Statistical Analysis to comparing the Average Difference of School Location on Students' Mathematics Achievement

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ABSTRACT:

- The researchers have used descriptive procedure through surveying, the aim of this study is to examine the average difference of school location on students' mathematics achievement of 406 students enrolled in various secondary schools in Libya. The stratified random sampling approach was used to sample 406 students such that the variables in the study were put into consideration. students' ages averaged between 16 and 19 years, located at three different locations in Libya, (five urban schools, three semi-urban schools, and five rural schools). Of this total, 29.6% of students were from urban institutions, 34.2% of students were from Semi-urban schools, and 36.2% of students were from rural schools. The students were asked to respond to the questionnaire items using a 5-point Likert scale. The data was analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0, to determine the average. The results of showed that there are significant differences in average of mathematics

achievement scores based on school location groups (urban schools; semi-urban schools; and rural schools), that the average score for students who are studying at urban schools was significantly different from students who are studying at semi-urban schools location and rural schools location·

Keywords: School location, Gender, academic achievement.

1. Introduction

The school environment can affect the behavior of teachers and students and their success in teaching and learning. Creemers (1994), when studying the effects of the classroom, noted that the school environment factors affect education at the classroom level. While can be found some evidence that schools with favorable environments are academically more successful with students, some authors have argued that conclusions about these relationships are premature due to the data on school-level environments and student outcomes have been confounded by some other issues.

Another factor that was found related significantly with student performance was the school locality. Mandeville and Liu (1997) indicated in their review of studies on the effects of school location on student achievement that in general, while students in the urban schools performed significantly better than students in rural and semi-urban schools. Oludipe (2012) and Kola and Taiwo (2013) observed in their various studies that there is no significant difference between male and female performance. Students attending rural schools face challenges of higher poverty than those attending urban schools.

1.1. Statement of the Problem

Gender and location have been identified as some of the factors that can influence students' academic achievement in mathematics. Previous studies on the influence of these variables on

academic achievement is not conclusive. While some of the findings of the studies discovered that, there is a significant influence of these variables on students' academic achievement. Some studies equally discovered that these variables do not significantly influence students' academic achievement. There is need to actually find out the influence of gender and school location on students' academic achievement in mathematics.

The statement of the problem of this study is put in question form as, what is the influence of gender and school location on students' academic achievement in mathematics.

1.2. Purpose of the study

The main purpose of the study is to find out the influence of gender and location on students' academic achievement in mathematics.

1.3. The specific purposes are to:

1. Find out the academic achievement of students in mathematics.

2. Assess the difference in students' academic achievement in mathematics with respect to gender.

3. Determine the difference in students' academic achievement in mathematics with respect to school location.

1.4. Research Questions

1. What is the academic achievement of students' in mathematics?

2. Is there any difference in students' academic achievement in mathematics with respect to their gender?

3. Is there any difference in students' academic achievement in mathematics with respect to school location?

1.5. Research Questions

The following research questions guided the study:

1. What is the academic achievement of students' in mathematics?

2. Is there any difference in students' academic achievement in mathematics with respect to their gender?

3. Is there any difference in students' academic achievement in mathematics with respect to school location?

1.6 Research Hypotheses

The following hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the academic achievement of students' in mathematics with respect to gender.

2. There is no significant difference in the academic achievement of students in mathematics with respect to school location.

1.7. Significance of the Study

The study will provide insights to the curriculum developers, teachers, students, counsellors, and policy makers regarding the influence that gender and school location can have on students' academic achievement in mathematics. The findings of the study will necessitate the stakeholders to advice on what best can be done so that these factors can help to improve student's achievement in mathematics.

The findings of the study will add to empirical data bank on the influence of gender, school location on students' academic achievement in mathematics.

2. Research Design

The study was an ex-post factor design in which the variables were not manipulated nor controlled. It focused on gender, school location and the academic achievement of students' in mathematics. The dependent variable was students' academic achievement in mathematics. The independent variables were gender and school location.

2.1 Research Methodology

The target population consisted of first, second and third grade students enrolled in various secondary schools in Libya, the population of these schools is around 2300 students, students' ages averaged between 16 and 19 years, located at three different locations in Libya, (five urban schools, three semi-urban schools, and five rural schools). Although the researcher distributed the questionnaires to a sample consisting of 750 students, a total of 406 students responded these questionnaires. Data were analyzed using descriptive statistics of mean and standard deviation (SD) was used to answer the research questions while the analysis of variance (ANOVA) statistical tools was used to test the hypotheses at 0.05 level of significant($\alpha = 0.05$).

3.   Results and Discussion

One-way analysis of variance technique (one-way ANOVA) test using SPSS 25.0 computer software package were run to determine whether there were any differences in the student's achievement in mathematics based on school's location.

In this study the researcher used one-way analysis of variance techniques (one-way ANOVA) test due to there are more than two groups in schools location (Pallant, 2010).

3.1 sample of students used in the study

The stratified random sampling approach was used to sample out 406 students such that the variables in the study were put into consideration. This is shown in table 1.

Table 1: Sample of students used in the study.

Variable		No. of Students	Percentage (%)
Gender	**Male**	175	43.1
	Female	231	56.9
	Total	406	100
School location	**Urban**	139	34.2
	Semi-Urban	120	29.6
	Rural	147	36.2
	Total	406	100
Students Grade	**First Grade**	057	14.0
	Second Grade	181	44.6
	Third Grade	168	41.4
	Total	406	100
Age	**<16**	026	06.4
	16 - 17	242	59.6
	>17	138	34.0
	Total	406	100

The demographic characteristics of students are shown in Table 2.

Table 2: Cross Tabulation of Student demographic

	Age	Urban		Semi-Urban		Rural		Total
		Male	**Female**	**Male**	**Female**	**Male**	**Female**	
	< 16	1	6	0	0	0	8	15
First Grade	16 – 17	12	14	0	0	5	4	35
	>17	2	2	0	0	2	1	7
	< 16	0	0	0	2	0	5	7
Second Grade	16 – 17	6	11	37	28	16	40	138
	>17	1	7	10	4	7	6	35
	< 16	0	0	0	0	0	0	0
Third Grade	16 – 17	6	6	10	17	7	18	64
	>17	26	20	11	20	16	12	105
Total		68	71	54	66	53	94	406

3.2 Research Question one

What is the academic achievement of students in mathematics?

Table 3: Descriptive statistics of students' Academic Achievement in Mathematics

No. of students	Minimum	Maximum	Mean	SD
406	1	5	2.93	0.51

In table 3 the data showed the mean score performance of the students in mathematics as 2.93 with a standard deviation of 0.51. This is above the level of 2.5. Hence, the mean score is above average. The minimum level the students got in the Scores of Mathematical was 1 while the maximum level was 5

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3.3 Research Question Two

Is there any difference in the students' academic achievement in mathematics with respect to gender?

Table 4: Z-test on differences in academic achievement with respect to Gender

Gender	N	Mean	SD	d.f.	Z	p-value	Decision
Male	175	3.12	1.03				
				404	3.38	0.001	Reject H_0
Female	231	2.78	0.99				

The data in table 4 showed that the mean score of male students is 3.12 (SD=1.03), while that of female students is 2.78 (SD=0.99). The mean performance of male students is above the benchmark of 2.5 while that of female students and male students are above 2.5. Hence, the male students performed better than the female students in the Scores of Mathematical.

3.3.1 Hypothesis one

There is no significant difference in the academic achievement of students in mathematics with respect to their gender.

As shown in table 4, the computed Z-value of 3.38 was found significant at p=0.001 at df=404 is equally significant at 0.05 since p<0.05. The hypothesis is rejected. In other words, there is a significant difference in the academic achievement of students in mathematics with respect to gender. Therefore, the mean difference,

which is in favour of male, is significant. It indicated that the male students performed better than the female students.

3.4. Research Question three

Is there any difference between the students' academic achievement in mathematics with respect to school location?

Table 5: ANOVA based Differences in academic achievement with respect to School location

School location groups were compared using one-way ANOVA with post-hoc test to explore the impact of school location on student's achievement in mathematics. School location was divided into three groups according to the location of schools (urban schools' location; semi-urban schools' location; and rural schools' location).

Table 5. Differences in mean of mathematics achievement based on school location

	Sum of Squares	d.f	Mean Square	F	P-value.
Between Groups	19.682	2	9.841	9.780	0.001
Within Groups	405.520	403	1.006		
Total	425.202	405			

The one-way analysis of variance (ANOVA) table as shown in Table 5, indicated that there was a statistically significant difference at the $p<0.05$ level in students' achievement in mathematics for the three school location groups.

3.4.1 Hypothesis two

The hypothesis is rejected. In other words, there is a significant difference in the academic achievement of students in mathematics with respect to school's location. The actual difference in mean scores between the groups was (eta squared =.0.046) would be considered a fairly medium effect size.

The magnitude of the differences between groups proposed by Cohen, (1988) which are 0.01=small effect, 0.06=moderate effect, 0.14=large effect. The effect size eta squared for ANOVA test calculated by using the formula as follows:

$$\text{eta squared} = \frac{\text{Sum of squares between groups}}{\text{Total sum of squares}} \text{ (Cohen, 1988).}$$

Post-hoc comparisons using the Tukey HSD test showed that the mean score for students who are studying at urban schools (M=2.773, SD=0.991) was significantly different from students who are studying at semi-urban schools location (M=3.266, SD=1.002) and rural schools location (M=2.795, SD=1.014). Students who are studying at semi-urban schools' location did not differ significantly from students who are studying at rural schools' location.

Also, there were statistically significant differences at the p < 0.05 level in teaching practices and methods for the three school's location groups. Post-hoc comparisons showed that the urban school's location was significantly different from the semi-urban schools' location and rural schools' location. The actual difference in the mean scores between the three groups was 0.097 would be considered a fairly

large. As well as there were statistically significant differences at the p < 0.05 level in student's strategy learning for the three school's location groups. Post-hoc comparisons showed that the urban school's location was significantly different from the semi-urban schools' location. While rural schools' location did not differ significantly from either urban school's location or semi-urban schools·

4. Discussion and Conclusion

The result of the study designates that the students have a mean achievement in mathematics. The result also showed that male students performed better than female students did significantly. This is consistent with the findings of Onuekwusi and Ogomaka (2013), and Amoo (2013), but disagreed with the findings of Kola and Taiwo (2013) who observed that there is no significant difference between male and female performance.

Findings from the study showed that there is significant difference between the performance of Urban students and Semi-Urban, also there is significant difference between the performance of Rural students and Semi-Urban students. However, there is no significant difference between the performance of Urban and Rural.

This result disagrees with that of Amoo (2013), Onuekwusi and Ogomaka (2013), but negate that of Obioma (1985).

In addition, the results of One-way ANOVA table showed that there are significant differences in mean of mathematics achievement scores based on school location groups.

T-tests and one-way analysis of variance ANOVA table were run to determine whether there are any differences in students' achievement across school location.

One-way ANOVA table, indicated that there was a statistically significant difference in students achievement in mathematics for the three school location groups (urban schools; semi-urban schools; and rural schools), that the mean score for students who are studying at urban schools was significantly different from students who are studying at semi-urban schools location and rural schools location, these results consistent with the finding of Chepete (2008), Ghagar, Othman, and Mohammadpour (2011), and Mandeville and Liu (1997) who indicated that students in the urban schools performed significantly better than students in rural and semi-urban schools. This finding was expected because urban students are more advantaged than rural students in terms of having access to more educational resources and family background.

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