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Towards O-Level Students' Performance in Mathematics:

Do Teaching and Learning Environment factors matter?

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Abstract

Purpose: This paper is aimed at assessing the possible factors which impacted the mass failure in O-Level mathematics examinations for the year 2012 in Tanzania.

Methodology: The paper benefited from the secondary data collected from the Open Data Portal hosted by the Government of Tanzania. Common factors which determine the students' performance such as class-size, teacher-students ratio, number of mathematics textbooks and learning environment were examined in different secondary schools across 7 zones in Tanzania to see how much they might have contributed to this poor performance in mathematics. Using t-test statistics, the results show that neither of these common factors had a statistically significant impact in a concerned students' performance in mathematics. To test whether the year 2012 students' performance in mathematics was statistically significantly different from other neighbouring years, t-statistics was employed to test statistical difference of the mathematics results between 2012 and 2013 and that between 2013 and 2014.

Results: The results show that there is a strong significant statistical difference in performance between 2012 and 2013. However, the difference in performance between 2013 and 2014 is reported to be statistically insignificant. These findings propose the possible effect of grading system change between 2012 and 2013 which was an outcry all over country by the education stakeholders. It is thought that change in grading system from division system to GPA system had its large contribution in the poor performance of mathematics in 2012.

Recommendation: Following the wide-spread complaints from educational stakeholders that the process of changing the grading system lacked transparency and no clear justification was provided in lowering the pass benchmarks, this paper recommends the education policy makers to involve all key education stakeholders in changing any education policy which might affect the education standards in the country.

Key words: *students' performance, grading system, mathematics education*

1.0 INTRODUCTION

The Total Grading System (TGS), commonly called *divisions* system, is a system that determines students' performance in Form Four and Form Six national examination results in Tanzania. This system does not involve any other kind of assessment apart from the final national examinations, and therefore students are mainly trained to pass these examinations. The form of TGS is based on a 1 to 5 points, where A is 1 point, B is 2, C is 3, D is 4 and F is 5. The points obtained by adding 7 best performed subjects and the less the points obtained the better the performance (Saumu, 2016).

The divisions system was established in 1973 and the examiners score pass marks by using total number of points scored in each subject. There were five categorizations designated as A, B, C, D and F, and the results showed scores of Divisions One, Two, Three, Four and Zero. The grades lie within 20 marks range, where grade 'A' was defined as *excellent performance*, ranging from 81% to 100%, 'B' was recognized as *very good performance* ranging from 61% to 80%, 'C' as *good*, a pass mark average that required remediation, ranging from 41% to 60%, 'D' as *satisfactory*, ranging between 21% and 40% and 'F' as *fail*, ranging from 0% to 20% (NECTA, 2014). For decades ordinary level secondary education has been implemented five grades in all national examinations written at this level. However, these grades have been adjusted to seven grades in 2013 after more than 65% of students who sat for the Form Four national examinations in 2012 scored division zero, compare to 50.4% and 53.6% pass rates in 2011 and 2010 respectively (Saumu, 2016).

On the other hand, a Grade Point Average (GPA) system is an indication of a student's academic attainment at higher educational level, calculated as the average value of the accrued examination grades earned in courses or subjects over a period of time. In secondary schools, the GPA systems evaluates students' progress through Continuous Assessment (CA), includes end of term 1 and 2 examinations in Form One and Three, Form Two and Form Four mock examinations and project marks. The form of GPA is based on a 0 to 4.0 scale, where A is scaled as 4.0, B as 3.0, C as 2.0, D as 1.0 and F as 0 (Saumu, 2016).

The government of Tanzania changed the grading system for secondary schools, from TGS to GPA system from 2013 to 2015 to involve CA tests in students' final national Form Four Examination results. The changes happened to comply with the GPA grading system currently used in higher education and with the intention of upgrading the results or eliminating Division zero in the TGS, after the mass failure in 2012 (Mangola, 2013).

The categorization of the GPA was changed from five grades to seven, designated as A, B+, B, C, D, E and F and the results showed scores of Divisions One, Two, Three, Four and Five, instead of previous grades. Grade 'A' was defined as an *outstanding performance/distinction*, lies within 25 marks range (75% to 100%), compared to the previous 20 marks range. 'B+' was identified as *an excellent performance*, ranging from 60% to 74%. While, 'B' was recognized as *very good performance* ranging from 50% to 59%, 'C' as *good*, a pass mark average that required remediation, ranging from 40% to 49%, 'D' and 'E' as *low* and *very low*, ranging from 30% to 39% and 20% to 29% respectively, both recognized as remediation pass marks, and 'F' was declared as *unsatisfactory performance*, an intensive remediation mark (NECTA, 2014).

The education stakeholders received the new system with doubt as the reasons behind the lessening of the pass marks and upgrading the grades were not transparent and strongly stated (Mangola, 2013). Moreover, the decision of lowering the benchmarks could transmit negative image to the students and believed that they do not need to work hard to pass their examinations. This could also create a society of young people who must be 'spoon fed' to succeed in their careers. On the other hand, the initiation of implementing the system of students' CA was significant in making reasonable decision of the students' performance and skills throughout their lower level of secondary education. These changes brought in some challenges in the sector; for example it was really difficult to ascertain the authentic objective(s) of GPA for secondary school students in 2013, because the system produced unskilled residents and was seen as an effort to please parents after the mass failure in Form Four national examinations in 2012, the worst results in the history of Tanzania secondary schools examinations, which instigated a severe outcry and were strictly criticized by education experts inside and outside our country as well as opposition politicians (Machira, 2013).

According to the Citizen of 4th November2013, one member of the parliament reported that most of the potential educational shareholders were not involved on the changes of the new grading system, particularly the Tanzania Teacher's Union President who is the key partner in education. He also mentioned that the changes might be political move towards 2015 elections (Machira, 2013). The goals for changing from TGS to GPA were not clearly stated and the mentioned ones where not the most important, led too difficult to measure students' progress, if were any (Guardian, 8th January 2016). Furthermore, the goals were not critically examined if they led to the results the government, specifically the Ministry of Education and Vocational Training (MoEVT) seeks out.

Students' performance in mathematics over a period may be mainly influenced by socio-political and socio-economic components inventing from students' learning environment, culture backgrounds, students themselves, teaching and learning approaches. However, mathematics textbooks used, school environment and teachers-student ratio affect students' attentiveness in the classroom (Sitko, 2013)

Various studies have investigated and explained several components that contribute to poor student performance in mathematics in secondary schools within and outside the country. There is obviously the evidence from the above cited studies that school environment, student-teacher ratio and mathematics textbooks are among the major components that influence secondary schools academic performance in mathematics in Tanzania. It was reported that the general rate of students' performance in Certificate Secondary Education Examination (CSEE) for academic years 2012 and 2013 were 12.1% and 18% respectively (Mkumbo, 2013). However, little attention is paid to investigating the performance difference between TGS and GPA systems. Therefore, this study seeks to investigate whether poor performance during GPA system was a result of the change in grading system or a result of regularly cited factors such as school environment, availability of textbooks and student-teacher ratio that commonly influence secondary school academic performance in mathematics. The study hypothesizes that there is a significant difference in students' mathematics performance between 2012 and 2013, and the difference is fueled by the change in grading system as envisaged in the previous paragraphs.

2.0 RELATED LITERATURE

2.1. Theoretical Underpinnings

2.1.1 Socrates' and Plato's thoughts on teaching and learning approaches

The theoretical views of Socrates on teaching and learning approach is that the learning process originates from the students' self-assurance and learning experience, and the responsibility of the teacher is to involve students in critical classroom discussion, inspiring them to inquire into solving problems for themselves. His teaching approaches based on asking and answering questions to arouse critical thinking about the topic taught and pull out ideas and fundamental presumptions (Copeland, 2010). Socrates theory invented from Plato's work who believed the ideas behind the concrete beings were practiced through senses and the knowledge of geometry has been in control before the birth of the child (Frede, 1992). This means that, students may perform better in mathematics as teachers provide them various reasoning questions to arouse their knowledge and understanding in mathematics concepts.

2.1.2 John Locke thoughts on knowledge of practice

John's thoughts on knowledge of practice are that, genuine knowledge comes to individuals through their sensory involvements, such as sighting, hearing, touching, smelling and tasting. John insisted that children mind resemble a white sheet of paper on which experiences are documented in their brain (Tarcov, 1989). This implies that, teaching and learning approaches in mathematics contain all five senses of organs of students to perform well and the teacher must provide students' tasks to attempt while teaching, guide them and follow up their tasks. Teachers must be able to teach students in such a way that they can practically do what they are taught, hearing it well by having a standard number of students in the classroom and use of an authentic school environment to make students understand mathematics (Maganga, 2013).

2.1.3 Paul Freire thoughts on learning environment

Freiere's view on learning environment focuses on teacher-students discussion in generating new ways of solving mathematics problems in the classroom (Freire, 1970). This means, mathematics teachers should instruct their students problems related to their actual living surroundings. For example, topics such as areas and volumes, teachers are encouraged to take their students to play grounds (e.g. football or basketball pitches) to calculate the actual area of the pitch. Freire was emphasizing on the use of discourse approach between the teacher and students on their learning environments rather than depending on the written books and syllabuses in a curriculum of study.

2.1.4 Julius Nyerere on Philosophy of Education

The philosophy of the Honorable Late Mwalimu Nyerere on education for Self-Reliance (Nyerere, 1967), which was a way of encouraging socialism in the country and promote the education system in Tanzania was seriously pro-poor focused and the need for curriculum change was emphasized in pedagogical approaches and content. The curriculum changes were made to train the teachers and allow students to implement topics related to students' real-life activities (Wedgwood, 2013). Since independence, numerous changes on teachers teaching practices have been made. Among them are student's centered methods, which was introduced in 2009 (URT, 2010).

To achieve these changes in mathematics, students must be actively engaged in learning activities and process in the classroom. It is important to notice that continuous poor performance in mathematics by Form Four secondary school students or any other educational level indicate that there is a major problem in the whole process of education, particularly on the teaching and learning of the subject.

2.2 Empirical Literature

According to Asikhia (2010) poor academic performance is an enactment that falls below the expected standards. A candidate who fails to achieve a set standard of enactment in any learning environment evaluation, such as a test, an examination or an assessment is considered as showing poor performance in the classroom. Very often the society blame teachers, students or the government on the poor performance in the school. Our argument is that before start blaming anyone it is crucial to scrutinize causes of poor performance because they affect the whole society in terms of lack of manpower in all scope of politics and economy in a country.

Secondary school education is the fundamental towards advanced knowledge in tertiary educational level (Asikhia, 2010). According to Nyandwi (2014:12) education is "an investment and an instrument that can be used to achieve a more rapid social, technological, scientific and cultural development in the country." The poor students' performance in Form Four National Examinations distresses the Tanzanian education system in 2012 that led to the changing of grading system in 2013 from Divisions system to GPA system. The poor performance is evident by two students from Feza Boys Secondary school who were interviewed by The Daily News on 20th February 2013 in Dar es Salaam commented that they have arose the best performers in the 2012 Form Four National Examinations by scoring Division One with nine points instead of seven, which is the highest points in the highest category. Their results differ to the earlier years where the best student(s) scored Division One with seven points clear (seven A's).

Fundi (2016) agree that our education system needs changes to eradicate the poor performance of students in their examinations, specifically in mathematics. However, the changes must be conversant, transparent and supported by scientific grounds. What has happened after the unprecedented failure in 2012 is that the government formed a commission task force to examine the root causes for the massive failure. However, in 2016 due to political and other issues the government changed again the grading system from GPA to Divisions.

According to the Citizen of the 20th October 2014, the GPA system that was introduced in 2013 worsened the quality of education in secondary schools. In the interview, the executive director of Hakielimu (2013) states that:

> *This is not something to celebrate, because if you investigate 2013 results as per the previous grading system, many of these pupils have not passed; we need to work hard to make sure that there is real improvement in the sector. It seems like more pupils passes this year because of the adjustment in the grading system which was made by government by lowering the pass grades, more pupils who would have scored division zero seemed to have passed their examination. If you combine the newly E and F grades the truth is that there would have been a mass failure compare to 2012.*

Changing the measure from GPA to Divisions system could be reliable and fair among the society, but if the grades continue to be in low standards as they are currently, there will be no changes in students' performance. Moreover, in his letter to the previous Prime Minister Rajan (2013) insisted that:

> Changing the grading system does not help our students *and the nation by making our students look like they are performing better by lowering our standards; we help the students by equipping them to perform in accordance with high standards.*

The pass or fail standards after independence were set low and specifically lower between 2013 and 2015 (Fundi, 2016). In our view, to measure students' educational improvement we need a more valid, rigorous, reliable and fair standards. In addition, it is essential to critically identify causes of continuous poor performance in mathematics, particularly in secondary schools.

Discoursing the benchmark problem only will not upgrade the students' performance and convey back reliable learning in secondary schools. Various researchers have provided different learning assessment studies with students in secondary schools for many years. One of the studies organized by TWAWEZA found that our secondary school students are not reasoning learning. The study revealed that teachers' absenteeism, lack of ethically, decrepit learning and teaching environment, language of instruction, lack of learning and teaching materials result to low levels of cognitive learning and poor performance for students.

Nyandwi (2014) investigated on determinants of poor academic performance of secondary school students in Sumbawanga District and found that gender, truancy, parents' occupation, competency in language of instruction, libraries and meals provision at school are potential components contribute on students' poor performance.

Jeynes (2002)'s findings on poor academic performance revealed that socio-economic, environmental factors, school location and demographic are the common components hinders students' attainment in secondary schools. For example, many of secondary schools in Rukwa Region are in the districts, which are allocated in rural areas, where physical setup is limited and poor and the municipal could be affected by low socio-economic factor that influences the students' academic performance.

Many researchers (Adino, 2015; Kitta, 2004; Maganga, 2016; Mtitu, 2014; URT, 2010) have emphasized the significance of textbooks to student performance. They have revealed that textbooks are the only source of information commonly used in secondary schools in most developing countries, Tanzania being among them. Kitta (2004) found that many secondary schools in Tanzania do not have relevant textbooks for teaching mathematics. This could be among the reasons for poor students' performance. Moreover, Adino (2015) findings on the factors influencing students' performance in mathematics in Kenya secondary schools revealed that lack of teaching and learning resources hindered performance in mathematics. In addition, Mudassir *et al.* (2015) investigated the influence of school environment on students' academic performance in Malaysia and found that students from a school with sufficient amenities, competent teachers and favorable environment, such as toilets, perform better than those from schools with inadequate amenities.

Nevertheless, Oluwole and Idowu (2014) examined the effects of student-teacher ratio on student academic performance in three selected secondary schools in Nigeria. The results showed a significant relationship between student's views on student-teacher ratio and academic performance in mathematics.

3.0 METHODOLOGY

3.1 Data

This paper benefited from the secondary data collected from the Open Data Portal which is managed by the open data working group comprising of National Bureau of Statistics (NBS) under the Ministry of Finance, e-Government Agency and National Archive Department under the President's Office Public Services Management. This working group is responsible for overseeing the sustainable establishment of open data initiatives in Tanzania including the open data portal.

The data collected include; the number of students in class, teacher-student ratio, number of mathematics books, number of latrines and mathematics performance in CSEE mathematics examinations for different schools across 7 zones in Tanzania between 2012 and 2013 as presented in Table 1 below. The zones involved in this study are central, lake, coastal, northern, southern highlands, southern and western. The period 2012 and 2013 is chosen because the Government of Tanzania changed the grading system for secondary schools, from division system which was used in 2012 CSEE exams to GPA system in 2013. These two periods are important for performance comparison between two grading systems. For the purpose of this study a student is considered to have passed if he/she attains anything above F otherwise the student is considered to have failed.

Table 1: Summary of variables used in the study

ZONE	YEAR	NS	T-S Ratio	NMTXT	NLTRN	PR (%)
Central	2012	2029	40.5	84772	3428	31
	2013	1783	35.7	85272	3846	53
Lake	2012	2285	45.7	171904	7903	33
	2013	2241	44.8	173404	8954	50
Coast	2012	4059	81.2	237351	12403	44
	2013	3825	76.5	238851	14062	56
Northern	2012	2814	56.3	154358	9875	36
	2013	2635	52.7	155858	11323	46
Southern highland	2012	3356	67.1	136112	8571	48
	2013	3204	64.1	137612	9050	57
Southern	2012	1921	38.4	96334	4414	21
	2013	1817	36.3	97834	4828	27
Western	2012	2145	42.9	106538	5170	44
	2013	1774	35.5	108038	5270	61

3.2 Analytical tools

This study is descriptive in nature, and data was analyzed by STATA and presented using bar charts. The significance of performance difference of students' performance in mathematics between 2012 and 2013 was tested using t-statistics. The t-statistics is the ratio of the departure of the estimated value of a parameter from its hypothesized value to its standard error. We hypothesized that there is a significant difference in students' mathematics performance between 2012 and 2013, the difference which is caused by the change in grading system. T-statistics was used to see whether *the number of students in class (NS)*, *teacher-student ratio (T-S Ratio), number of mathematics textbooks (NMTXT), number of latrines (NLTRN),* the commonly blamed factors for poor performance in secondary school examinations, were statistically different between 2012 and 2013. The t-statistics was also used to see whether the claimed performance difference between 2012 and 2013 is statistically different.

4.0 RESULTS AND DISCUSSION

Table 1 presents the summary of the variables of interest in this study across all studied zones between 2012 and 2013. The table shows that performance in CSEE Mathematics exams has consistently increased in 2013 relative to 2012 across all 7 zones. The table also shows the highest performance in mathematics was in western zone with a pass rate of 61% in 2013. However, the highest pass rate of 48% was recorded to be in Southern highlands in 2012. Southern zone recorded the lowest of all at the pass rate in both 2012 and 2013 at of 21% and 27% respectively. This description is also shown in the bar chart in Figure 1 below. The bar chart shows the CSEE mathematics exams performance in all zones has been consistently lower in 2012 than in 2013.

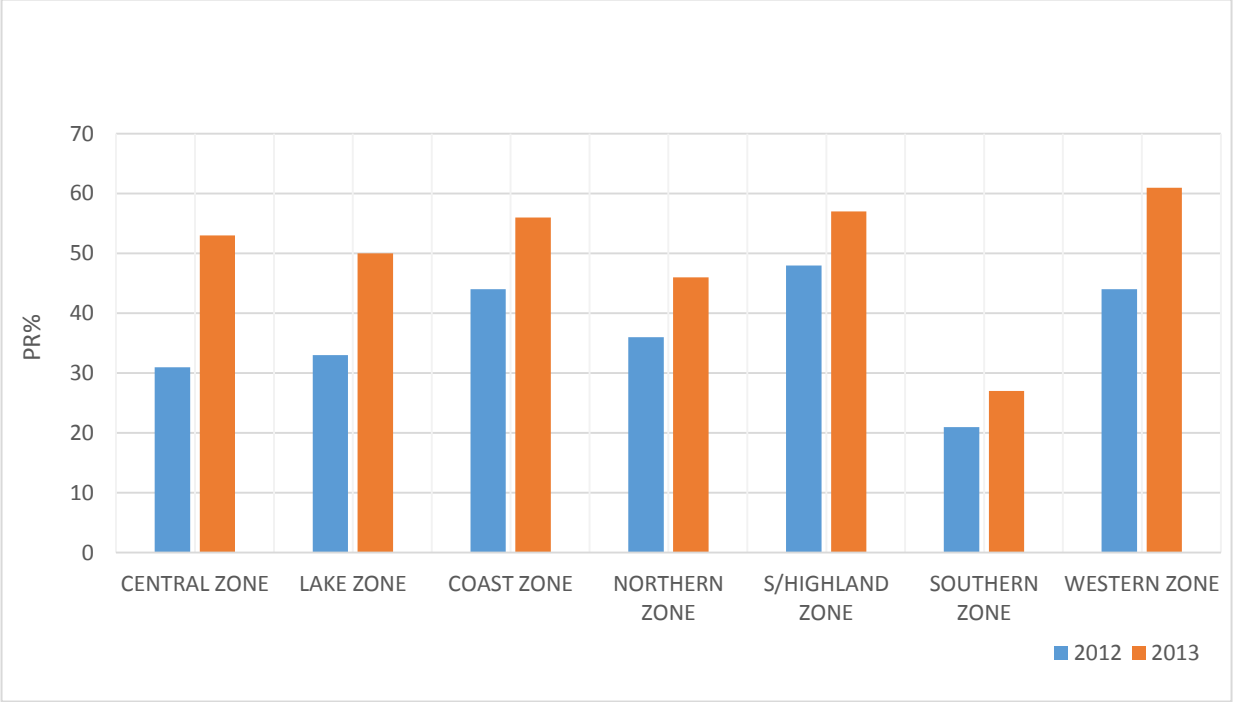

Fig.1: CSEE Mathematics Exams Performance Between 2012 and 2013 by Zones

To test the significance of the performance difference, a t-test is run, and results in Table 2 below shows that the performance difference between 2012 and 2013 is statistically significant at 5% significant level (t-test = 0.034). This implies that students performed better in mathematics in 2013 than 2012. The difference in performance might be due to change in grading system, from TGS to GPA. The increment in students'performance in 2013 could also be due to the lowering of students standards/benchmark as explained in pages 1 and 2 of this paper that in the GPA system 'A' ranges from 75% to 100% instead of 81% to100%. It was also mentioned in the literature that the scale set in 2013 was too wide and and the passing rate was too low compared to that in 2012, and it looks unsuitable to group a student who scored 75% in the similar rank as the one who scores 99% in the same examination.

We agree that the country needs change in refining the mathematics performance, but the change could be transparent and supported with evidence(s).

Table 2: T-test results for performance difference 2012 and 2013

Group	Observation	Mean	Standard error	Standard deviation	[95% interval]	confidence
2012	7	36.71	3.54	9.38	28.04	45.39
2013	7	50	4.25	11.26	39.59	60.41
difference		-13.26	5.54		-25.35	-1.22
difference = mean (2012) - mean (2013)				t = -2.399		
Ho: difference = 0 **Ha: difference ≠ 0** **t-test = 0.034**						

It was important to investigate whether there was a performance difference before the change of grading system, that is between 2009 and 2011. Table 3 and 4 shows t-test statistics for CSEE mathematics examination performance of students across all studied regions between 2009-2010 and 2010-2011 respectively. The results show that there is no statistically significant difference in performance between 2009-2011, with t-test =0.631 and t-test =0.128 for 2009-2010 and 2010-2011 respectively.

Table 3: T-test results for performance difference between 2009 and 2010

Group	Observation	Mean	Standard error	Standard deviation	[95% interval]	confidence
2009	7	50	3.32	8.79	41.87	58.13
2010	7	47.57	3.64	9.64	38.65	56.49
difference		2.43	4.93		-8.33	13.18
difference = mean (2009) - mean (2010)				t = 0.492		
Ho: difference = 0 **Ha: difference ≠ 0** **t-test = 0.631**						

We further analyze whether between 2013 and 2014 the performance was significantly different or not just to confirm either the huge increase in the performance in 2013 was due to change in grading system or other factors which persisted even in 2014. It was also found that the difference in performance between 2013 and 2014 is not statistically significant at 5% significant level. This implies there was no difference in students performance between these two years. These findings keep confirming the effect of grading system change which tookplace in 2013. Furthermore, Socrats' and Plato's thoughts on teaching and learning approaches emphasise that learning process does not arise from the lowering of the benchmark, rather from the students' self-assurance and it is teachers' responsibitity to involve students' in critical classroom discussions, stimulating them to inquire into solving problems in order to raise their knowledge and performance. This implies, students' could perform better in mathematics if teachers provide them various reasoning questions to awaken their knowledge and understanding in mathematics concepts.

Table 4: T-test results for performance difference between 2010 and 2011

Group	Observation	Mean	Standard error	Standard deviation	[95% confidence interval]	
2010	7	47.57	3.64	9.64	38.65	56.49
2011	7	54.14	1.69	4.49	49.99	58.29
difference		-6.57	4.02		-15.33	2.19
difference = mean (2010) - mean (2011)				t = -1.635		
Ho: difference = 0 **Ha: difference ≠ 0** **t-test = 0.128**						

Further, Table 5 shows t-test of the difference on the number of students sat for CSEE mathematics examinations in 2012 and 2013. The results in Table 1 shows that number of students in 2013 have been decreasing consistently across all zones compared to 2012. The decrease in number of students might be one of the factors which improve the classroom performance as suggested in the literature. This means, small class sizes tend to favor good performance. However, when a t-test was run to see whether this difference is statistically significant, it was found that the difference is not statistically significant at 5% significant level as shown in Table 5 (t = 0.66). This implies there are other fundamental teaching and learning issues that continues to lower our students' performance. The MoEVT should aknowledge the existence of these fudamental issues, otheriwise the students' performance in Tanzania secondary schools might not improve. Among all the components, the teaching and learning approaches eachers use in the classroom should bese on questioning and feedback approaches to arouse critical thinking on each topic taught and teachers should pull out various ideas that could improve stdents' standards.

Table 5: T-test results for difference in class size

Group	Observation	Mean	Standard error	Standard deviation	[95% interval]	confidence
2012	7	2658.43	301.40	797.44	1920.92	3395.94
2013	7	2468.43	302.26	799.71	1728.82	3208.04
difference		190	426.86		-740.04	1120.04
difference = mean (2012) - mean (2013)				t = 0.445		
Ho: difference = 0 **Ha: difference ≠ 0** **t-test = 0.664**						

Moreover, the teacher-students ratio was examined to see whether between 2012 and 2013 the ratio has significantly changed to influence such a huge increase in students' performance in 2013. Teachers are said to contribute significantly towards students' performance. We expected the significant change in this ratio would have a significant contributive effect towards the abrupt increase in students' performance in mathematics exams in 2013. There was higher teacher-students ratio across all the zones in 2012 than 2013 as shown in Table 1. Moreover, the mean for difference in teacher-students ratio was higher in 2012 as seen in Table 6. However, the t-test results for difference in teacher-students ratio is not significant at all as presented in Table 6 below. This still proves that teacher-students ratio does not have a significant contribution towards the substantial increase in mathematics performance increase in 2013. Since the results proves that teacher-students ratio does not have significant contribution in students' performance, teachers may focus on teacher-students discussion in creating new techniques of solving mathematics problems in the classroom in order to improve students' performance and students learning standards.

Table 6: T-test results for difference teacher-students ratio

Group	Observation	Mean	Standard error	Standard deviation	[95% interval]	confidence
2012	7	53.16	6.03	15.97	38.39	67.92
2013	7	49.50	6.03	15.97	34.74	64.26
difference		3.66	8.53		-14.93	22.25
difference = mean (2012) - mean (2013)				t = 0.429		
Ho: difference = 0 **Ha: difference ≠ 0** **t-test = 0.676**						

In addition, number of mathematics textbooks available and availability of latrines across all zones were also examined to determine whether the increment of mathematics textbooks and latrines in 2013 has significantly influenced students' performance compared to 2012. It was expected that the more and appropriate textbooks students have during the lesson the better understanding and hence, better the performance. However, the t-test results for difference number of mathematics textbooks in 2012 and 2013 shows no statistical significance at 5% significance level (t-test= 0.97) as can be seen in Table 7. Therefore, this implies that despite the increase of the number of mathematics textbooks in 2013 across all 7 zones, the impact is unnoticeable. These results could be due to many factors, but one of them could be the available mathematics textbooks might not suitably fit to the required curriculum.

Table 7: T-test results for difference number of mathematics textbooks

Group	Observation	Mean	Standard error	Standard deviation	[95% interval]	confidence
2012	7	141052.7	19991.16	52891.64	92136.11	189969.3
2013	7	142195.6	20004.47	5292.86	93246.39	191144.8
difference		-1142.86	28281.18		-62762.26	60476.55
difference = mean (2012) - mean (2013)				t = -0.040		
Ho: difference = 0 **Ha: difference ≠ 0** **t-test = 0.968**						

Likewise, the literature show that students' with favorable latrines perform better than those from schools with inadequate latrines. Therefore, we anticipated a significant contributive effect towards the rapid increase in student's performance in mathematics CSSE in 2013. Despite the increase in the number of latrines across all the zones, the difference is not statistically significant as seen in Table 8. This could imply that, there was an increment of latrines in 2013 compared to 2012, but these latrines are still not favorable to our students or to the school environment in general.

Table 8: T-test results for difference number of latrines

Group	Observation	Mean	Standard error	Standard deviation	[95% interval]	confidence
2012	7	7394.86	1219.34	3226.08	4411.23	10378.48
2013	7	8190.43	1416.89	3748.76	4723.41	11657.45
difference		-795.57	1869.33		-4868.49	3277.35
difference = mean (2012) - mean (2013)				t = -0.426		
Ho: difference = 0 **Ha: difference ≠ 0** **t-test = 0.678**						

5.0 CONCLUSION

The Tanzanian education system is faced by many problems. Among them, was the despondently performance of Form Four students in 2012. In response to the failure, the government of Tanzania announced to investigate the root cause of massive failure. However, it was noted that in 2013, the MoEVT changed the TGS system to GPA system as a way to support and raise students' performance. In reality the country did not support secondary school children by lowering the benchmarks and make these students appear to be performing better. Usually, students need to work hard to succeed and the teachers assist the students by training them to accomplish their studies in accordance with high standards.

This paper aimed at assessing the possible factors which impacted the mass failure in O-Level mathematics examinations for the year 2012. The paper benefited from the secondary data collected from seven zones in Tanzania, from the Open Data Portal hosted by the Government of Tanzania. Common factors which determine the students' performance such as class-size, teacher-students' ratio, number of textbooks and number of latrines were examined to see how much they have contributed to this poor performance in mathematics. Using t-test statistics, the results show that neither of these common factors had a statistically significant impact in a concerned students' performance in mathematics.

The verdict to bring back the yardstick from GPA to TGS from 2016 for CSEE might look worthy to some individuals, but it does not discourse the core problem of the scale itself and the massive failure of these students', as it was evidenced in this paper there was no statistically significant difference in the main components, such as number of mathematics textbooks, number of latrines and teacher-students ratio that affect students' performance as reported by many other researchers. The only statistically difference that was found to be significant was the performance of students between 2012 and 2013.

The TGS could be reliable and possibly rational if it will come up with higher benchmarks, rather than change the yardstick that could raise students' standards in mathematics. Addressing the yardstick problem alone will not bring authentic learning back in Tanzanian secondary schools. If TGS remains to be based on the existing benchmarks, it might not be challenging.

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