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Gender and Location Impact's on Student's Academic Performance in South African National Examination

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Abstract: This study investigates the student's performance in the grade 12 national examination (matric) over a period of 10 years, 2009-2018. The performance of students in South Africa in Mathematics and Physical Sciences is statistically not different. Thus, the policy of Mathematics been a prerequisite for offering Physical Sciences should be upheld. There is no significant improvement in South Africa students performance in the national examination. Therefore, a more effective turn around strategy is highly required. Location still remains a barrier as it plays a significant role in the chances of student's performance in South Africa national examination. A gender inequality is seen in the performance of students in Mathematics as the male students perform better than their female counterpart in Mathematics. This however continually disadvantage women in terms of opportunities relative to careers in the field of mathematical sciences. It is, therefore, of great importance that, urgent attention be given by the education stakeholders to support the female students. Contributing factors as to why there is gender inequality in the student's performance in Mathematics and other subjects will be investigated in the next study.

INTRODUCTION

According to the great icon, Mandela, "Education is the most powerful weapon which you can use to change the world"[1]. Education is seen as the instrument of change in which the nations of the world's hopes rest in developing human capital for their effectual functioning[2]. High school education which is the hub of any country's system of education does not meet up with the expectations in South Africa due to the poor learner's performance in the matric examinations.

Learner's performance, since, the postulations of educational theory has been a global concern to all education stakeholders[3]. The standard for judging the success and effectiveness of every educational institution is the learner's academic performance. Much emphasis was laid on learner's academic performance to be the primary criterion that measures all learning-teaching activities of educational institutions[4].

Various factors affecting learner's academic performance such as gender, parental involvement and different researchers have established race, family income level, location and institutional ownership type among others. It was concluded in a study carried out by Chapman and Pascarella[5] that learner's performance significantly depends on the residential type as they saw that those living on campus perform better than their off-campus counterpart does.

Learner's performance is found to be significantly different based on gender, school type and school location[6]. Later by Betts *et al*.[7] submitted that much of the variation in learner's performance is accounted for by their socio-economic backgrounds.

Owoeye[8] posited that jointly school location, facilities and class size does not have a significant impact on learner's performance as the performance of learners from different location (say urban and rural) is significantly different. Of much importance is the study carried out by Adedeji *et al*.[9] in Nigeria on the school resources management impact on learning outcome. This study summed up that the better the management of resources the higher the learner's performance and this seems to contradict the submission by Owoeye and Yara[10] schools in the urban areas stand better chances of resource management than their rural counterpart does.

Study on the relationship of learner's performance to class size and facility in Nigeria by Alabi and Oyetunde[11] revealed that the availability of certain facilities positively significantly contributes to the performance of learners. Relationship between average class size high school learner's performance of Epe Local Government of lagos State investigated by Fabunmi and Okore[12] using the Spearman rank correlation test indicated a positive relationship among the two variables. However, this result was contradicted when the pearson correlation coefficient was used on the same study which could be as results of the underlying assumptions upon which each test is based.

Martins *et al*.[13] studied the regression analysis of learner's performance on class size, student's classroom and class utilisation rate in Akwa-Ibom state from 1997-2002. The results indicated the individual significant contribution of class factors on the performance of learners and also when their joint effect is significant as well on learner's performance.

The ratio teacher-learners relationship to school's performance/productivity in Enugu state revealed the existence of a moderate positive relationship between the two variables[14].

Education is the main access to national development and teachers constitute a very vital component of the system. Teachers occupy a significant position in the school system. Though learners are the central figure in the process without teachers, teaching and learning activities cannot take place. Mkpa is of the opinion that teachers are the heart and soul of the educational enterprise while Molagun[15] identifies teachers as the life wire of the school system. Otu[16] considers teachers as the prime mover in the development of optimum condition for learning. Mayer *et al*.[17] in their research confirmed that capable teachers are the essential link between public aspirations for high-quality schooling and student's academic performance.

Having a good teacher was ranked in America as the most important factor needed by schools to enhance good performance Johnson and Immerwahr[18]. Sparks[19] also submitted that schools with well-qualified teachers in their classroom stand a better chance of learner's performance improvement in America.

Based on the study of school location and resource availability relationship to student's performance in Kwara state in Nigeria[20]. He also submitted that performance of the student in Mathematics and e Language was significantly related to the geographical location of the schools. Furthermore, Johnson[20]. results indicated that community involvement, distance to school, instructional materials and number of teachers have significant influence on the learner's performance in both Mathematics and English language with exception to physical facilities.

A positive relationship was found among school performance and school building condition based on the impact of school facilities on student's performance research carried out in selected schools in texas[21].

Bulach[22] was of the opinion that schools with good climate and poor significantly do not perform equally as resulted from their study. Also, schools with a positive climate performed better than their counterpart according to Hirase, Akanle concluded that parent income level, family type and lack of government funding influence learner's performance in Nigeria. Thus, the study is carried out to examine the contingency of learner's performance on race, gender school location in South Africa.

"The quality of learning across all grades and phases of the basic education sector is less than satisfactory and this poor performance is most prevalent in poor communities. The emphasis on improving learning outcomes is not new but in recent years has intensified in particular as far as outcomes below the grade 12 level are concerned. A milestone in this regard was the 2008 Foundations for learning policy document 1 which introduced clearer specifications on what teachers should teach, the materials learners need and how monitoring of progress should occur. Much of what is said in the Action Plan builds on foundations for learning. Key to these interventions has been the targeting of learners in poor communities across the country" said the[23].

MATERIALS AND METHODS

In this study, academic performance is characterized by performance in grade 12 Mathematics and Physical Science examinations and provinces are considered to be the locations. The gender of students considered in this study are male and female under. School location is the province from which the exam was taken by the learners. Thus, the 9 provinces in South Africa will be considered in this study. The gender of students considered in this

study are male and female under. The data was obtained from the website of the Department of Basic Education Report's section.

Two-way (factor) Analysis of Variance (ANOVA) is used to study a significant difference among all the locations and among the 10 years of examination. T-test is also carried out to test for the significant mean difference in student's performance in Mathematics and Physical Sciences. The mean significant test of male and female performance in Mathematics and Physical Sciences separately.

RESULTS AND DISCUSSION

The performance of students in the national Mathematics and Physical Sciences examinations are represented in Fig. 1. Student's performance in these two subjects exhibits the same pattern (Appendix: Table 1). Performance in Physical Sciences is seen to be slightly higher than the performance in Mathematics from 2011-2018.

The performance of students in the national Mathematics examinations by both male and female is represented in Fig. 2. Though male and female performance in Mathematics exhibits the same pattern, however, it is evident from Fig. 2 that the male performance in Mathematics is consistently higher than that of their female counterpart in Mathematics over this period of 10 years that is from 2009-2018 (Appendix: Table 2).

The performance of students in the national Physical Sciences examinations by both male and female is represented in Fig. 3. Though male and female performance in Physical Sciences exhibits the same pattern, however, it is evident from Fig. 2 that the male performance in Physical Sciences is slightly higher than that of their female counterpart in Physical Sciences over this period of 10 years that is from 2009-2018 (Appendix: Table 3).

Table 1 shows the results of t-test carried based on those three null hypothesis. The null hypothesis, students performance in Mathematics and Physical Sciences is the same, is not rejected. This implies that students performance in Mathematics and Physical Sciences national examination is significantly not different over the period of 10 years in South Africa.

The null hypothesis of students performance in Mathematics by gender is the same is rejected. Meaning that students performance in Mathematics national examination by male and female is significantly different over the period of 10 years in South Africa.

The null hypothesis of students performance in Physical Sciences by male and female is the same is not rejected. This means that students performance in Physical Sciences national examination by male and female is significantly not different over the period of 10 years in South Africa.

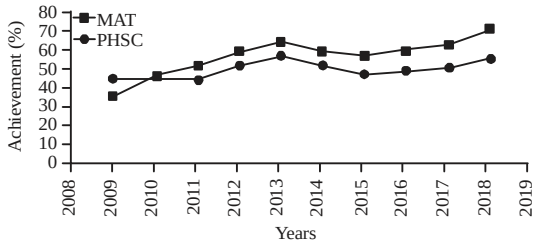

Fig. 1: Students achievement in Mathematics and Physical Sciences

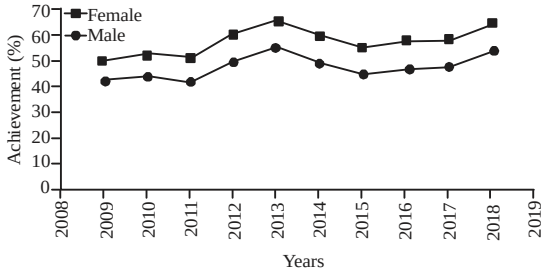

Fig. 2: Students achievement by gender in Mathematics

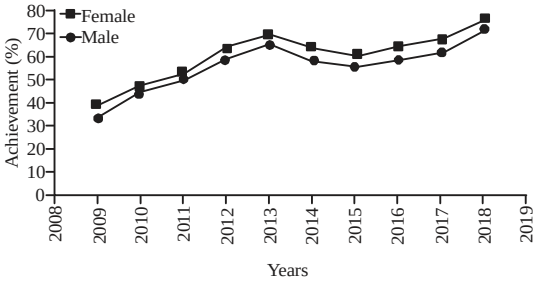

Fig. 3: Students achievement by gender in Physical Sciences

Table 1: Results of t-test

Null hypothesis	t-stat	p-value
Students performance in Mathematics and Physical Sciences is the same	-1.9644	0.0731
Students performance in Mathematics by male and female is the same	-4.7377	0.0002
Students performance in Physical Sciences by male and female is the same	-0.8755	0.3928

Table 2: ANOVA test results two-way ANOVA: achievement versus province, year of exam

Source	DF	SS	MS	F	p-values
Province	8	4970.8	621.35	4.57	0.000
Year of exam	9	2446.8	271.862	2.00	0.052
Error	72	9784.9	135.902		
Total	89	17202.5			

S = 11.66 R^2 = 43.12% R^2 (adj) = 29.69%

Table 2 shows the results of two-way ANOVA test. The effect of location on s tudent's performance across all the subjects in the matric examination over the period of 10 years is investigated by carrying out the ANOVA test.

The null hypothesis that the student's performance across all the nine provinces is the same is rejected as the p-value is <1%. This implies that students; performance across the nine provinces is significantly different. That is students chances of passing matric examination has to do with their location of study. Also, effort is made to see if the yearly performance is significantly different or not using ANOVA test. It is found at 5% significant level that year to year students performance in the matric examination is significantly not different. Meaning a significant improvement has not yet been realised despite the effort made by the government, poly makers and other stakeholders.

CONCLUSION

Students performance in Mathematics and Physical Sciences national examination is statistically not different. This implies that the policy that mandates that a student who takes Physical Sciences must take Mathematics is effective and such policy should be upheld from time to time. The male students are seen to be significantly performing better than their female counterpart in Mathematics while the two genders perform statistically equally in Physical Sciences. Thus, gender equality is yet to be realised in the student's performance in Mathematics in South Africa. And this inequality in performance disadvantage the female students in pursuing careers in any discipline that requires Mathematics. This calls for the urgent attention of government, policymakers and other education stakeholders to fully support the education of a girl child in South Africa in an effort to promote gender equality and empowerment of women in South Africa. Though each year the minister of education celebrates an increase in the matric result of the current year compared to the previous, however, ANOVA test results show no significant difference in the 10 years matric results. Meaning that much effort is required on the part of all education stakeholders to make a meaningful contribution that will improve the yearly performance in the matric examination statistically/scientifically. Also, the nine provinces in South Africa significantly perform differently in the matric examination over a period of ten years. This could be a result of all provinces not equally resourced in terms of infrastructures, enough quality teachers, facilities (such as technology), provincial policy on education, etc.

In the next study, the factors responsible for a significant difference in the performance of all the province will be considered. And contributing factors as to why there is gender inequality in the student's performance in Mathematics and other subjects will be investigated in the next study.

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APPENDIX

Table 1: T-test result of students performance in Mathematics and Physical Sciences examination

t-Test: two-sample assuming unequal variances	MAT	PHSC
Mean	51.64	58.81
Variance	21.1382222	112.0877
Observations	10	10
Hypothesized mean difference	0	
df	12	
t stat	-1.964377	
p (t<=t) one-tail	0.03653599	
t Critical one-tail	1.78228756	
p(t<=t) two-tail	0.07307198	
t Critical two-tail	2.17881283	

Table 2: T-test of male and female performance in Mathematics examination

t-Test: Two-sample assuming unequal variances	Female	Male
Mean	47.12	57.12
Variance	19.08178	25.47067
Observations	10	10
Hypothesized mean difference	0	
df	18	
t stat	-4.73766	
p(t<=t) one-tail	8.22E-05	
t Critical one-tail	1.734064	
P(T<=t) two-tail	0.000164	
t Critical two-tail	2.100922	

Table 3: T-test result of male and female performance in Physical Science examination

t-Test: two-sample assuming unequal variances	Female	Male
Mean	56.54	60.8
Variance	118.2427	118.5067
Observations	10	10
Hypothesized mean difference	0	
df	18	
t stat	-0.87552	
p (t<=t) one-tail	0.196413	
t Critical one-tail	1.734064	
p(t<=t) two-tail	0.392826	
t Critical two-tail	2.100922	

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