Gender as a Factor in Predicting Academic Performance in Agriculture in Primary School Leaving Examination in Gaborone, Botswana

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Author's contributions

This work was carried out in collaboration between both authors. Author TB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author KM managed the literature searches and data collection cleaning and entry into SPSS. Both authors read and approved the final manuscript.

Short Research Article

ABSTRACT

The study looked at gender as it relates to academic performance of students in Agriculture Primary School Leaving Examination in Gaborone schools. The research was quantitative ex-post facto type design. The sample composed of 3781 (1751 males and 2030 females) students who wrote PSLE in 2012. The sample was taken from 43 primary schools in Gaborone area which included private and government schools. The results which included students' scores were obtained from Botswana Examinations Council academic records and were not manipulated in any way. The results were then subjected to testing using Statistical Package for Social Sciences at significance level of 0.05. An independent t-test was conducted to determine significance difference and value of -5.964 which is statistically significance (P = 0.00) obtained and therefore the null hypothesis that states that there is no significant difference between males and females was rejected. The analysis revealed that girls performed better than boys and moreover there is a significant difference between males and females' academic performance. It was therefore,

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recommended that the Gaborone Regional Education office intensify research to establish how other variables such as location, parental support and economic status of parents contribute to poor Primary School leaving Examinations.

1. INTRODUCTION

The government of Botswana has adopted a dynamic philosophy of education that promotes economic development, political stability, cultural advancement, national utility and the overall quality of education. The education system is well structured to offer individuals a lifelong opportunity that will make the country competitive internationally. Schools as institutions should offer opportunities to develop and prepare students for the world of work and self-sustenance.

The Botswana Education System has the 7-3-2 structure via Primary School, Junior Secondary School and Senior Secondary School. In the education of Botswana, the government provides the free and universal education to all students for ten years. The major goal of the government is to make the education available to all in the country. The primary Botswana schools are mostly aided by the government of Botswana. There are also private schools in the country.

Primary education is the most important level of education, as it is the foundation upon which all other schooling will rest. It is critical that children go through the best possible schooling at this level. 100% of primary school leavers go to junior schools today as compared to 35% in 1997 and before [1]. All students are guaranteed ten years of basic education, leading to junior certificate qualification.

The Revised National Policy on Education of April 1992 recommended that primary school subjects should have groups. In the grouping Agriculture is in upper primary and should be learned by students when doing standard 5 -7. Other subjects that fall in the lower primary are learnt from standard 1-7. Among all other subjects taught agriculture was the only subject which pupils didn't sit for its examination. The Ministry of Education Skills and Development (MOE) hence adopted a strategy for this syllabus to be examined at Primary School Leaving Examination (PSLE).

It is a common practice to determine academic readiness and hence perform selection of learners for the next level of education based on the results of their performance in previous related examinations. Conducting examinations within and at the end of each and every school year is part of the school curriculum and in Botswana, like in other countries; learners take public examination to determine their academic performance at each level of education. In Botswana at the end of seven-year basic education, students are expected to sit for public examination i.e. Primary School Leaving Examination (PSLE).

The PSLE assesses the achievement of learners who have completed the first seven years of the 10-year basic education programme. Candidates are examined on seven syllabuses; English, Mathematics, Science, Setswana, Social Studies, Agriculture and Religious and Moral Education (REME). English and Setswana consist of two components each: A multiple choice paper and extended writing paper. Agriculture has one component consisting of open ended questions. The rest of the subjects have one multiple choice paper each consisting of sixty items.

The agriculture syllabus in primary schools was fully implemented in 2005 and the first group to be examined was in 2007. The PSLE agriculture results for 2007 and 2008 was good just like other subjects that were tested at PSLE perhaps it was because the examination was multiple choice type of questions, however the performance started declining drastically in 2009 onwards. From 2009 the PSLE agriculture examination which the candidates were sitting for was structured type of questions.

1.1 Statement of the Problem

The pre-requisite to go to junior secondary school one must have set for PSLE examination and agriculture is one of the subjects tested. Every examination results serve the fundamental purpose of predicting the readiness of the learner for the next level of education. The performance

of students in PSLE agriculture has been gradually deteriorating therefore there is a need to determine whether gender can be used in predicting performance in PSLE agriculture. The input of poor PSLE results into junior secondary education has a potential to spill over into the next level of education.

1.2 Purpose of Study

The purpose of the study was to determine whether student's personal attributes (gender) can significantly predict performance in PSLE agriculture. Specifically, the objective of the study was to:

- To determine the extent to which gender influences academic performance in Agriculture Primary School leaving Examination.

1.3 Research Question

The following research question guided the study:

- Does gender influence students' academic performance in Agriculture Primary School leaving Examination.?

1.4 Research Hypothesis

The following null hypothesis was formulated in the study and tested at 0.05 level of significance:

HO: There is no significant difference between males and females' performance in Agriculture Primary School leaving Examination in Gaborone schools.

H1: There is a significant difference between males and females' performance in Agriculture Primary School leaving Examination in Gaborone schools.

1.5 Significance of the Study

It is anticipated that the findings of this study will help the Ministry of Education Skills and Development to adopt some strategies that will help improve standard seven agriculture results. This can be achieved through Department of Curriculum Development evaluating the syllabus and bring it to the level of primary school students. It is also expected that the study will seek to determine / predict performance in Primary School leaving Examination agriculture by gender therefore the study will benefit Botswana Examinations Council to establish any gender biasness in their examination items.

2. REVIEW OF RELATED LITERATURE

2.1 Theoretical Framework

The theoretical framework of this study is based Eagly's social role theory developed in 1987. Eagly, Wood & Diekmen, [2] posited that social role theory suggests that the sexual division of labour and societal expectations, based on stereotypes, produces gender roles. This theory thus assumes that gendered roles influence academic performance and this makes it appropriate theoretical framework for this study. Anselmi & Law, [3] observed that the social role theory distinguishes between the communal and agentic dimensions of gender-stereotyped characteristics. They explain agentic role as characterised by attributes such as assertiveness and independence which are commonly associated with public activities, and thus, with men.

Ramatlala and Nenty [4] conducted a study in 2011 to investigate gender as a factor in the prediction of performance in Botswana General Certificate of Secondary Education physical education by coursework and forecast grades among secondary schools in Botswana. The sample composed of 2292 (1432 males and 860 females) students who, based on Botswana Examination Council records obtained grades in coursework, forecast and Botswana General Certificate of Secondary Education physical education grades from 2005 through 2008.

Secondary data was used for the study and were retrieved with permission from Botswana Examination Council academic records. Data was coded and entered into the computer and analysis done by carrying out Pearson Correlation Coefficient and three multiple regression analysis. All the analyses were done using SPSS Version 16 for Windows. The results of the study revealed that coursework and forecast grades significantly predict the Botswana General Certificate of Secondary Education grades in physical education among senior secondary school students in Botswana, based on each year data, gender does not influence such prediction significantly, but for cumulative data across all the years it does. This study is related to my study as they both look at gender as a factor in prediction of performance.

Similarly, [5] carried out a study to find out the factors leading to poor performance of girls in science based subjects. The researcher had used the descriptive survey type using hand delivered questionnaire to collect data from both students and teachers in three secondary schools in Gaborone. Simple random sampling was used to sample the population of both students and teachers. The respondents were from four students since they had taken secondary junior examinations and had idea about science courses they took at form three level and teachers from selected subjects. Out of 300 form four pupils in the three selected schools, 20% was chosen for the study which was 60 students in total and two teachers from each selected subject were selected in each school which made 36 teachers for the study.

The researcher had also analyzed the data using SPSS and the results indicated that factors leading to poor performance of girls in science based subjects were socially constructed including home and community factors such as family socialization, gender, masculinity of science and teachers and students' attitudes. The respondents had agreed that science based subjects are difficult for girls to handle that is they are developed by male professionals for boys and therefore discourage girls. The teachers also don't put much effort in helping and motivating girls to do better.

Dayioglu and Turut-Asik [6] conducted a study whose aim was to determine whether there is a significant gender differences in academic performance among undergraduate students in a large public university in Turkey. The study was based on three indicators; university entrance scores, performance in English preparatory school and in the programme the student is majoring in. Cumulative Grade-Point Average was used to capture student's performance at different stages of student academic life.

The data for this study came from the undergraduate students' records compiled by the registers office of Middle East Technical University. The original data included 11,560 students. International students were excluded (who constituted 4.6% of the population) and those who have been transferred from abroad for the reason that they have no university entrance score. Departments such as Physical Education and vocational training were dropped for the reason that they admit students not through the university exam but via an alternative mechanism. Additional exclusions included a small number of students with missing information. With all these exclusions, the data set was reduced to 10,343 individual cases. Female students constituted 37.4% of the total students and were heavily represented in non-engineering department.

The findings of the study revealed that a small number of female students managed to enter the university and when they do so they enter with lower scores. However, once they are admitted to the university, they excel in their studies and outperform their male counterparts during their college years.

In another related study [7] conducted a study on gender differences in academic qualifications and medical school performance of osteopathic medical students. The study was interested in answering the following questions: (1) do women and men differ in their overall medical school performance? (2) Are there significant differences in the preadmission academic qualifications of female and male medical students? (3) Are gender differences in preadmission qualifications a factor in medical school performance?

The study involved 704 medical students from four successive graduating classes (2002- 2005) at the New York College of Osteopathic Medicine. These were students who had completed their coursework in four years and had passed the COMPLEX –USA Level 1 and Level 2 examinations. The size of each class (2002-2005) was 168, 180, 182 and 175 respectively. The percentage of women in each class was 48%, 46%, 49% and 50% respectively.

Performance measures included the medical school Grade Point Average, clinical subject examinations, clinical evaluations and the Level 1 and Level 2 COMLEX examinations. Grade Point Average and clinical performances were obtained from institutional databases and COMPLEX-USA examination scores were those reported by the National Board of Osteopathic Medical Examiners to the institution. Preadmission data was obtained from the American Association of Colleges of Osteopathic Medicine Application Service. Medical school performance was measured by comparing the means of the performance measures using the independent sample t-test. An analysis of covariance using the total Medical College Admission Test Scores a covariate was performed. Statistical tests were calculated with SPSS statistical software, version 14.0.

The results showed that there was no gender difference in undergraduate Grade Point Average, while the mean total Medical College Admission Test Scores of men were higher than that of women. There was also no significant gender difference between women and men in their cumulative Grade Point Average for the first two years of medical school. Men had higher mean scores on the Comprehensive Osteopathic Medical Licensing Examination (COMPLEX) Level 1, given after the first two years of medical school, but when total MCAST's were controlled, there was no gender difference in COMPLEX Level 1 performance. Clinical performance was determined by scores on clinical subject examinations and the clinically-based COMPLEX Level2 examination. No significant gender differences were seen in these two clinical performance measures. Women outperformed men in evaluations of clinical clerkship performance.

Mogobe [8] also carried out a study to determine the effects of gender in student's performance on their vegetable practical project. The study was conducted at Sir Seretse Khama Community Junior Secondary School in Gaborone. The researcher used a descriptive research type using hand delivered questionnaire to collect data from teachers. Data was also collected from the student's assessment records of vegetable production. The sampling method that was employed to select the respondent was a hat model sampling technique to select students name from the records.

Data was analyzed using tables in order to work out the frequencies, mean and percentages. The results presented from the past assessment records and the response from the teachers showed that male gender group outperformed females, it was therefore concluded that gender has an effect on the performance of students.

In a recent study, [9] carried out a study on the attitude and academic performance of public single-sex (Boys' and Girls' only) high school students in the teaching and learning of Agricultural Science in the aspect of practical knowledge of Agriculture in Ibadan. This study was a descriptive survey design and he reported that the mean scores obtained by one Girls' only school was significantly different from one Boys' only schools another two Girls' only schools' mean scores at 5% significant level.

3. RESEARCH METHODOLOGY

The study adopted a quantitative research approach which was carried out in forty-three primary schools in South Central Region of Botswana. The study implored a descriptive survey design of the ex-post facto type. This is because the researcher was not able to manipulate the variables for the simple reason that they have already occurred. The predictor variable was student gender while criterion variable was the final agriculture grade. This was therefore a quantitative research. Quantitative research is concerned with measurement and numbers rather than words in the collection and analysis of data. Quantitative research usually seeks to establish relationships between two or more variables using statistical methods to test the strength and significance of the relationship. It involves some type of comparison and attempts to discover relationships or influence between existing manipulable and non-manipulable variables. The data produced is numerical which can be analyzed in a variety of ways. Statistics was used to analyze and to determine the results of the study.

The total population of this study was 3781 students who sat for 2012 Primary School Leaving Examination and was sourced from Botswana Examination Council academic records. The breakdown of this population shows gives 1751 male students and 2030 females. All the students from the forty-three primary schools in Gaborone area were used in study.

Secondary data of the year 2012 Primary School Leaving Examination was sourced from Botswana Examination Council academic records using a USB flash drive. Intensive panel-based content analysis and face validation is carried out in Botswana Examination Council by each subject panel, so the sores were assumed valid for use in this study.

The names of the students were not used but only their identification numbers were used to ensure high level of confidentiality.

Data was analyzed using Statistical Package for Social Sciences version 16 computer program. Descriptive statistic was used to interpret data and report the findings of the study. Frequencies, means, t-test, P- value and standard deviations were used to interpret data.

4. RESULTS

A descriptive analysis of the research data was done among the two variables of the study. To test for the hypothesis, analysis was done with scores being dependent variable and gender as independent variable.

Table 1 gives information about the total number of the sample population as well as the number of males and females. 1751 were males which constitute 46.3% and 2030 were females which represent 53.7%.

Table 1. Percentage representation of males and females in the sample population

	Gender	
	Frequency	**Percent**
Male	1751	46.3
Female	2030	53.7
Total	3781	100.0

Table 2 shows the mean and standard deviations as well as the standard error of the mean among the two variables of the study. The males have a mean score of 19.24 while the females have a mean score of 21.20. The males have highest standard deviation of 10.502 while females have 9.717. This indicted that most males were away from the mean score as compared to females.

Table 3 shows that the mean difference in performance between males and females was -1.962. The value of t, which is -5.964 and statistically significance (P = 0.00) and therefore the null hypothesis that states that there is no significant difference between males and females is rejected.

5. DISCUSSION

The objective of the study was to determine the extent to which gender influences academic performance in PSLE agriculture. The results show that the mean total score of females is higher than that of males by 1.96 (see Table 2). This shows that females performed better that their male counterparts in the 2012 PSLE agriculture examination. The males and females have a standard deviation of 10.502 and 9.717 respectively which means that most males were far away from the mean score as compared to females.

Analysis of the results indicated that there is a significant difference between males and females' academic performance since the results shows a P value of 0.00 hence gives strong evidence against the null hypothesis. This is in agreement with [10] who stated that the P-value may be used as strength of evidence against H0 provided by the data – the smaller the P is the stronger is that evidence. It also shows a t-value of -5.964 which means that there was a small difference between means.

Similar studies [4] and [6] agreed with the study that there is a significant difference between males and females and that females perform better than males. Ramatlala and Nenty [4] observed that gender influence prediction of students' performance significantly based on cumulative data. The significantly different prediction validities are .473 for males and .551 for females. Similarly, [6] also conducted a study which revealed that despite their lower university entrance scores and under representation in most departments, female undergraduate

Table 2. Mean, standard deviation and standard error of the mean of variables in the study

		Group statistics			
	Gender	**N**	**Mean**	**Std. deviation**	**Std. error mean**
Score	Male	1751	19.24	10.502	.251
	Female	2030	21.20	9.717	.216

Table 3. Mean difference in performance between males and females

Score equal variance assumed	f	sig	t	df	Sig (2 tailed)	Mean difference	std error difference	95%confidence interval of difference	
								Lower	**Upper**
	15.327	.000	-5.964	3779	.000	-1.962	.329	-2.607	-1.317

students outperform their male counterparts. The findings further concur with those of [9] who reported high mean scores obtained by girls compared to boys in practical agriculture in Abadan, Nigeria.

The variability between males and females occurs because of a number of factors such as cognitive skills and attitude towards learning. In cognitive skills, the largest and most consistent gender difference is found in verbal, language and certain spatial skills. For example, girls tend to produce words at an earlier age, have a larger vocabulary and show a higher level of language complexity beginning in early childhood. Girls also show positive attitude towards learning which include attentiveness, task persistence, eagerness to learn, learning independence, flexibility and organization. All these contribute towards females outperforming their male counterparts. Leonard and Jiang [11] suggest that females have better skills than the male students. Other researchers have argued that women receive higher grades than males because they work harder and attend class more frequently [12].

The findings of this study adds credence to the of Eagle's social role theory developed in 1987, which posits that gendered roles influence academic performance.

6. CONCLUSION

The study shows that girls performed better than males in the 2012 PSLE agriculture examination. It be concluded that there is a significant difference between males and females in academic performance in agriculture in primary schools in Gaborone. Boys contribute significantly to the overall poor agriculture performance reported in Gaborone schools.

7. RECOMMENDATIONS

Further research must be carried out to establish how gender and even other measures are impacting on Primary School leaving Examination performance in other different subjects beside Agriculture. Such studied should be carried out with other variables like location, ethnicity and socio-economic levels as factors in the prediction of performance in Primary School leaving Examination.

Deliberate and affirmative policies must be developed to help boy child to improve academic performance and get to similar level with their girl counterparts especially in agriculture.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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