

A REFLECTION ON GENDER ACHIEVEMENT IN SCIENCES' RURAL SCHOOL SETTINGS OF MULTICULTURAL SOUTH AFRICA

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Abstract

The participation of learners in science is important to a country's socio-economic development impediments, therefore, the argument is that the girl learner should be increasingly encouraged to perform well in STEM related subjects (STATS SA). UNESCO indicates 35% women representative in STEM as students in higher education globally, whilst less than 40% of South Africa's scientists, engineers and technologists are women. This situation also relates to the South African education system, particularly in rural schools where girl learners are outperformed by boy learners in STEM, especially, in subjects such as Life Sciences and Physical Sciences. The purpose of this reflective paper is to ascertain the factors prohibiting excellent achievement of females in sciences in rural high schools of South Africa. The data has been gathered from numerous documents such as national and provincial analysis of result, examination and assessment directorate analysis and the district statistics in solidifying our investigation as couched by document analysis. Based on our observations and experiences of the conditions prevailing in rural high schools and less participation of female learner access in STEM, suggestions are put forth as to how their performance can be improved. The investment thereof in the body of knowledge will be to fulfil the concern not only of the country but the world at large when the number of female participants increase in STEM.

Keywords: *Gender achievement, science subjects, rural high schools.*

1. Introduction

The idea of bridging the gap and increase participation of females in science has been expounded for many years. For instance, Kimotho (2019) registered that for the last three decades, it has been the **global mission** to invest in STEM by addressing gender equality. An interconnected world economy market liberalization was produced that focused on abilities to master STEM as key for economic growth. In the same vein, United Nations Educational, science and Cultural Organisation (UNESCO) alarmed by 35% of women and girls participating in STEM, calls for promotion of female empowerment through education by enhancing awareness for the sole reason reiterated that STEM careers are important as jobs for the future, for social being, inclusive growth and sustainable development (UNESCO, 2020).

According to the national development plan of South Africa (NDP) as a guiding document, it is the country's vision to eliminate poverty and inequality by increasing women and girl participation in science as captured in vision 2030. Its chapter 9 on improving education, innovation and training, envisage about 450 000 university entrants in science and maths and 100 STEM PhD graduates in 2030 (National Science and Technology, 2019). Which means Further Education and Training band has a large responsibility to ensure quality throughput in order to meet the vision. Furthermore, the Sustainable Development Goal number 5 of the NDP 2030 focuses on addressing gender equality and equity by suggesting empowering women participation in science (Voluntary National Review (VNR) 2019).

Women make up a large percentage of the poor in rural areas hence it is vital that they are assisted with the aim of contributing towards transformation of the economy (VNR, 2019). Concurring with Shepherd (2017) there are many aspects that may not be ignored such as girls' self-efficacy, motivation, cultural responsibilities coupled with stereotype beliefs and their enthusiasm in closing gender gap towards STEM. Societal stereotypes such as technology and engineering are more relevant for boys than girls, can be so influential that they turn up to be baring negative results for the country.

The most important field in which people are able to show their knowledge and application of skills globally, is in science. This is the field that seems to benefit most people since it is able to create multiple employment opportunities, economic growth and wealth for various countries, including South Africa.

2. Aim of paper

The purpose of this reflective paper is to ascertain the factors prohibiting excellent achievement of females in sciences in rural high schools of South Africa.

3. Methodology

To steer the said investigation, a qualitative research method was executed, through document analysis (annual public & exam results reports, subject policy documents), observations and unstructured interviews, reports such as the national, provincial analysis of grade 12 results; the analysis from the Free State Department of Education's Examination Directorate and statistics were useful in this regard. These sources were analysed and interpreted as data gathering tools and to get an understanding of the realities of girl learner achievement and participation in sciences. Taking into consideration the contribution in the body of knowledge, the objective was provoking girl learners in order to increase female participation and closing the gap in STEM. Schools in the rural, Xhariep educational district of the Free State province were identified as the research sites.

4. Our reflective overview

In a previous study we observed that the number of female learners writing science subjects at the end of the year in the Free State province, declined in the previous four to five consecutive years (FSDoE Examination and Assessment Statistics). It is for this reason as to why we became interested in comparing the achievement of females to males. Having reviewed the statistics of the year end grade 12 results, we observed that female learners do not perform well, that's despite their large enrolment as compared to male learners. For instance in 2016, the provincial pass percentage was 86.8 for females and 89.8 for males; in 2017, it was 85.0 for females whilst males performed at 87.5%; in 2018, females 86.4% and males 88.7%. (Free State results brief, 2019)-see table 1. The trend we observed is that female's performance in science is improving steadily against males who continuously perform outstandingly. The general performance portrayed is not different from the performance of female learners, specifically in science (Life Sciences and Physical science). In general, learners regard science subjects as the most difficult subjects especially Physical sciences and mathematics. However learners still don't perform exceptional in Life Sciences. Nonetheless, based on the focus for the paper, our belief is that there should be equality in performance comparatively between females and males. Pertaining to gender parity it has been noticed that the number of females enrolling in sciences seem to be higher than male learners- this in turn may give them better chances of achieving at higher levels and as such, pursuing science in institutions of higher learning. Another issue that drew our attention was that the number of females who sit for examination is lesser than the enrolled number, meaning they exit the schooling system during the year. Below is a table displaying statistics of all learners. According to Free State Examination and Assessment Directorate in different years which shows the number of both males and females registered, wrote and the disparity in pass percentage Compared to boys there are more girls sitting for examination at the end of the year but amazingly less pass percentage.

Table 1. Free State examination and assessment statistics per gender 2020.

FREE STATE OVERALL PERFORMANCE PER GENDER 2016-2019								
Year	2016		2017		2018		2019	
Gender	Female	Male	Female	Male	Female	Male	Female	Male
Registered	15919	12982	15076	12647	16138	13902	16566	13475
Wrote	13615	11297	13640	11550	13730	11932	14023	11549
Passed	11821	10141	11588	10107	11864	10579	12254	10348
Pass %	86.8%	89.8%	85.0%	87.5%	86.4%	88.7%	87.4%	89.6%

Data displayed in table 1 above, indicate all learners who wrote in all subjects where boys are performing higher than girls which means the department of education is aware of the fact that there is enormous gender disparity engagement in studies generally. We saw the similar achievement disparity

especially in Life Sciences (Free State examination and assessment statistics, 2020). Does it mean girls do not take their studies seriously, this is one of the questions that was directed to subject teachers? Xhariep is one rural district in Free State were compared to other streams, learners taking science subjects (Physical Sciences, Life Sciences, Mathematics) form the smallest class in all schools. Furthermore, over and above the gender gap in sciences, female learners in Xhariep become disadvantaged for being in a rural area with other socio-economic challenges affecting them. The situation of Xhariep confirms what 2011 census reported regarding gender disparity that as little as 23.7 of rural females made it through grade 12 at the end of that specific year nationally compared to 33.4 of urban females (Gender series volume II, 2012).

The Xhariep educational district in the Free State province is located in rural areas of the Free State as indicated earlier where lack of basic resources plays a major role; making it more difficult to increase participation in science. For example, resources such as electricity, water, laboratories are scarce and these are imperative resources in Sciences subjects which have experiments to be conducted in order to master specific skills of the subject. These are challenges as observed by the learning facilitator during routine school visits which are part of contributing factors towards poor performance. Only theoretical work is addressed due to non-availability of resources.

Despite the rigorous strategies put forth by teachers, the performance is still not coming to where is expected. We have tracked the performance of Life science (LFSC) and Physical science (PHSC) over the past consecutive years as displayed in the table below after a full implementation of various strategies.

Table 2. Adapted from Xhariep district statistics and subject performance: 2020.

Subject	Grade 12	Wrote	Pass %	Average	Subject	Wrote	Pass%	Average
LFSC	2020	528	79	43	PHSC	234	73	37
	2019	462	76	41		199	85	45
	2018	523	73	40		187	81	42
	2017	444	80	44		206	76	42

From the data in table 2 above one will notice that the total number of two grade 12 science classes is not large for 25 rural high schools but it is difficult to get to all of them passing not even reaching 90% which is expected. The total number of schools in this district is 26 and only 20 are offering Physical science. And the actual average percent fluctuates in the 40s against the expected 50%. As we were reflecting on learner performance in science, there must be something lacking. Compared to the district we also viewed the provincial performance in LFSC and PHSC as portrayed below.

Our attention is drawn to the fact that the number of learners who are doing Life sciences is always more than those who are taking Physical Science. If then these are the recorded numbers in Life sciences, it means there are even lesser in Physical science therefore less participants in STEM. Characteristics and challenges of rural schools as listed in Jimerson (2005) are found simulating how Xhariep district is. For instance, in 2017 of the 23 schools that offered Life sciences, 12 schools experienced challenges such as lack of teachers, lack of experienced teachers, teachers not completing a full year as they got attracted by urban areas where they become nearer to many facilities that make life to be easy. The district continues to lose experienced teachers for it being rural. Due to small and declining enrolment of learners, some schools did not qualify to get substitute teachers for death and for those who took maternity leave. The larger population of Xhariep district is unemployed which affects furthering studies since parents do not afford to pay for higher institutions. Very few learners manage to continue with their studies which makes it even worse lesser for sciences as it is portrayed by statistics.

5. Concluding remarks

Of significance and for better performance, female participation in science should be encouraged from an early age of schooling. Which means it becomes the responsibility of the department of education, teachers and parents to encourage the girl learners to participate in sciences. We take into cognisance that globally there is a gender gap of participation in sciences that even affect the world of work (UNESCO UIS, 2020).

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