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Location Based Relationship: Students' Performance in Mathematics and Physics in West African Senior School Certificate Examination (WASSCE)

By

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Abstract

This study analysed the influence of school location on students' performance in West African Senior School Certificate Examinations in mathematics and physics in Nsukka Local Government Area, Enugu State of Nigeria. Two research questions and their corresponding null hypotheses guided the study. Ex-post facto research design was adopted for the study. All the students who sat for WASSCE in 2014-2016 in Nsukka Local Government Area formed the population of the study while a sample of 1039 students was used for the study. Students' Academic Performance proforma was used to gather students' performance in Mathematics and Physics for the years in question. Data collected were analysed using mean and standard deviation to answer the research questions and t-test of independent samples to test the null hypotheses at 0.05 level of significance. The findings of the study showed that there is a significant difference in the mean performances of urban and rural students in WASSCE mathematics in favour of the students in rural schools. However, the result equally showed that there is no significant difference in the mean performances of urban and rural students in WASSCE physics. The implication of this is that there is a significant influence of school location on students' performance in mathematics but has no significant influence in physics. Thus, it was recommended among others that school authorities should consider school location as one of the determinants of students' performance in mathematics.

Keywords: Influence, Location, Performance, Mathematics, Physics

Mathematics was historically developed with abstraction and logical reasoning (Agwagah, 2014). Students' exposure to Mathematics helps in developing their analytic minds and assists in better organization of ideas and accurate expression of thoughts (Awogbemi, Oloda & Alagbe, 2015; Adetunji, 2007). Despite the objectives of secondary school Mathematics curriculum, students' performances in this subject are not encouraging (Uzoechi, Kurumeh & Azuka 2013). Mathematics and Physics are closely related to one another (Mekonnen, 2014).

Physics enables learners to develop analytical skills necessary for problem solving in various situations they encounter in life (Adeoye, 2010). Secondary school Physics is primarily concerned with the study of these two dominant themes that run through the development of Physics: Matter and Energy, the search for order and patterns (Nwagbo, 2000). The decline in the performance of Physics is prompting question about the future level of scientific literacy and technological expertise (UNESCO, 2000). Performance in Physics may likely be linked to location (McCracken and Barcinas, 2006).

Location means the particular position a school is sited which could have an urban and rural setting (Mbah, 2003). This classification may have influence on students' performance in the learning of Mathematics and Physics (Weeks, 2010). Ogbe (2009) discovered that location of the school contributes to low performance of students in Mathematics. McCracken & Barcinas (2006) found that the location of a school whether in an urban or a rural area did not make any significant difference in the level of students' performance in Physics. In addition, the influence of location of a school on students' performance in Mathematics was found not to be significant (Haller & Virkler, 2007). The discrepancy in educational performance between urban and rural students seems unclear, yet the reasons are not yet wholly attributed to known factors. In an effort to determine some factors responsible for such discrepancies in educational performance between the urban and rural students, this present study investigated the influence of location on students' performance in Mathematics and in Physics using WASSCE in Nsukka L.G.A.

Research Questions

The study was guided by the following questions:

1. What are the mean performances of urban and rural students in WASSCE Mathematics?
2. What are the mean performances of urban and rural students in WASSCE Physics?

Hypotheses

The following null hypotheses test at 0.05 level of significance guided the study:

Ho_1: There is no significant difference in the mean performances of urban and rural students in WASSCE Mathematics.

Ho_2: There is no significant difference in the mean performances of urban and rural students in WASSCE Physics.

Methodology

The study adopted Ex-post facto research design. The targeted population for the study was Senior Secondary III (SS III) Mathematics and Physics students of public secondary schools in Nsukka Local Government Area, Enugu State of Nigeria. The population of the study comprised of students in all public Secondary Schools Nsukka Local Government Area. A total of 1039 Mathematics and Physics Students were used as sample for the study which consists of 343 urban and 696 rural students. Students' Academic Performance in Mathematics and Physics Proforma was used for data collection. Data collected were analyzed using mean and standard deviation to answer the research questions and t-test of independent samples to test the null hypotheses at 0.05 level of significance.

Results

The results were presented in line with the research questions and hypotheses that guided the study.

Research Question One: What are the mean performances of urban and rural students in WASSCE Mathematics?

Table 1: t-test Analysis of Difference in the Performance of Urban and Rural Students in Mathematics in WASSCE

Location	N	Mean	SD	df	t-cal	Sig. (2-tailed)
Urban	343	48.73	12.63	1037	-10.439	.000
Rural	696	58.09	14.03			

Table 1 shows the mean performance of urban and rural students in mathematics in WASSCE. It shows that students in urban schools had mean mathematics performance of 48.73 with standard deviation of 12.63 while the students in rural schools had mean mathematics performance of 58.09 with a standard deviation of 14.03. This indicates that mean mathematics performance of students in rural schools is higher than the students in urban schools.

Ho_1: There is no significant difference in the mean performances of urban and rural students in WASSCE Mathematics.

Table 1 reveals that the probability associated with the calculated value of t (-10.439) for the difference in the mean performances of urban and rural students in mathematics in WASSCE is 0.000. Since the associated probability value is less than the 0.05 level of significance, the null hypothesis was rejected. Thus, there is a significant difference

in the mean performances of urban and rural students in WASSCE Mathematics in favour of the rural students.

Research Question Two: What are the mean performances of urban and rural students in WASSCE Physics?

Table 2: t-test Analysis of Difference in the Performance Urban and Rural Students in Physics in WASSCE

Location	N	Mean	SD	df	t-cal	Sig. (2-tailed)
Urban	343	54.33	12.04	1037	-1.013	.311
Rural	696	55.01	9.05			

Table 2 shows the mean performance of urban and rural students in physics in WASSCE. It shows that students in urban schools had mean physics performance of 54.33 with standard deviation of 12.04 while the students in rural schools had mean physics performance of 55.01 with a standard deviation of 9.05. This implies that mean physics performance of students in rural schools is higher than the students in urban schools.

Ho_2: There is no significant difference in the mean performances of urban and rural students in WASSCE Physics.

Table 2 reveals that the probability associated with the calculated value of t (-1.013) for the difference in mean performances of urban and rural students in WASSCE in Physics is 0.311. Since the associated probability value is greater than the 0.05 level of significance, the null hypothesis was accepted. Thus, there is no significant difference in the mean performances of urban and rural students in WASSCE in physics.

Discussion of Results

The result of the study revealed that there is a significant difference in the mean performances of urban and rural students in WASSCE Mathematics in favour of the rural students. In order words, students in rural schools significantly performed better than their counterparts in the urban schools. This result looks surprising as it is expected that students in urban schools should do better than those in rural schools as a result of the school's climate. This is an indication that location of school has influence in the performance of students in mathematics in favour of the students in rural schools. However, this result contradicts the findings of Iyortyer (2004), Iyabo (2006), and Bulus (2008) who established from their separate studies that, there is significant difference between the performance of students from the two sets of environments (urban and rural) in favour of students in urban schools.

It was equally revealed that there is no significant difference in the mean performances of urban and rural students in WASSCE physics. This implies that irrespective of school location, students can do their best in physics examinations. The little difference

in the performance of students in urban and rural schools in physics may have occurred as a result of chance factors. This result agrees with the finding of Adebayo (2000) who found that there was no statistically significant difference in the performance of urban and rural students in physics. In addition, McCracken & Barcinas (2006) found that the location of a school whether in an urban or a rural area did not make any significant difference in the level of students' performance in physics.

Conclusion and Recommendations

Based on the result of the study, the researchers concluded that school location has influence on students' performance in mathematics but does not have significant influence on students' performance in physics. It is therefore recommended that:

1. School authorities should consider the school location as one of the determinants of students' performance in mathematics.
2. Extra effort should be made by mathematics teachers in urban schools in order to enable the students in urban schools measure up with their rural counterparts.
3. Physics teachers should endeavour to give students equal opportunity to learn physics irrespective of the school location.

References

Adebayo, O. A. (2000). Gender, environment and co-education as factors of performance in the ravens' standard progressive matrices. *Gombe Technical Education Journal, 1* (2), 27-29.

Adeoye, A. F. (2010). Impact of Systematic Assessment in Instruction on Secondary Students Physics Achievement at Cognitive level of Knowledge. *Eurasia J, Physics and Chem. Educ. 2* (1), 44-52.

Adetunji, A. O. (2007). Profile of human and ICT resources in mathematics. *Ebonyi Journal of Science Education (EJSE),* 2 (1), 97-104.

Agwagah, U. V. N. (2014). Aesthetic values of Mathematics. *Journal of Mathematical Association of Nigeria, 32* (1), 8-11.

Awogbemi, C. A., Oloda, F. S. S., & Alagbe, S. A. (2015). A Correlational Analysis of Students' Achievement in WASSCE and NECO (SSCE) Mathematics. *Journal of Research & Methords in Education, 2* (4), 14-21.

Bulus, N. K. (2008). A survey of problems of teaching and learning science and technology in rural environment in Sokoto state. *Sokoto Educational Review, 2* (1), 121-123.

Haller, E. J. & Virkler, S. J., (2007). Rural and non-rural differences in students' educational aspirations. *Journal of Research in Rural Education, 9*, 170-178.

Iyabo A. U. (2006). Comparative study of students' academic performance in rural and urban areas. *Journal of Educational Psychology, 51* (2), 16-18.

Iyortyer, J. N. (2004). The effects of school location and school type on students' achievement in mathematics. *International Journal of Environmental and science Education*, 3(1), 30-34.

Mbah, J. O. (2003). *Motivation for academic study scale*. Ibadan: Striling–Horden Publisher.

McCracken, J. D. & Barcinas, J. D. (2006). Differences between rural and urban schools, student characteristics, and students‟ aspirations in Ohio. *Journal of Research Rural Education, 7* (2), 29-40.

Mekonnen, S. (2014). Problems challenging the academic performance of physics students in higher governmental institutions in the case of Arbaminch, Wolayita Sodo, Hawassa and Dilla Universities, *Natural Science, 6* (3), 362–375.

Nwagbo, D. T. (2000). Factors influencing the performance and learning of physics among secondary school students in Nairobi, Kenya: *Kenyatta University College, Bureau of Education Research*, 38 (4) 324-329.

Ogbe, S. (2009). Development and validation of an affective behaviour assessment inventory for Anambra state secondary school's students. *International Journal of Professional Practice, 2* (4) 365-374

UNESCO. 2000. *World Declaration on Education for All*. Retrieved January 25, 2002, at*http://www.unesco.org/education/efa/ed_for_all/background/jomtien_declaration.shtml.*

Uzoechi, B. C., Kurumeh, M. S. & Azuka, B. E. (2013). Emotional Intelligence: A tool for improving the Academic Achievement of Secondary School Students in Mathematics. *Journal of Mathematical Science Education*, 2 (1) 220-231.

Weeks, J. R. (2010). Defining urban areas. Retrieved on May 26, 2017 from http://geography.sdsu.edu./Research/Project/IPC/publication/weeks-ch3.pdf.