). Pilot testing was conducted on a small sample in Baringo Central Sub-County to check if the research instruments would effectively perform. Test-retest method was used to determine reliability of instrument results. The method involved administering the questionnaires twice in a span of 2 weeks to a group with similar characteristics as the respondents of the study and in an almost similar research setting. A test retest coefficient i.e. Pearson's product correlation coefficient ($r^{xy} = 0.85$) on the principals and deputy principal's questionnaire and $r^{xy} = 0.87$ on the teacher's questionnaire indicated strong association indicating both were instruments results were reliable. The questions the respondents answered included; -

- What is the quality of teachers in Baringo North?
- What is the academic achievement of students in Baringo North?
- Is there an effect of teacher quality on student achievement?
- Do teacher characteristics: teacher's gender, age, academic qualification, teaching experience have an effect on teacher quality?
- Do school characteristics; type of school, category of school, student's gender have an effect on teacher quality?

The data obtained was subjected to both descriptive and inferential statistics with an objective of determining the effect of teacher quality on student achievement guided by the null hypothesis;

- H_{01} There is no difference between teacher quality and student academic achievement in Baringo North Sub County.
- H_{02} There is no difference between Teacher's gender and teacher quality in Baringo North Sub County.
- H_{03} There is no difference between teachers age and teacher quality in Baringo North Sub County
- H_{04} There is no difference between teachers' academic qualification and teacher quality in Baringo North Sub County.
- H_{05} There is no difference between teachers teaching experience and teacher quality in Baringo North Sub County.
- H_{06} There is no difference between category of school and teacher quality in Baringo North Sub County.
- H_{07} There is no difference between type of school and teacher quality in Baringo North Sub County.
- H_{08} There is no difference between gender of students and teacher quality in Baringo North Sub County.

4. Results and Discussions

4.1. Teacher Quality in Baringo North

The first research question sought to determine the quality of teachers in Baringo North. To answer the question, the study first sought to know the number of times school administrators had evaluated teachers in their schools using the TPAD tool. A cross-tabulation was used to establish the association between designation and number of times teachers had been evaluated and the findings indicated that 52.8% of the principals and 47.2% of the deputy principals had evaluated their staff using the TPAD tool over the three-year period under focus as illustrated in table 1.

			How many times have you evaluated teachers in your school using the TPAD tool?			Total
			Once	Twice	Thrice	
Designation	Principal	Count	3	6	19	28
		% of Total	5.7%	11.3%	35.8%	52.8%
	D/principal	Count	1	5	19	25
		% of Total	1.9%	9.4%	35.8%	47.2%
Total		Count	4	11	38	53
		% of Total	7.5%	20.8%	71.7%	100.0%

Table 1: Number of Times Administrators Had Evaluated Teachers in Their Schools Using the TPAD Tool

Secondly, the study sought to find out how many times teachers had been evaluated using the TPAD tool, using cross-tabulation it emerged that a majority of the teachers 71.6% had been evaluated using TPAD of whom 40.4% were HODs, 21.1% were HOSs and 38.5% were assistant teachers as indicated in table 2. Overall, this implied that majority of the teachers had been evaluated using the TPAD tool.

			Have you been Evaluated on TPAD?		Total
			Yes	No	
Designation	HOD	Count	37	7	44
		% of Total	33.9%	6.4%	40.4%
	HOS	Count	19	4	23
		% of Total	17.4%	3.7%	21.1%
	Asst Teacher	Count	22	20	42
		% of Total	20.2%	18.3%	38.5%
Total		Count	78	31	109
		% of Total	71.6%	28.4%	100.0%

Table 2: Have You Been Evaluated on TPAD?

Thirdly, the study sought to determine the teacher quality as expressed by TPAD scores awarded to those teachers who had been evaluated, the findings showed that on the overall TPAD scores per section generally increased over the period from 2016 to 2018. Subsequently, the overall TPAD mean score in 2016 was 75.91; SD= 9.52. In 2017 the overall TPAD MS= 76.41; SD=8.92 and in the year 2018 the overall TPAD MS= 77.1; 3 SD= 8.84 as illustrated in table 3. On average the overall TPAD mean score between 2016 and 2018 was 76.48 SD= 9.09. This indicated that teachers in Baringo North fully met their targets and were rated as good as per their TPAD scores (TSC, 2016).

	Minimum	Maximum	Mean	Std. Deviation
TPAD 2016	54.00	99.00	75.91	9.52
TPAD 2017	58.00	100.00	76.41	8.92
TPAD 2018	52.00	100.00	77.13	8.84
Mean	55	99.67	76.48	9.09

Table 3: TPAD Descriptive Statistics

4.2. Academic Achievement of Students in Baringo North

The second research question was to establish the academic achievement of students in Baringo North. To respond to question, respondents were first asked if they had presented a candidate class in their 1st and 2nd teaching subjects over the last 3 years. The findings indicated that majority 84% of the respondents had presented a candidate class for KCSE exams in at least one of their teaching subjects over the last 3 years under focus.

	Frequency	Percent	Cumulative Percent
Yes	137	84.0	84.0
No	26	16.0	100.0
Total	163	100.0	

Table 4: Presented a Candidate Class for KCSE Exams in the Last 3 Years

Secondly, the respondents were asked about the performance in their 1st and 2nd subjects, and the findings indicated that the performance in the 1st subject in 2016 had a MS= 4.41; SD = 2.22, in 2017 MS=3.58; SD= 1.47 and in 2018 MS=3.72; SD= 1.46 while for the 2nd subject in 2016 MS=4.39; SD=2.29, in 2017 MS=3.57; SD=1.59 and in 2018 MS=3.87; SD=1.68. This implied that the 1st subject and 2nd subject performance was highest in 2016, followed by 2018 and finally 2017. Thirdly, the study sought to find out the overall mean score attained by the schools over the three years under focus. The findings showed the overall mean score of KCSE performance in 2016 was 3.8; SD= 1.1. In 2017 MS= 3.2: SD= 0.79 and in 2018 MS= 3.49; SD 0.77. This finding indicated that the mean score of KCSE performance was highest in 2016, followed by 2018 and finally 2017. The mean score of KCSE performance in Baringo North had declined between 2016 and 2018 as illustrated in table 5.

	Minimum	Maximum	Mean	Std. Deviation
2016	2.00	6.11	3.80	1.10
2017	1.94	5.01	3.20	0.79
2018	2.05	5.15	3.49	0.77
Mean	2.00	5.42	3.50	0.89

Table 5: Descriptive Statistics on Overall Mean Score Performance in KCSE

4.3. Effect of Teacher Quality on Academic Performance

The third research question was to establish if teacher quality had an effect on student achievement in Baringo North Sub County. Teacher quality measured using TPAD scores for the years 2016, 2017 and 2018 while academic performance was measured using overall KCSE results for the period. One-way analysis of variance (ANOVA) was used to compare the mean scores of TPAD Scores and mean KCSE performance between 2016 and 2018. The findings indicated that the mean performance of KCSE between 2016 and 2018 was 3.45 with a general decline over the period while the TPAD mean score was on an upward trend having peaked at 78.43%. The ANOVA revealed a statistically significant difference between the three TPAD scores and overall KCSE performance in 2016 {F (27, 57) = 2.243, p = .005}; 2017 {F (27, 57) = 2.767, p = .001} and 2018 {F (27, 57) = 3.444, p = .000} as indicated in table 6. Similarly, there was statistical significance between the overall TPAD score and overall KCSE performance {F (27, 57) = 3.038, p = .000}. Consequently, the study rejected the null hypothesis H_{01} (There is no difference between teacher quality and student academic achievement in Baringo North Sub County) and concluded that there was a difference between teacher quality and student academic achievement.

		Sum of Squares	Df	Mean Square	F	Sig.
TPAD 2016	Between Groups	3804.631	27	140.912	2.243	.005
	Within Groups	3581.575	57	62.835		
	Total	7386.206	84			
TPAD 2017	Between Groups	3988.124	27	147.708	2.767	.001
	Within Groups	3042.800	57	53.382		
	Total	7030.924	84			
TPAD 2018	Between Groups	4630.342	27	171.494	3.444	.000
	Within Groups	2837.964	57	49.789		
	Total	7468.306	84			

Table 6: ANOVA of TPAD Score of 2016, 2017 and 2018 and KCSE Performance

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3638.763	27	134.769	3.038	.000
Within Groups	2528.206	57	44.354		
Total	6166.969	84			

Table 7: ANOVA of mean TPAD score on KCSE performance

4.4. Effect of Teacher Characteristics on Teacher Quality

The fourth research question was to determine whether teacher characteristics had an effect on teacher quality. First, the study sought to establish whether there was a difference between teacher's gender and teacher quality in Baringo North sub County. The findings indicated that majority (68.7%) of the teachers in the Sub County were male pointing towards a gender disparity in staffing at secondary school level in Baringo North Sub County. There were 64 male teachers and 26 female teachers with TPAD scores for the entire three years under focus. The mean TPAD score for male teachers was 76.47% and the mean TPAD score for female teachers was 78.13%. There was no significant difference in TPAD scores for males ($M=76.4714$, $SD=8.348$) and females [$M=78.135$, $SD= 9.105$]. The magnitude of the differences in the means was very small. An independent t-test was run on the data with 95% confidence interval (CI) for the mean difference (table 8). From the findings the 95% CI was (-5.6, 2.3) which did not contain zero and agreed with the small p -value of the significant test hence there was no statistically significant difference between TPAD scores of male teachers and TPAD scores of female teachers ($t_{88}=.835$, $p > .05$). The average TPAD scores for male teachers was 1.66% less than the average TPAD scores for female teachers and since the $p > 0.05$, the study failed to reject the H_{02} (There is no difference between Teacher's gender and teacher quality in Baringo North Sub County) and conclude that the mean TPAD scores for male and female teachers was not significantly different.

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	
TPAD	Equal variances assumed	0.029	0.866	-0.835	88.0	0.406	-1.663	1.993	-5.624
	Equal variances not assumed			-0.804	43.0	0.426	-1.663	2.068	-5.834

Table 8: Independent Samples T Test of Teacher's Gender

Secondly, the study sought to establish if there was a difference between teacher's age and teacher quality in Baringo North Sub County. The findings showed that majority of the respondents (57%) were below 40 years with the greatest number (35%) in the age bracket 18-30 years. Only 14.1% of the respondents were aged above 50years (Table 9).

		Frequency	Percent	Cumulative Percent
	18-30yrs	57	35.0	35.0
	31-40yrs	37	22.7	57.7
	41-50yrs	46	28.2	85.9
	51-60yrs	23	14.1	100.0
	Total	163	100.0	

Table 9: Teachers Age

Descriptive statistics on age and teacher quality indicated that teachers' age between 18 and 30 years had the highest TPAD score of 81.595% while teachers with the least TPAD score (75.54%) were aged between 51 and 60 years (table 10). This indicated that younger teachers were of a higher quality as compared to the older ones.

Age	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
18-30yrs	14	81.5952	10.79188	2.88425	75.3642	87.8263	69.33	99.33
31-40yrs	26	76.0705	7.96495	1.56205	72.8534	79.2876	56.67	86.33
41-50yrs	31	76.4624	8.59314	1.54337	73.3104	79.6144	59.33	96.00
51-60yrs	19	75.5351	6.79701	1.55934	72.2590	78.8111	58.67	86.33
Total	90	76.9519	8.55551	.90183	75.1599	78.7438	56.67	99.33

Table 10: Descriptive Statistics of Age and Teacher Quality

However, an ANOVA of teachers age and TPAD score indicated that there was no statistically significant difference between teachers age and TPAD Score, { $F(3, 86) = 1.714, p > .05$ } (table 11). Since the p value associated with the F ratio ($p = 0.170$), was greater than the α level (.05), the study failed to reject H_{03} (There is no difference between teachers age and teacher quality in Baringo North Sub County). The study therefore concluded that the differences between teachers' age means are likely due to chance and not likely due to the IV manipulation.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	367.615	3	122.538	1.714	.170
Within Groups	6146.899	86	71.476		
Total	6514.514	89			

Table 11 ANOVA of Age and Teacher Quality

Thirdly the study sought to establish if there was a difference between teacher's academic qualification and teacher quality in Baringo North sub County. The findings indicated that majority of the respondents 86.5% had at least degree level academic qualification while 13.5% had diploma level academic qualification (table 12). All respondents had the attained the least qualification to teach at secondary school level.

	Frequency	Percent	Cumulative Percent
Diploma	22	13.5	13.5
Degree	141	86.5	100.0
Total	163	100.0	

Table 12: Teacher's Academic Qualification

Descriptive statistics of academic qualification and TPADS core revealed that the diploma teachers had the highest TPAD score of 79.31% as compared to 76.59% for their degree holder counterparts (table 13).

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Diploma	12	79.3056	6.58811	1.90182	75.1197	83.4914	69.67	94.33
Degree	78	76.5897	8.79815	.99619	74.6061	78.5734	56.67	99.33
Total	90	76.9519	8.55551	.90183	75.1599	78.7438	56.67	99.33

Table 13: Descriptive Statistics of Academic Qualification and Tpadscore

The results from the ANOVA indicated that there was no statistically significant difference between teacher's academic qualification and the TPAD Score {F (1, 88) = 1.049, $p > .05$.} (table 14). Since the p value associated with the F ratio ($p = 0.309$) was greater than the α level (0.05), the study failed to reject H_{04} (There is no difference between teachers' academic qualification and teacher quality in Baringo North Sub County). The study therefore concluded that the differences in academic qualification means was likely due to chance and not due to the IV manipulation.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	76.707	1	76.707	1.049	.309
Within Groups	6437.807	88	73.157		
Total	6514.514	89			

Table 14: ANOVA of Academic Qualification and TPAD Score

Fourthly, the study sought to establish if there was a difference between teaching experience and teacher quality in Baringo North Sub County. The findings indicated that a majority of the respondents (53.4%) had less than 10 years teaching experience. Only 30 % of the teachers had over 20 years teaching experience (table 15).

	Frequency	Percent	Cumulative Percent
1-5yrs	56	34.4	34.4
6-10yrs	31	19.0	53.4
11-15yrs	16	9.8	63.2
16-20yrs	11	6.7	69.9
21-25yrs	31	19.0	89.0
26yrs and over	18	11.0	100.0
Total	163	100.0	

Table 15: Length of Teaching Experience in Years

The study also established that 64.8 % of the administrators had served in their current institutions for less than four years, while 20.4% had served for more than 6 years. A cross tabulation of the number of years served as an administrator and designation revealed that half of the principals (17) had served in their stations for less than 4years as was a majority (18) of the deputy principals (table 16). This indicated that majority of the administrators had served for a relatively short stint in their current institutions.

			number of years served in your current institution in administrative position				Total
			Below 2 yrs	3-4 yrs	5-6yrs	More Than 6 yrs	
Designation	Principal	Count	7	10	3	8	28
		% of Total	13.0%	18.5%	5.6%	14.8%	51.9%
	D/principal	Count	10	8	5	3	26
		% of Total	18.5%	14.8%	9.3%	5.6%	48.1%
Total		Count	17	18	8	11	54
		% of Total	31.5%	33.3%	14.8%	20.4%	100.0%

Table 16: Cross Tabulation of Designation against Number of Years Served In Your Current Institution in Administrative Position

Overall, the descriptive findings indicated that teachers with less than 5 years of teaching experience had the highest TPAD score of 82.795%, while the followed by teachers with teaching experience of 11 and 15 years with 76.41% and the least score of 74.7% was for teachers with over 26 years of experience (table 17). The mean values for the six-teaching experience bands indicated that the teachers with less teaching experience had higher TPAD scores compared to their more experienced teachers.

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1-5yrs	13	82.7949	10.64628	2.95275	76.3614	89.2284	69.33	99.33
6-10yrs	21	75.2143	8.91116	1.94457	71.1580	79.2706	56.67	94.33
11-15yrs	11	78.8485	8.18720	2.46853	73.3482	84.3487	69.00	96.00
16-20yrs	8	75.0833	7.47217	2.64181	68.8364	81.3302	61.00	81.67
21-25yrs	22	76.4091	6.62601	1.41267	73.4713	79.3469	62.33	86.33
26yrs and over	15	74.7222	8.13860	2.10138	70.2152	79.2292	58.67	88.67
Total	90	76.9519	8.55551	.90183	75.1599	78.7438	56.67	99.33

Table 17: Descriptive Statistics of Teaching Experience and TPADScore

However, an ANOVA of teaching experience and TPAD Score indicated that there was no statistically significant difference between teaching experience and TPAD Score, {F (5, 84) = 1.88, $p > .05$ } (table 18). Since the p value associated with the F ratio ($p = 0.106$), which was greater than the α level (.05), so the study failed to reject H_{05} (There is no difference between teachers teaching experience and teacher quality in Baringo North Sub County). The study therefore concluded that the differences between teaching experience means were likely due to chance and not likely due to the IV manipulation.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	655.783	5	131.157	1.880	.106
Within Groups	5858.730	84	69.747		
Total	6514.514	89			

Table 18: ANOVA of Teaching Experience and Tpadscore

4.5. Effect of School Characteristics on Teacher Quality

The fifth research question was to determine whether the school characteristics had an effect on teacher quality. Firstly, the study sought to determine if there was a difference between category of school and teacher quality. The findings indicated that majority of the respondents were from Sub County schools (54%), while the least (20.9%) was from Extra County schools (table 19).

	Frequency	Percent	Cumulative Percent
County	41	25.2	25.2
Sub county	88	54.0	79.1
Extra county	34	20.9	100.0
Total	163	100.0	

Table 19: Category of School

From the descriptive statistics it emerged that the highest TPAD score (80%) was attributable to teachers drawn from the county schools, followed by 75.85% for those in Sub County schools and the least score of 74.9% for those drawn from Extra County schools (Table20).

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
County	28	80.0000	7.66425	1.44841	77.0281	82.9719	65.33	96.00
Sub county	44	75.8485	7.53843	1.13646	73.5566	78.1404	58.67	94.33
Extra county	18	74.9074	11.10367	2.61716	69.3857	80.4291	56.67	99.33
Total	90	76.9519	8.55551	.90183	75.1599	78.7438	56.67	99.33

Table 20: Descriptive Statistics on Effect of Category of School on Teacher Quality

However, the ANOVA results of category of school and TPAD Score indicated that there was no statistically significant difference between category of school and TPAD Score $\{F(2, 87) = 2.622, p > .05\}$ (table 21). Since $p = 0.078$, which is greater than the α level (.05), the study failed to reject H_{06} (There is no difference between category of school and teacher quality in Baringo North Sub County). The study therefore concluded that the differences between category of school means were likely due to chance and not likely due to the Independent Variable manipulation.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	370.320	2	185.160	2.622	.078
Within Groups	6144.194	87	70.623		
Total	6514.514	89			

Table 21: ANOVA of Category of School and TPADScore

Secondly, the study sought to establish whether there was a difference between type of school and teacher quality in Baringo North Sub County. The findings indicated that respondents were drawn evenly from all types of schools (table 22)

	Frequency	Percent	Cumulative Percent
Day	46	28.2	28.2
Boarding	64	39.3	67.5
Boarding & day	53	32.5	100.0
Total	163	100.0	

Table 22: Respondents by Type of School

Descriptive statistics on the effect of type of school on teacher quality revealed that the majority of teachers with the highest TPAD score (78.35%) were drawn from the boarding & day schools, followed by boarding schools with 77.79% and the least score of 73.3% drawn from day schools (table 23). These findings indicate that teachers from boarding & day schools had the higher TPAD scores compared to their counterparts drawn from boarding only or day only schools.

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Day	21	73.3016	6.95354	1.51739	70.1364	76.4668	58.67	83.00
Boarding	36	77.7963	10.38108	1.73018	74.2838	81.3087	56.67	99.33
Boarding & day	33	78.3535	6.62693	1.15360	76.0037	80.7033	59.33	94.33
Total	90	76.9519	8.55551	.90183	75.1599	78.7438	56.67	99.33

Table 23: Descriptive on Effect of Type of School and Teacher Quality

The ANOVA results indicated that there was no statistically significant difference between type of school and TPAD Score, $\{F(2, 87) = 2.76, p > .05\}$ (Table 24). Since the $p = 0.069$, which was greater than the α level (.05), the study therefore failed to reject H_{07} (There is no difference between type of school and teacher quality in Baringo North Sub County). The study therefore concluded that the differences between type of school means were likely due to chance and not likely due to the Independent Variable manipulation.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	388.956	2	194.478	2.762	.069
Within Groups	6125.558	87	70.409		
Total	6514.514	89			

Table 24: ANOVA of Type of School and Tpadscore

Thirdly, the study sought to establish whether there was a difference between gender of students and teacher quality in Baringo North Sub County. The results indicated that majority of the respondents 69.9% were drawn from mixed schools, with 17.2% from girls' only school and 12.9% from boys' only schools (Table 25).

	Frequency	Percent	Cumulative Percent
Boys	21	12.9	12.9
Girls	28	17.2	30.1
Mixed	114	69.9	100.0
Total	163	100.0	

Table 25: Gender of Students

The Descriptive statistics indicated that the highest TPAD score of 87.03% was attributable to teachers drawn from the boys only schools, followed by girls only schools with 75.77% and the least score of 75.32% for teachers drawn from mixed schools (table 26).

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Boys	12	87.0278	8.96284	2.58735	81.3331	92.7225	73.33	99.33
Girls	13	75.7692	6.67275	1.85069	71.7369	79.8015	65.33	86.33
Mixed	65	75.3282	7.59185	.94165	73.4470	77.2094	56.67	94.33
Total	90	76.9519	8.55551	.90183	75.1599	78.7438	56.67	99.33

Table 26: Descriptive on Gender of Students and Teacher Quality

5. ANOVA on Gender of Students and Teacher Quality

ANOVA results indicated that there was a statistically significant difference between the gender of students and TPAD scores, $[F(2, 87) = 11.99, p < .05]$ (table 27). Since the $p = 0.000$, which is less than the α level (.05), the study rejected H_{08} (There is no difference between gender of students and teacher quality in Baringo North Sub County). The study concluded that the gender of students had an effect on teacher quality.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1407.828	2	703.914	11.992	.000
Within Groups	5106.686	87	58.698		
Total	6514.514	89			

Table 27: ANOVA of Gender of Students and TPAD Score

6. Discussion of Findings

The study set out to determine the effect of teacher quality on student academic achievement. Teacher quality was expressed by TPAD scores while student academic achievement was expressed by KCSE performance mean scores. It emerged that there was a statistically significant difference between TPAD scores and KCSE performance in 2016, 2017 and 2018. In addition, there was a statistically significant difference between the TPAD scores and the overall KCSE performance. The finding agreed with Siriati (2016); Chen, *et al* (2017) and Seebruck, (2015) however disagreed with Nolan (2010) who indicated that teachers' appraisal had no additional impact on student test scores. The study sought to find out if selected teacher characteristics would have an effect on teacher quality as expressed by TPAD scores awarded. It emerges that the mean TPAD scores for male and female teachers was not significantly different. This finding agreed with Shore and Thorton III (1986). However, the finding was contrary to Drake, *et al* (2019), Bailey *et al* (2016) and Campbell & Ronfeldt (2018) who found lower ratings for male teachers. The findings indicated there was no statistically significant difference between the teachers' age and teachers teaching experience and TPAD scores, it was noted that novice teachers received relatively low ratings. The study found that teaching experience did not affect TPAD rating, however given that most of the respondents were within the professional (4- 6 years) and expert stages (7-12years) which explains the higher TPAD scores agreeing with Rivkin *et al* (2005), Thelma *et al* (2017) and Gonzalez & Gerri (2018). However, the findings were contrary to Drake *et al* (2019). Teacher's academic qualification has no difference on teacher quality in Baringo North Sub County. The study therefore concluded that the academic qualification held by a teacher did

not have an effect on the TPAD score they were assigned. This finding was echoed by Seweje and Jegede (2005) who argued that the ability of a teacher to teach is not derived only from one's academic background but it is based upon outstanding pedagogical skill acquired. The study sought to find out if selected school characteristics would have an effect on teacher quality as expressed by TPAD scores awarded. It emerges that there was no difference between category of school and type of school teachers and teacher quality agreeing with Odour (2018) that in Kenya, top performing schools set their own unique targets and as a result tended to disregard the TSC TPAD and only did fake figures at the end of the term to satisfy the employer's requirements. However, it emerged that there was a difference between gender of students and teacher quality. This agreed with Anditi, *et al* (2013) and Olaitan (2017).

7. Conclusion and Recommendation

The study established that teachers in Baringo North had largely embraced the TPAD appraisal system as expected by the Teachers service commission (TSC, 2016; Teachers Service Commission, 2018) and were rated as good. It was also established that there was a decline in KCSE performance within the Sub County as had been noted by stakeholders. However, the study established that there was a statistically significant difference between teacher quality and student achievement. Based on the understanding that teacher performance appraisal is a measure of teacher quality (Danielson, 2013; AITSL, 2012; Stewart, 2011; Siriat, 2016), the study recommends that the TSC adopts a mechanism that will ensure the TPAD scores attained by teachers in the Sub County are reflected in the academic performance of students. Secondly, the study found that there was a significant difference between gender of students and teacher quality and therefore recommended that more single sex schools be set up as teacher quality seemed to be enhanced in them as compared to co-educational schools that seemed to dominate in the Sub County.

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