

Full Length Research Paper

Performance ranking in school mathematics in Kenya: A device that conceals and naturalizes inappropriate teaching strategies

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Teaching strategies have a significant influence on students' academic performance. This paper presents results from a qualitative study that examined the effects that performance ranking in Mathematics has on teaching strategies employed in Mathematics classrooms. In particular, the paper demonstrates how performance ranking disguises and legalizes inappropriate Mathematics teaching strategies. The participants for the study were Mathematics teachers and students in secondary schools in Embu County in Kenya. Face-to-face semi-structured interviews and focus group discussions were employed in data collection. Results showed that due to competition by teachers to achieve a higher mean score, they engaged in examination malpractices such as leaking examination questions to students. Secondly, teachers' desire for excellence in their subjects, and achieving top rank to receive prizes was found to be another reason behind teaching students to pass examinations rather than for conceptual understanding. Additionally, the study revealed that performance ranking promoted private tuition to offer assistance to the weak students in Mathematics to improve performance in the subject. This paper recommends that the practice of ranking should be tailored to include all the aspects.

Key words: Performance ranking, mathematics, teaching strategies, learning.

INTRODUCTION

Teaching strategies are generalized plans for a lesson that is inclusive of the lesson structure, desired learner behavior in terms of the goals of the instruction, and an outline of planned tactics necessary to implement the strategies (Gill and Kusum, 2017). Most importantly, teaching strategies are techniques teachers employ to help students become independent strategic learners. Strategic learners make meaningful connections between

skills, ideas, and real-life situations if appropriate teaching strategies are employed in classroom discourses. In this regard, appropriate teaching strategies promote an effective learning environment for students learning (Macsuga-Gage et al., 2012).

Studies have shown that teaching strategies can be influenced by performance ranking in examinations if sanctions are attached to students' performance

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(Kellaghan et al., 2009). In such a case, performance ranking data becomes an operation for the school administrators with a variety of rewards or punishments for teachers attached to students' performance. The teachers may receive rewards in the form of presents for students' excellent performance comparatively and may be demoted in case of low students' performance (Kellaghan et al., 2009). This practice motivates the teachers to modify teaching strategies in the requirements of sanctions. The strategies may seem appropriate because of the student's excellent performance when in the fact they are inappropriate. The practice of performance ranking differs across countries in the world.

In the Kenyan context, the performance ranking of schools and students in examinations began in 1940 (Bogonko, 1992). In 1940 there were three categories of schools namely, local native schools, government schools, and missionary schools. The ranking was meant to compare performance across the three categories of schools. Up to 2014, before the ban on performance ranking, there have been seven categories for ranking schools. These were: best overall, National schools, Provincial schools, District schools, Private schools, most improved, and students' categories (Amunga et al., 2010). The modality of ranking was only based on achievement in national standardized examinations, Kellaghan et al. (2009) unlike modalities used in other countries that look at other factors that contribute to an all-round student (Harris, 2011).

To enhance equity and quality of education, the report on Totally Integrated Quality Education and Training (TIQET) in 1999 recommended the abolishment of the ranking of students and schools (Republic of Kenya, 1999). The reason for the recommendation was that ranking was based on high stakes testing ignoring the other important factors of schooling such as co-curricular activities, student's entry behavior and social-economic background of learners (Wanzala, 2014). One of the recommendations of the report which was not implemented was the abolishing of the performance ranking of students and schools (Lelei and Weidman, 2012).

Performance ranking in standardized national and internal examinations at the national, County and sub-County levels continued until 2014 when the Kenya government banned the practice (Wanzala, 2014). The ban was as a result of unethical examination malpractices such as cheating in examinations among others (Ocholla, 2011). Despite the ban on performance ranking, the malpractices persisted in 2015 (Murori, 2016). Therefore, performance ranking was not the main cause of the examination malpractices. Moreover, performance ranking may have had a great influence on teaching and learning. The ban on performance ranking generated heated debate and as a result of the pressure in 2016, the government lifted the ban but with a

significant change in the modalities of inclusion of co-curricular activities (Republic of Kenya, 2016). The recommendation on the new way of ranking is yet to be implemented (Nyamwembe, 2020).

Ranking of schools and students was meant to disseminate information on students' performance and promote healthy competition between schools which would motivate teachers to improve their instructional practices (Shindler, 2010). However, the publication of results has had several effects on teaching and learning. It led to a change of content to which students are exposed to in order to emphasize short-term or superficial strategies like memorization, teaching for factual knowledge and rehearsing. Furthermore, there was a devotion of a significant amount of time to test preparation activities and a focus on students who are more likely to succeed at the expense of the average and slow learners (Kellaghan et al., 2009). Existing literature has examined performance ranking in national examinations in Kenya. For example, a study carried out by Amunga et al. (2010) focused on perceptions of teachers and students on the ranking of students and schools in national examinations. This paper takes the conversation a little further by investigating the effects of performance ranking on teaching strategies employed in Mathematics classrooms.

LITERATURE REVIEW

Several studies have shown that performance ranking has some effects on the pedagogical strategies employed in teaching and learning with effective teaching strategies linked to students' achievement (Schedsmo and Huber, 2019). Opponents of performance ranking contend that performance ranking has made students, teachers and schools desperate for top positions hence encouraging cheating in national examinations (Anderman and Murdock, 2007). In their effort to obtain a better rank position, teachers resorted to various forms of cheating designed to give a student or a school undue advantage over others (Njue et al., 2014). According to a study by Njue et al. (2014), the examination malpractices takes many forms such as teachers aiding students to answer examination questions during an examination, collusion between school principals and examination supervisors and purchasing of examination materials. Ochola (2011) observes that the ranking of schools by the media is one of the factors affecting the management of the Kenya Certificate of Secondary Education (K.C.S.E) examinations negatively. Subsequently, it contributes significantly to examination irregularity cases in Kenya. Similarly, Nyamwange et al. (2013) argue that the issue of examination malpractice is a continuous recurrence issue in the educational discourse in Kenya. This scourge has led most of the stakeholders to be at a loss as to the right action to take that will generate useful results on the

matter pertaining to ending examination malpractices (Adow et al., 2015). Most importantly, it has been observed that 9 out of every 10 students indulge in one form of examination malpractice or another (Murori, 2016). The situation becomes more worrisome when teachers who should be custodians of moral code of conduct increase students incentives to cheat to ensure that they shine in their final examination results (Ramberg and Modin, 2019).

Additionally, performance ranking motivates teachers to change their pedagogical strategies for their students to appear at the top of the league tables. A study by Limangura et al. (2017) observed that ranking motivates teachers to speedily cover the syllabus, change institutional practices and focus their teaching activities towards test-taking skills neglecting other aspects of education. The practice denies the students the opportunity to develop creativity and innovations during the learning process.

Furthermore, Kivilu (2004) observed that ranking in Africa resulted in low completion rates as many schools kept on skimming only the best students and the rest were required to either repeat or leave such schools. There was a lot of wastage of human resources where children were labeled as failures when in fact they had the potential for further education. Teaching dominated school time while co-curricular activities were forgotten and time increased for instruction beyond the ones laid down by the Ministry of Education. For example, some schools increased tuition by introducing evening classes and holiday tuition in desperation for a top rank (Wanyama and Njeru, 2004). Teaching was also characterized by frequent testing to identify performance gaps and to improve test-taking skills so that the schools improved their rank.

On the other hand, several studies have shown the need to rank and publicize schools based on examination results. Kellaghan and Greaney (2003) stated that performance ranking provides information on the performance of secondary schools in various subjects. Through the information from the rank data, underperforming schools are identified and the reason for under-performance investigated. The practice leads to the provision of practical advice regarding the skills to be developed and the types of targets to be set. If the conclusion is that poor performance is a result of a lack of teaching/learning resources, then the matter can be addressed through the relevant authorities.

Furthermore, proponents of performance ranking contend that the issue of assessment is critical to the functioning of schools. It serves as a motivator of students' performance and provides feedback to the teacher on the effectiveness of the teaching methods. Therefore, the teacher can use the feedback from the students' assessment to adjust the teaching methods for students learning. Besides, the ranking data communicates to the students, parents, and other stakeholders on the level of the students as far as

teaching and learning is concerned (James, 1998).

METHODOLOGY

Research approach and design

The study aimed at gaining insights into the effects of performance ranking on Mathematics pedagogical strategies in participant's natural settings. The study, therefore, adopted a qualitative approach and a case study design. The qualitative approach enabled the researchers to have in-depth information by exploring participants' views in more depth (Creswell and Clark, 2011).

Participants and context of the study

The study was carried out in Embu County in Kenya. In Kenya, there are forty-seven counties and in each County there are two categories of secondary schools; namely, public and private. The public secondary schools are further grouped into four categories: National, Extra County, County and Sub-County schools; depending on students' performance and teaching and learning resources available (Makori et al., 2015). The secondary education cycle in Kenya is divided into four grades, called Forms (Form 1, 2, 3 and 4). Simple random sampling was employed to determine the schools, teachers and students that will take part in the study. Random number generator was used to sample the particular secondary schools which took part in the study. The researcher accomplished this by listing and assigning numbers to schools then used an online random generator to get the final sample. The same procedure was done with teacher and students participants. The participants were teachers and students of eight public secondary schools (One National, one Extra County, two County and two Sub-County) and two private schools.

Data collection and analysis

The study employed multiple data collection methods namely; face-to-face semi-structured interviews and focus group discussions (Plano and Creswell, 2008). A total of fourteen face to face semi-structured interviews lasting between 40 to 60 min were conducted with Mathematics teachers and students. Six were conducted with students' participants and eight with teacher participants. One focus group discussion was conducted with teachers and three with students lasting between 40 to 60 min. Data collected were transcribed and subjected to qualitative data analysis. During the analysis, the transcripts were analyzed, categorized through the back and forth analytical process (Suter, 2012). The research participants were guaranteed anonymity and quotations from the interviews reported accordingly (Sim and Waterfield, 2019).

RESULTS AND DISCUSSION

The face-to-face semi-structured interviews and focus group discussions focused on a range of topics, from the methodology of performance rankings to their impact on teaching strategies employed in Mathematics classrooms. In brief three major themes emerged from the analysis of the interviews and focus group discussions: while (1) performance rankings were an encouragement for teachers to engage in examination malpractices, and (2) private tutoring, (3) it was also a

motivation for teachers to teach for factual knowledge as opposed to teaching for conceptual understanding.

Teachers engagement in examination malpractices

Students' views on whether performance ranking in Mathematics encourages examination malpractices among teachers revealed that during the examination season Mathematics teachers taught areas included in the examinations. The strategy denied students the opportunity to gauge their level of preparedness in the Mathematics examination; a practice that was not appreciated by the students as revealed during the interviews.

Student's high scores as a result of cheating do not benefit at all, because educational excellence is not only about passing examinations but should be focused on acquiring adequate Mathematics knowledge and skills. During examination season Mathematics teachers engaged students in test-taking skills and students scored highly (Form 4 student in a private school). ... Sometimes our teacher would revise questions only to find them in the internal Mathematics examinations (Form 4 student in a County school)

A focus group discussion with Mathematics students revealed that during the national examinations, Mathematics teachers positioned themselves in strategic places during the examination so that they get opportunities to present the answers to the students through collusion with the invigilators. The students would excuse themselves to get out of the examination room under the guise of visiting the washrooms. In this way, they would get an opportunity to obtain the answers to the difficult questions in the test from the teacher.

In the last year, during the end of the secondary course examination, a Mathematics teacher was caught by the examination supervisor in a strategic area aiding students in answering examination questions. The students pretended to have gone out to the washrooms only to get where the teacher was to obtain the answers (A form 3 student in a County school).

A focus group discussion with Mathematics teachers revealed that there was a practice of teachers organizing to obtain the examination tests prior to the examination and hold discussions with the students at night on the eve of the examination. Furthermore, the school principals purchased the national examinations so that their schools emerge at the top of the rank when the results are announced through the media. The practice brought out the idea of the marketization of education where students were viewed as commodities and grades as the outputs.

.....Performance ranking puts pressure on Mathematics teachers because the administration requires them to ensure their classes get a mean score of C+ and above to benefit from any internal appointments in the school. The teachers, therefore, employed all means including obtaining the examination question paper in advance and revised with students before the real examination time. This is a common practice in this school (A teacher in an Extra- County school).

In line with the study findings, Greaney and Kellaghan (1995) opined that a worrying aspect of ranking is the examination malpractices. In their effort to obtain a better rank, teachers employed all examination cheating strategies to give a student undue advantage over others. The examination malpractices take many forms such as copying from other students during an examination, collusion between teachers and examination supervisors, purchasing of examination materials among others (Njue et al., 2014). When students' performance in examinations is highly consequential for teachers and administrators, the pressure by the examinations sometimes results in cheating by teachers and administrators breaking of standardized procedures associated with examinations (Berliner, 2011). Sometimes the teachers engage in curriculum narrowing to accommodate the pressure for obtaining higher examination scores from the students. The pressure of higher mean score also results in teachers engaging in vast amounts of examination writing techniques with their students which cause validity of examination to be compromised. The purpose of an examination is to provide feedback to the education stakeholders on the level of knowledge acquisition and retention by the students. Any form of examination malpractice distorts this feedback mechanism and gives a false outcome of the learning process. This may be the most important lesson to be learned by schools using performance ranking data in the evaluation of teachers' teaching strategies. Therefore, the factors that trigger the practice should be addressed through the relevant bodies. From the results of the study, one of the main factors that encourage examination malpractices is performance ranking in subjects.

Private tuition

It was the interest of the study to find out the teachers and students' views on whether performance ranking in Mathematics promotes the practice of private tuition in secondary schools. Private tuition is supplementary instruction in academic subjects arranged by an individual or the guardian (Kim and Lee, 2010). Private tuition normally takes place in the morning, evening, weekends when the school is in session and full days of the week during school holidays especially for the examination class. Sometimes a parent or a guardian

arranges for private tutoring for his or her daughter from a belief that such an arrangement allows students to improve knowledge or skills more rapidly than in a classroom setting where the teacher is expected to divide their attention across many students (Mutua et al., 2015).

Interviews with Mathematics teachers revealed that performance ranking in Mathematics promotes private tuition practice. The aim is to ensure that the class emerges the best after students sit for an examination. In some schools, the study found out that the teacher of the class at the top of the rank is awarded during school prize giving days. Thus being a motivation for teachers to engage students outside the stipulated teaching time. It could have been during the lunch break, in the evening and weekends.

Mathematics teachers have bad blood with other teachers in the school because they want to teach form 4 students in the evening after supper and in the morning before breakfast. The Mathematics teachers argue that for students to do well in other subjects they must be good in Mathematics but the motivation is to have many students scoring top grades. During the school annual prize-giving day teachers whose students scored B (plain) and above are given tokens of appreciation (Mathematics teacher in an Extra- County school).

I rank my Mathematics students using total marks after every Mathematics examination. I do this to bring out the positive competition and encourage Mathematics students to embrace hard work in their studies. Those who improve are proud and wish to continue working hard. I schedule extra time with weak students to assist them to improve their grades. (Form 2 teacher in a private school)

So far there is an indication that performance ranking promotes the practice of private tuition in Mathematics in secondary schools. The practice is for the teachers to offer assistance to the weak Mathematics students. Once the weak students improve their performance, the teachers are sure their Mathematics class will be at the top of the rank. Consequently, there is the enjoyment of the benefits associated with it. In tandem with the study findings, Mburugu (2012) observed that private tuition has been on the increase as a result of performance ranking.

Similarly, focus group discussion with the Mathematics students revealed that parents arrange for private tuition for students to improve their rank in Mathematics. A study on private supplementary tutoring undertaken by Bray (2017) revealed that private tuition is often conducted in the evenings and weekends while holiday tutoring is offered during school holidays for the students to improve on their performance.

...in my class I am always at the bottom of the rank in

Mathematics. I wish my parents have money to arrange for a teacher to assist me in my weak areas in Mathematics during the holidays as it happens with top achievers (Form 4 student in a sub-county school).

Furthermore, focus group discussion with Mathematics teachers revealed that teachers teach students Mathematics at night because it helps them to cover the work not covered during normal school days. The weak students are assisted, facilitating the Mathematics syllabus coverage and improves students' performance in Mathematics.

Mathematics syllabus is so wide and it's impossible to complete it in the four years without teaching extra time. I care for my students and my wish is to have all of them scoring a C+ and above at the end of the secondary course national examination. Secondly, there are "baby" classes to assist the weak students to attain the target grades (Form 4 teacher in a national school).

Private tuition practices bring out the issue of inequity in education as some students do not benefit from the arrangement because of the socio-economic status of their guardians. Besides, a good proportion of guardians may not afford to pay tuition fees for their sons and daughters. Therefore, the practice favors students from a section of the families in the Country. The outcome of the ranking data in that connection reflects the socio-economic status of the students' backgrounds instead of the students' achievement in Mathematics. Thus concealing the inappropriate teaching strategies employed by Mathematics teachers in Mathematics classrooms. According to Hallak and Poisson (2007), private tuition presents a financial burden to the guardians because of the extra payment for their children to benefit from the practice. Additionally, some teachers created the demand by teaching part of the curriculum leaving what is perceived to be important for private tuition classes. Those students from low socio-economic backgrounds are left out there by introducing injustice and inequity in accessing education. According to Adams Equity theory, there should be fairness in teaching and learning where all the students are exposed to similar conditions; otherwise, ranking data would display the socio-economic backgrounds of the students instead of students' abilities (Akareem and Hossain, 2016).

Teaching for factual knowledge

Teaching for factual knowledge denies students the opportunity to develop critical thinking skills making it impossible to evaluate what a student knows thereby diminishing the validity of test scores (Puspita and Aloysius, 2019). The strategy appears very appropriate to concerned stakeholders because it leads to the

improvement of students' performance in examinations. The stakeholders fail to realize that the strategy fails in developing higher-order thinking skills and students are not able to make meaningful connections between skills and ideas in real-life situations. Teachers of Mathematics interviewed observed that teachers teach verbatim memorization of facts in Mathematics which is not necessarily accompanied by an understanding of the facts. There exists a stiff competition amongst Mathematics teachers as teachers whose students obtain a high mean score in Mathematics are rewarded during the school annual prize-giving day.

I teach students techniques required for them to pass Mathematics examinations not necessarily understand because Mathematics syllabus is so wide and it is not possible to teach for understanding. This is because it would take a long time which is not possible in the four years. If the government wants students to be taught for understanding, then they should revise the Mathematics curriculum. Teachers teach for examinations and not knowledge (Teacher in a county school).

Teaching methods are characterized by intense revision of past Mathematics papers coupled with test-taking skills and fortnightly, Mathematics tests. The students in the examination class were taught throughout the day and were not left out to study on their own and no time for extracurricular activities. It is interesting to note that teachers sometimes compete for students during personal study time at night.

Teachers teach for examinations, that is, examination-oriented at the expense of other important issues in schooling. Some will teach at break time, lunchtime and even the time the learners are supposed to be out for games. Other teachers will teach at night for the boarding schools. Teachers fight to get learners during their free time, thereby suffocating learners with content. In one incident there was a commotion in one of the classes because of Mathematics and Chemistry teachers wanted to have the learners at the same time (Head of Mathematics department in a sub-county school).

The responses revealed that the facts taught to students were meant to help them to score highly in Mathematics examinations. This proves disadvantageous to the students because they are not able to solve Mathematical problems involving applications of the concepts taught. Still, the students are unable to interpret unfamiliar Mathematical information and relate to their context. Therefore, teachers geared their teaching towards passing examinations thereby encouraging teaching for factual knowledge. A focus on teaching for factual knowledge in Mathematics classrooms is consistent with the view of learning as knowledge acquisition in which

students seek to add new Mathematical information to their memories. This should not be the only focus because meaningful learning in Mathematics requires that instruction goes beyond a simple presentation of factual knowledge by presenting tasks that will provoke learners' critical thinking. The assessment tasks should be tailored to require more of students than simply recalling or recognizing factual knowledge like the application of the learned concepts. Moreover, pressure from examinations and ranking of schools according to performance should be blamed for lack of depth in learning and the teaching process (Mugi and Mwangi, 2018). Focusing on examination results ignored many other important outcomes of schooling like physical wellbeing, life skills, confidence, and extracurricular activities.

Furthermore, the teacher employed a test-taking skills strategy to benefit during the prize-giving day. The teacher rewards given during the schools' annual prize-giving days were based on comparative students' scores. Tying teachers rewards to students' test scores can discourage teachers from wanting to work in schools with below-average students with a large variation in the results and their perceived unfairness can undermine the morale of teachers. Additionally, the practice can discourage teacher collaboration in teaching and learning. Appropriate teaching strategies encourage collaboration where teachers work across classroom boundaries towards the common goal for educating all students to their full potential (Baker et al., 2010).

Summary of the study

This paper examined the effects of performance ranking on the teaching strategies employed in Mathematics classrooms. Data were analyzed from interviews and focus group discussions with students and teachers of Mathematics drawn from eight public and two private secondary schools in Embu County of Kenya. The analyses of the data were guided by the back-and-forth analytical process of Suter (2012). The results of the analyses demonstrated that performance ranking influenced the pedagogical strategies used by teachers of Mathematics in their instruction. In particular, the teachers tended to teach for examinations rather than for conceptual understanding. The teachers focused more on repetition and review, with superficial coverage of contents so as to achieve good grades in the final examination. It was observed that the teachers were keen on manipulating the examination process to favor their students. Teachers flouted the laid examination rules during the examination season by aiding students in answering questions. The practice encouraged unfairness in the assessment of the students' performance as opposed to serving as a foundation of the teacher's credibility when it comes to fostering the

moral and ethical development of their students. Besides, in their effort to improve students' academic performance in the final examinations, teachers engaged students throughout the day denying them the opportunity to attend to co-curricular activities with the pretext of covering the syllabus. In some situations, teachers engaged students during the school holidays to assess each student's learning needs and set the pace necessary to achieve the best results for their benefit.

Conclusions

The objective of this paper was to demonstrate how performance ranking in school Mathematics disguises and legalizes inappropriate teaching strategies. This paper has shown that teachers taught factual knowledge as opposed to teaching for conceptual understanding hence engaged the students even in the time meant for co-curricular activities. Furthermore, the study established that, due to competition by teachers of Mathematics to register a high mean score, the teachers engaged in examination malpractices such as leaking examination to students. Besides, the teachers positioned themselves strategically during the national examination to guide students on how to answer examination questions. The practice made students fail the examinations since they did not prepare adequately, with the hope that they would be able to engage in such examination malpractices. Finally, this paper has shown that performance ranking promoted the practice of private tuition, a move that was intended to offer assistance to the weak students in Mathematics to improve performance in the subject.

The findings of the study indicate several implications of performance ranking on pedagogical strategies in Mathematics classrooms. First, as opposed to facilitating examination malpractices, the teacher should seek to support student active learning following the guidelines provided by Kenya Institute of Curriculum Development and to uphold high moral standards in their teaching practice. Thus relevant agencies should devise ways of curbing examination malpractices to guarantee a level-playing ground for all learners. Secondly, there is a need to come up with a methodology for performance ranking that does not over-emphasize the final examination so as to discourage examination malpractice and superficial teaching. This can be achieved by ensuring that students assessments are tailored to include all the aspects that the school nurtures instead of focusing on academic performance only. The grading system should be in such a manner that it rewards everything that the school nurtures including talents with teachers' promotion not pegged on students achievement in final examination only. Furthermore, in bridging the gap between the top-performing and low performing student's, remedial work should be tailored to each student's needs, involving topics and materials related to the syllabus giving room

for the students to take part in co-curricular activities. In this way, the student's interest is taken care of in the learning process showing ways of applying learned knowledge in real-life situations.

Recommendations

This paper has shown that the practice of performance ranking disguises and legalizes inappropriate teaching strategies employed by the Mathematics teachers. This is because of the strategies employed lead to the students displaying excellent achievement in high stakes testing which obscure the evidence regarding manipulation and outright cheating in examinations. The effects were felt when the students failed to apply learned knowledge in other areas. Therefore, this paper recommends that the practice of ranking should be tailored to include all the aspects that the school nurtures instead of focusing on academic performance in high stakes tests and position in the league tables. In this way, everything that the school nurtures, including talents will be rewarded. Moreover, the inappropriate teaching strategies are forgotten and teachers focus on the broader aims of education instead of the position in the ranking data.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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