

Disparities in Performance in Mathematics between Boarding and Non Boarding Schools: A Study of the Seven Districts of Manicaland Province, Zimbabwe

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Abstract: *The study investigated the differences in performance in mathematics between students who study through boarding schools and those who study through non boarding schools in the province of Manicaland. The period that was examined by the researchers was at least ten years after obtaining political independence. The seven districts of Manicaland were compared on ten variables. The study revealed that students who studied through boarding schools outperformed their colleagues who studied mathematics through non boarding schools. The study concluded that the differences in performance were due to the better study atmosphere at boarding schools. The students at boarding schools also had adequate resources and time for study without the burden of extra household duties at home. The study recommended that the Ministry of Primary and Secondary Education, in collaboration with school authorities and parents of students at non boarding schools provide adequate resources, a conducive study environment after normal school hours and adequate study time for students to improve on mathematics.*

I. Background To The Problem

Education has long been touted as an important tool for the development of nations and societies. The Zimbabwean government has invested vastly in education since the attainment of independence in 1980. The gains were apparent for the black community which had suffered under an educational system which was designed to prop up the interests of whites while undermining the interests of blacks. The developments in education in Zimbabwe however, were fraught with challenges such as low pass rates in mathematics which was viewed as one of the most important subjects. Umamer (2011) viewed education in mathematics as a bedrock and an indispensable tool for scientific, technological and economic advancement of any nation. Umamer (2011) however noted that there was a high failure rate in mathematics inspite of the importance of the subject. Davis and Hersh, (2012) indicated that mathematics was an important subject not only from the point of view of getting an academic qualification at school or college, but also as a subject that prepares the students for the future.

In Zimbabwe, performance in mathematics has been bad regardless of its importance. The subject is generally disliked by students and it is regarded as difficult (Tshabalala & Ncube, 2012). There are, however, two main systems in Zimbabwe's secondary schools, boarding schools and non boarding schools. There has not been any specific study detailing the differences in performance between boarding and non boarding schools in mathematics in Manicaland province of Zimbabwe.

II. Statement Of The Problem

Performance in mathematics in Zimbabwe has been low, general perceptions indicated that boarding schools produce better results than non boarding schools. There is however no empirical evidence to this assertion to guide policy makers on the best model of improving performance in mathematics in Zimbabwe. The statement of the problem could therefore be stated as follows; Is good performance in Mathematics function of whether a student learns at a boarding school or not.

III. Research Question

This study sought to answer the following question;

- Were there differences in performance in Mathematics determined by the type of school, e.g. boarding or non-boarding?
- If differences existed, what were possible major causes of differences in academic performance between boarding and non-boarding secondary schools?

IV. Significance Of The Study

The study adds to the knowledge bank on the strategies that may increase the pass rate of mathematics in Zimbabwe. There has not been significant literature on the differences in performance between boarding and

non boarding schools and the extent to which the two different schemes were effective for teaching mathematics.

The study gives an insight into the differences in performance of boarding and non boarding schools generally. This is important for parents as they make plans for their children. The analysis is also important for the government in determining the criteria for distributing resources. Resources would thus be distributed where they are more critically needed.

V. Review Of Related Literature

Several studies have been carried out which reflected that performance differed between boarding schools and day schools because of the different conditions. Diriye (2006) concluded that the poor performance of Somali pupils based in the United Kingdom was due to the lack of space to study as they lived in families which averaged six children. The apartments made it difficult for the parents to create study space. Boarding places were therefore viewed as imperative to boost the pupils' performance. On the other hand, Dermie et al (2007) observed that the poor performance of the Somali students was due to lack of parental support and contribution which is, however, generally more significant in day schools. The two studies by Diriye (2006) and Dermie et al (2007) therefore propounded that the availability boarding places and parental support at home were important conditions for academic performance of students.

Experiences in Kenya as observed by Mackenzie (1997) indicated that boarding schools were more conducive for better academic performance. The home environment was regarded as not suitable for reading as students had to participate in extra household chores after school rather than reading. The study also revealed that there was a shortage of facilities such as reading desks, books and proper lighting at homes hence students could not study effectively.

The other causes of differences in performance between boarding school students and day scholars is the distance travelled between home and school on a daily basis as noted by Coady and Parker (2002) in Mexico. Day scholars were found to have been negatively affected by the distance in terms of their energy levels and level of concentration in class. Hinum and Park (2004) concluded that there was a positive correlation of the study materials and better performance at home in rural China. The study, however, reported that children who studied from home did not have adequate study materials.

VI. Research Methodology

The research design used falls under the category of a census. Cohen, Manion and Morrison (2011) suggest that a census is a developmental research which involves time series, longitudinal and cross sectional studies. Most of the study focused on cross sectional survey with a view of drawing comparisons based on some educational characteristics. A cohort study where successive measures are taken at different points in time from the same subjects was not possible for the variables used due to unavailability of such data at district level.

Secondary data were collected from the Ministry of Primary and Secondary Education's regional offices. The District Staffing Officers provided the researchers with very relevant statistical data. Some data were collected from the Annual Reports of the Secretary for Education and Culture. Some information from school heads was also used to cross check data from the official documents at the Ministry's Regional Offices. The research covered all the seven districts that make up the province of Manicaland. The total number of secondary schools studied was 248.

The hypothesis for consideration was that the performance of students at boarding schools was not different from that of those at non-boarding schools. The researchers did not take the whole population but a sample.

The researchers used random sampling. In random sampling, as explained by Mulder (1982:57) each member of the population has an equal chance of being selected for the sample. The population was made up of the 248 schools. A random sample of 23 boarding secondary schools was used. A sample of thirty (30) schools was taken from the 225 remaining non-boarding schools using the same random sampling techniques. The thirty schools constituted thirteen percent (13%) of the total population of non boarding schools. According to Gay (1980) the minimum acceptable sample size statistically is 10 percent of the population. The researcher considered the 65% sample for the boarding schools and 13 percent for the non boarding schools as adequate.

In this study, a student who obtained a symbol 'C' or better at O' level Mathematics fell into the pass category. Anything less than a C grade was considered to be a failure. Examination results for the Cambridge School certificate for 1991 were used.

VII. Findings

7.1 Comparing Boarding Schools with Non Boarding Schools in Performance

A comparative investigation on the performance of boarding schools and non-boarding schools was carried out so that the researchers could draw some valid conclusions on the distribution of boarding schools. If

the performance between the two types of schools was the same, then the high expenditure on boarding schools could not be justified. On the other hand, if boarding schools performed better, then that would mean districts that had more boarding schools were favoured in terms of expenditure on educational inputs and on academic achievement.

The data collected was then organised into pass and fail categories for the two types of schools as shown below. Any student who obtained a 'C' grade or better was assumed to have passed. Anything lower than a 'C' was considered to be a failure.

The Chi-Square Calculations for Mathematics Results for Boarding and Non Boarding Schools

STUDENTS	BOARDING SCHOOLS	NON BOARDING SCHOOLS	TOTAL
PASS	A 706	B 284	A + B 990
FAIL	C 798	D 744	C + D 1542
TOTAL	A + C 1504	B + D 1028	N 2532

To obtain the chi-square the following formula was then used:

$$\begin{aligned} X^2 &= \frac{N (AD - BC) - N/2)^2}{(A+B) (C+D) (A+C) (B+D)} \\ &= \frac{2532 ([1706 \times 744 - 284 \times 798] - 2532/2)^2}{990 \times 1542 \times 1504 \times 1028} \\ &= 99.9 \end{aligned}$$

The examination was a two tailed test with one degree of freedom. The following critical chi-square values were obtained, 3.84 (5% level) and 6.64 (1% level).

The calculated value (99.9) is greater than both of these values (3.84 and 6.64) and the null hypothesis must be rejected at the 1% level of significance. The researchers could therefore, assert with 99% confidence that there was a significant difference between the pass rate for boarding and non boarding schools. The better results for boarding schools cannot be wholly attributed to added value in the form of inputs. Probably the calibre of the students might be a determining factor.

Educational inputs in most boarding schools are more and of better quality than the inputs in the majority of non-boarding schools. Researches by Riddell and Nyagura (1980) describe the desperate situation of most District Council Schools which were not boarding schools. Boarding schools were favoured with many resources of better quality that might have had an influence on academic performance. However, the researchers should have controlled other factors that influence performance. But that was not possible within the period of investigation.

Boarding schools have some disadvantages, for example, the alienation of the student from his family. Such disadvantages including the high cost of this type of education seem to be overshadowed by the advantage of high academic achievement, a sense of independence and confidence in one's activities. Again, a cost benefit analysis would be needed in further studies.

VIII. Conclusions

The study concluded that students at boarding schools passed mathematics more than those at non boarding schools. The conditions at boarding schools enabled students to pass mathematics better than those at non boarding schools. The boarding schools were more equipped with better resources as compared to non boarding schools across all subjects because of more stable and significant sources of funding.

IX. Recommendations

1. The Ministry of Primary and Secondary Education and the different responsible authorities should allocate more resources to non boarding schools towards the teaching of mathematics.
2. The Ministry of Primary and Secondary Education in partnership with non boarding schools and parents should provide platforms for extra lessons in mathematics after the normal school hours and at home.
3. The number of 'O' level candidates who end up with 'U's is too high. A system should be devised where these students should not waste their time and public funds pursuing a course they are not going to benefit from. That would entail designing a curriculum that would benefit such students.
4. Further studies should be carried out using the 2012 census results to determine the extent to which the disparities that existed during the first decade of attaining political independence had persisted or reduced.

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