Int. j. adv. multidisc. res. stud. 2023; 3(3):646-649

Received: 19-04-2023
Accepted: 29-05-2023

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Pragmatic Influential Effects of Students' Gender, School Location and School Type on Prediction Strength of Students' Learning Outcomes in Senior Secondary Schools

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Abstract

Previous studies emphasized the influence of gender, school location, and school type on students' academic learning success. Scholars are not in the same direction towards this; some support that the variables or predictors significantly impact students' learning outcomes, while others believe that those variables or predictors do not significantly affect student learning success. This study examines the effects of gender, school location, and school type on the prediction strength of students' learning outcomes in senior secondary schools. Structural Equation Modeling, called SEM, was used via SmartPLS to model the influence of predictor variables (Gender, school location, and school type) over predicted variables (students' learning outcomes). The study comprised 1,200 students that have written both Mock and WAEC examinations between the 2021/2022 academic sessions. The students' scores were collected from secondary schools in Ogun State with official permission from the Ministry. The approval from the Ministry and schools authenticated the validity of the scores. When the collected data was subjected to a reliability index, the result of 0.788 showed that the instrument was highly reliable. The collection and collation of the data took four weeks to complete. After this, the data were screened to remove any outliers that could affect the analysis and results of the findings. The findings showed that gender, school location and school type are not influencing variables in predicting students learning outcomes of secondary school students.

Keywords: Gender, School Location, School Type, Prediction, Learning Outcomes

Introduction

Scholars are concerned about the influence of gender, school location and type on students' performance in secondary schools. Literature delved deeply into the direct effect of gender, school location and school type on students' academic learning outcomes in science subjects. To some authors, gender, school location, and school type do not affect students' performance, while some authors emphasized its implication on students' diversity of knowledge expectations. According to Musibau & Johnson (2010) [7], school type, sex, and location had no significant influence on student's academic performance, while the work of KÕlÕç & Saglama (2010) [6] showed that gender has a significant effect on students' meaningful learning orientation and school type has a significant impact in students' rote learning orientation. The issue of gender, school location and school type effects on students' performance has very complex perceptions, which depend on the area, environment and understanding of how these factors can influence students' learning outcomes at various levels of education. When talking about students' performance, studies in the past observed that male students do achieve better than females in science subjects like biology, physics, and chemistry (Danmole, 1998; Novak & Mosunda, 1991). Aremu (1999) noted that boys are better than girls in Mathematics and other science subjects. Okwo and Otunba (2007) revealed that boys performed better than girls in physics essay tests.

Likewise, some researchers noted that urban students achieved more than rural students in science subjects. In addition, highly qualified teachers prefer to serve in urban schools rather than in rural areas; that is why we find more qualified teachers in urban schools than in rural schools. Bosede (2010) stated that sex (gender) and school location influence students' academic achievement; in the year 2002, Streitmatter reported that the number of girls in a single-sex classroom had a sense of ownership of their class, while the girls with other counterpart did not feel the same. Female students derived some benefits from being in a single-sex atmosphere. It is also noticed that students do face sexual harassment in a combined educational

environment (Guarisco, 2010). Alordiah *et al*. (2015) [3] observed that male students outperformed females, urban outperformed rural counterparts, and students of parents with high Social Economic Status (SES) performed better than students of parents with low SES across subjects in secondary schools. When predicting student learning outcomes, gender, school location, and school type may not directly influence the prediction strengths. For instance, Christain (2015) asserted that school location, gender and even school section insignificantly affect student learning outcomes prediction. Ajayi (2018) discarded that predictors like gender, school location and school type do not affect students' performances because the study showed that the predictors covered less than 1% of the variance in the academic performance of student success.
Therefore, the research question below guides the study.

At what rate do gender, school location, and school type influence the prediction strength of students' learning outcomes?

Related Literature
The following literature support and against the influence and effects of gender, school location and school type on students' academic success and achievements:
Musibau & Johnson (2010) [7] researched the influence of gender, school type and location on students' academic performance in Ekiti state secondary schools in Nigeria. The study's findings showed that the student's academic performance level was low. It was also revealed that school type, sex and location did not significantly influence students' academic performance. KÕlÕç & Saglama (2010) [6] used 565 secondary school students to investigate differences in learning outcomes of male and female students attending three different school types in Turkey. The results revealed that gender significantly affects students' meaningful learning orientation, and school type substantially impacts students' rote learning orientation.
Olutola (2017) [8] investigated how gender and school location could influence students' learning outcomes using the West African Senior School Certificate Examination multiple choice test in biology. The study, which consisted of 1450 secondary school students, showed that significant differences existed between students' performance on school location. Alordiah *et al*. (2015) [3] explored the influence of gender, school location, and socioeconomic status (SES) on students' academic achievement in mathematics. The study was an ex-post factor design in which the variables were not manipulated nor controlled. 1900 students were sampled using the stratified random sampling method, taking into account the study's variables. The study's findings indicated that pupils generally perform well in mathematics. Additionally, the results demonstrated that male students outperformed female students, urban students outperformed rural students, and students of high SES parents outperformed students of low SES parents. One suggestion was that teachers should consider the differences between male and female, urban and rural, and low SES and high SES when teaching mathematics.
Christain (2015) researched to underscore the extent the gender, school location, and school section to predict the rate of dropout of secondary school students. The result showed about 19% dropout rates concerning the predictor variables. However, these rates were found to be non-significant at the dichotomous levels of these variables. Regression analyses also show non-significant values in the extent to which the predictor variables relatively and jointly predict the school dropout rate. The study's implication revealed that neither school location, gender and even school section significantly affect the rate of school dropout in Rivers State. In line with this, a study carried out by Akinwunmi (2017) in Ekiti State of Nigeria, where the effects of gender and school location on reading comprehension in the English language in Ekiti State secondary school students' achievement demonstrated that there was no discernible difference between the experimental and control groups in terms of male and female achievement. According to the study, children in urban schools outperformed those in rural ones in reading comprehension tests that required them to infer word meanings between experimental and control groups. Based on the study's findings, it was advised that rural schools be upgraded in terms of social amenities that could support instruction. Students should be urged to read widely regardless of their gender or school location.
Ajayi (2018) examined gender, school location, age, and subject combination as predictors of secondary school students' mathematics academic performance in Taraba State, Nigeria. The sample for the study was 444 (238 male and 206 female) students out of 3,966 in 12 senior secondary schools in the Jalingo Education Zone of Taraba state (2016/2017 academic session). The study's findings revealed that all the predictors accounted for less than 1% of the variance of academic performance in mathematics. Therefore, it was recommended that negative beliefs and practices that tend inhibit performance in mathematics, based on these predictors, should be discarded. Similarly, Adesegun *et al*. (2016) [10] examined the relationship between school location and gender as correlates of students' academic achievement in Economics. The study was conducted in Ogun State, Nigeria, and involved 640 students selected via stratified random sampling. The results were collated and analyzed using Pearson Product Moment Correlation (PPMC) and Inferential statistics of the T-test. Findings showed that schools near border towns and places of economic interest distract students' attention. Therefore, the researchers concluded that schools should not be located close to areas of financial interest in the future.

Methods
The study used structural equation modelling (SEM) via SmartPLS to model the influence of predictor variables (Gender, school location, and school type) over predicted variables (students' learning outcomes). The study comprised 1,200 students that have written both Mock and WAEC examinations in english, mathematics and computer studies between the 2021/2022 academic sessions. The student's scores were collected from secondary schools in Ogun State with official permission from the Ministry. The Ministry's approval and school support authenticated the validity of the scores. When the collected data was subjected to a reliability index, the result of 0.788 showed that the instrument was highly reliable. The collection and collation of the data took four weeks to complete. After this, the data were screened to remove any outliers that could affect the analysis and results of the findings.

Results

To test whether gender, school location and school type significantly influence students' learning outcomes; SmartPLS statistics software (CFA) was used and presented below. It is also necessary to first ensure that the data meet some conditions before it can be used to test the formulated research question, such as the value of outer loading (which must be equal or greater than 0.7), discriminant validity, internal consistency of the model and convergent validity:

Table 1: Outer Loading Matrix

	Gender	Mock Examination	School Location	School Type	WAEC Examination
CmpSci		0.728			
Englang		0.890			
Gender	1.000				
Maths		0.897			
SchLoc			1.000		
SchType				1.000	
WaecAvS					1.000

It can be seen (from Table 1) that the value of the outer loadings for each of the indicator variables has met the required threshold of 0.7. Therefore, there is no need to remove any indicator variable.

Discriminant Validity

One of the major approaches to assess discriminant validity is using Fornell Larcker. The value of Fornell Larcker is the root of the average variance extracted (AVE). It is suggested that the square root of the AVE of each latent variable should be greater than the correlations among the latent variables (Fornell & Larcker, 1981).

Table 2: Fornell-Larcker criterion for discriminant validity

	Gender	Mock Examination	School Location	School Type	WAEC Examination
Gender	1.000				
Mock Examination	0.012	0.842			
School Location	0.905	-0.017	1.000		
School Type	0.767	-0.006	0.763	1.000	
WAEC Examination	0.010	0.799	-0.018	-0.008	1.000

Based on Table 2, the result indicates that discriminant validity is well established.

Internal Consistency (Construct reliability and validity)

Table 3: Composite Reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
Mock Examination	0.790	0.806	0.879

Internal consistency is assessed using Dhillon-Goldstein Rho or Composite Reliability (ρ). It measures the reliability of the indicators. The composite reliability value must be above 0.7 or higher for confirmatory research and above 0.6 for exploratory analysis (Wong, 2014). The result of composite reliability is shown in Table 3, which implies strong reliability. So, the values shown are all larger than 0.7, indicating that the reflective latent variable has been demonstrated to have a high internal consistency reliability.

Convergent Validity

Table 4: Showing convergent validity of the model

	The average variance extracted (AVE)
Mock Examination	0.709

The convergent validity of the measurement model can be assessed using Average Variance Extracted (AVE). AVE measures the level of variance captured by a construct versus the class due to measurement error. Values above 0.7 are considered very good, whereas 0.5 is acceptable (Davis, Bagozzi & Yi, 1989). The result of convergent validity is shown in Table 4. Based on the AVE result, the value for the variable (Mock Examination) is found to be greater than the acceptable threshold of 0.5, and thus, the measurement instrument is valid.

Structural Equation Modelling (Inner Model)

The subsequent evaluation is the inner model or the structural model. It specifies the relationships between the independent and dependent latent variables (Wong, 2014). The measurement of the PLS-SEM structural model can be assessed using the path coefficients and coefficient of determination (R^2).

Table 5: Path Coefficients

	Path coefficients
Gender -> Mock Examination	0.310
Gender -> WAEC Examination	-0.010
Mock Examination -> WAEC Examination	0.999
School Location -> Mock Examination	-0.299
School Location -> WAEC Examination	0.006
School Type -> Mock Examination	-0.028
School Type -> WAEC Examination	0.001

Based on the results from Table 5, the Mock Examination significantly had an impact on WAEC Examination with a 0.999 path coefficient far above all other paths in the model; gender has a 0.310 influence on Mock Examination, school location, and type 0.006 and 0.001 impact on WAEC Examination while gender (-0.010) has negative implications on WAEC Examination; school location (-0.299) and kind (-0.028) have negative impact on Mock Examination.

Table 6: R-Square Results

	R-square	R-square adjusted
Mock Examination	0.004	0.002
WAEC Examination	0.998	0.998

Based on Table 6, the result of statistical computation using SmartPLS 4.0 for the coefficient of determination for students' learning outcomes was 0.004, which can be interpreted that 0.4% of Mock Examinations can be explained by gender, school location and school type. WAEC Examination was 0.998, which can be construed that 99.8% of which WAEC Examination can be defined by Mock Examination, gender, school location, and school type, respectively.

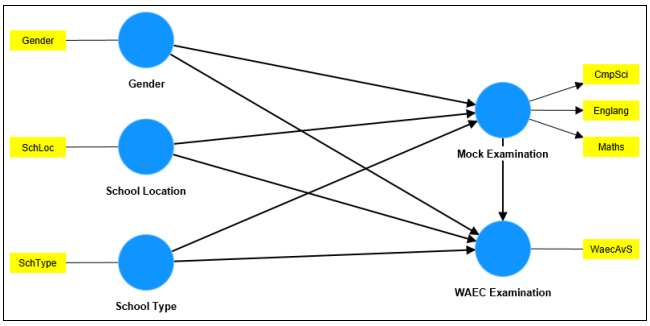

Fig 1: Final Model to test the hypothesis

The research question says, "At what rate do gender, school location, and school type influence the prediction strength of students' learning outcomes?"

The results show that gender was positively insignificantly (0.310) influenced by Mock Examination, while school location (-0.299) and school type (-0.028) were negatively insignificantly influenced by Mock Examination. On the contrary, Mock Examination has a powerful positive influence on WAEC Examination (.999) [See Table 5].

SmartPLS results with the final model (Fig 1) show that gender, school location, and school type did not significantly influence Mock examinations. The result implies that the predictors did not considerably affect the prediction strength of students' learning outcomes.

Discussion

Findings showed that gender, school location and school type are not influencing variables in predicting students learning outcomes of secondary school students. The result of this study implies that there is the possibility that gender, school location and school type sometimes influence students' performance. Still, in the case of prediction, they are not controlling variables to determine the student's learning outcomes. The finding of this study is in consonant with the results of Ajayi (2018), that discarded that predictors like gender, school location and school type do not affect students' performances because the study showed that the predictors accounted for less than 1% of the variance in the academic performance of student success. The work of Christian (2015) also supported this view when she said that neither school location, gender and even school section significantly affect student learning outcomes prediction.

Similarly, Musibau & Johnson (2010) [7] asserted that school type, sex and location had no significant influence on students' academic performance. Conversely, KÕlÕç & Saglama (2010) [6] showed that gender significantly affects students' meaningful learning orientation and school type substantially impacts students' rote learning orientation. However, the focus of their research is slightly different from the focus of the study.

Conclusion

It is observed in this study that there are so many factors that affect students' performances in both primary and secondary schools. Yet, in prediction, those factors might not necessarily influence the prediction strength of students' learning outcomes. Nevertheless, it is imperative to take note of situations where gender, school location and school type would be a threat to students learning success. So, teachers should consider the disparity between male/female, urban/rural and private/public when teaching. Hence, this study concluded that gender, school location, and school type do not influence student learning outcomes in secondary schools, especially in Ogun State of Nigeria.

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