

FACTOR DETERMINANTS OF FEMALE SECONDARY SCHOOL STUDENTS' PERFORMANCE IN MATHEMATICS

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E-mail: profsam8@gmail.com, Bintumusty5@gmail.com**ABSTRACT**

This study aimed to determine factors that affect female secondary school students' mathematics performance in Damaturu Local Government Area of Yobe State. Causal-comparative research design was adopted to investigate the problem. The subject for the study comprised of three hundred and twelve (312) female students drawn from the target population, using simple random sampling procedure. The instruments used for data collection include; achievement test, and questionnaire. From the analysis of data, the findings indicated that the variation in female students' mathematics performance test was accounted by variability in socio-economic variables (education, occupation and income) of parents. Also, the variation in female students' mathematics performance was accounted by variability in both out of school and in school factors like, home related factors, personal factors and in school related factors. Hence, there is need to arbitrate the problem specifically; School administrators should be coached to handle the problem (factors) that affect female students' mathematics performance by acting as facilitator/initiator with parents, stakeholders, concerned bodies and students.

Keywords: *Mathematics; Performance; Assessment; Factors; Female Students*

INTRODUCTION

In the events of scientific and technological advancement in the world mathematics plays a crucial role. According to Krutteskii (1976) as cited in Benbow & Arjmand (2012), emphasized that in daily life and in most human activities the knowledge of mathematics was important to understand the comprised world and much with the newly developing information technology. The strong background in mathematics was very vital, the development of sciences has to become more mathematical method and mathematical systems were penetrating everywhere. Studies conducted by Kwesiga (2002); Odaga & Henveld (1995) tried to pinpoint factors that influence equal educational opportunity specifically for female students.

Leach (2004); Kwesiga (2002); Unterhalter (2006) found that girls were falling behind boys in all three indicators of educational participation access (numbers enrolling), retention (length of time spent in school), and achievement (exam passes, especially in mathematics and science) Fangcrind & Saha (1989) as cited in Leach (2004). According to UNESCO (2000), achievement was related to wide range of variables among this the impact of school policies in areas such as retention and principal leadership, family, and community factors which includes parental education and involvement.

Many researchers have carried out studies on variables as predictors of students' mathematics achievement. For example, a study conducted by Hyde,

Fennema, and Lamon (1990) reveals that females tend to do better in computation/calculation, and there is no significant gender difference in understanding mathematics skills/concepts. Kimball (1999) in his study shows that females tend to get better grades than other counter part (males) in mathematics achievement. Mekasha (2000) in his study revealed that factors that affect the academic achievement of female students could be lack of study time and lack of encouragement both at home and at school, which highly influences mathematics achievement of students since it consumes much time to study and master concepts in mathematics.

In most research, socioeconomic status has been measured as a combination of parents' education, parents' occupational prestige, and family income Mayer & Jencks (1989); White (1982). The term "socio economic status" (SES) is used by sociologists to mean an individual or Family's overall rank in the social and economic hierarchy (Mayer & Jencks, 1989).

One of the theories that deal with why students leave the school is a "pull out theory" which refers to factors that makes students to measure the costs and benefits of staying in schools.

Nuri (2008) sounds that employment opportunity, family liabilities and other conditions that attract students to leave schools were "pull out" factor. Burstein (1992) in a comparative study of factors influencing mathematics achievement found out that there is a direct link between students' attitudes towards mathematics and students outcomes.

A number of studies showed that students' performance/achievement is correlated with parents' educational attainment (Coleman, 1996). For example, a study by Campell, Hombo, & Mazzeo (2000) reveals that students whose parents had less school education obtained smaller grades in mathematics than those whose parents had higher levels of education. According to Eamon (2005), socio-economic status is determined

to be a predictor of mathematics achievement and he found that parents/ family's annual income, level of education, and occupational prestige) has a vital potential in influencing students' mathematics achievement scores. Family background characteristics have a considerable influence on participation and achievement in mathematics education. Children from poor families have less access to learning materials and educational activities, and are less likely to complete high schools Oakes (1990); Sanabary (1993) as cited in Alemayehu (2006) also added that family's socio economic status influence their daughters' education through financial and moral support for own schooling and indirectly through a set of variables that include the daughter's physical, cognitive, and psychological development as well as her motivation, aspiration, and expectations.

Personal factors play a vital role in students' mathematics achievement apart from schools and out school factors. Mathematics education needs highly motivated students because it requires logical reasoning, problem solving and marking interpretations (Saritas and Akdemir, 2009). Several studies have been carried out between self-esteem and academic achievement of students. For instance, a study conducted by Chang (1976) as cited in Solomon (1999) found that grades are positively related or correlated with self -esteem.

According to Moe (2005), school facilities such as safety toilet, pedagogical center, teachers and guidance related factors have a great effect on students' achievement particularly female students. Tilaye (1999) in her study indicated that out of school factors such as quarrelsomeness of the home environment between mother, father and children create emotional disturbance among students in the form of anxiety, tensions which generally affect their concentration in class works.

Genet (1991) hinted that Girls performance was poor in mathematics and science in national examination. According to Fennenma (1980), the entire field of mathematics might be enriched if more young females were given the opportunity to grow into mathematical skills and able to play a vital role in every educational activities.

Therefore, this study intends to assess those factors that affect mathematics achievement of female students in secondary schools in Damaturu L.G.A of Yobe State, and ultimately tries to proffer possible solutions that would increase their performance in mathematics in general.

Purpose of the Study

The purpose of this study was to investigate factors that affect female secondary school students' mathematics achievement in Damaturu L.G.A. of Yobe State. Hence, this study intends to achieve the following specific objectives:

1. To examine the extent to which socio-economic status such as occupation, education and income of parents determine female secondary school students' mathematics achievement.
2. To examine the importance of personal factors or individual factors such as motivation, aspiration, self-esteem and expectation of female secondary school students on their mathematics achievement.
3. To identify the extent to which school factors determine female secondary school students' performance in mathematics
4. To identify the extent to which home related factors (out of school factors) affect female secondary school students' mathematics achievement.

Research Questions

This study sought answers to the following questions:

- i. To what extent socio-economic status such as occupation, education and income of parents determine female secondary school students' mathematics achievement?
- ii. What are the home related factors (out of school factors) that determine female secondary school students' performance in mathematics?
- iii. Is there any significant relation between school factors and female secondary school students' performance in mathematics?
- iv. Is there any significant relation between individual factors (personal factors) such as motivation, aspiration, self-esteem and expectation of female secondary school students on their mathematics achievement?

METHODOLOGY

This study adopted causal-comparative research design. This design was chosen in order to assess the relative importance of independent variable as the causes of variation or elicit changes in the dependent variable. Also to discover the possible causes of a phenomenon by comparing a group of subjects in whom the phenomenon is present with another group of subjects in whom the phenomenon is not present. Michal (2004) in his study explained that causal variables compete with each other to explain variation in an outcome variable. A good contender in this competition was an independent variable that was strongly correlated with the dependent variable.

Total number of 1431 female secondary school students in both Public/ Private schools in Damaturu L.G.A were the target population. The sample size was determined by using Krejcie & Morgan's (1970) as cited in Yonas (2010) formula of determining sample size for

research work or activities. By applying the formula, three hundred and twelve (312) female students were randomly selected and involved in this study which accounts 21.8% of the total expected maximum sample size. Therefore, it is easy to predict about the target population.

The instruments used for data collection include; questionnaire and achievement test. These instruments were designed by researcher to elicit relevant information for the study under investigation. The questionnaire was also validated by experts/specialists (i.e. three mathematics teachers and two science educators in the field of education and was recommended to be used to capture the data for this study.

The researcher administered questionnaire and achievement test to respondents' face-to-face fashion. The researcher then waited and collected the filled out questionnaire and achievement test. The descriptive statistics were used to describe characteristics of the sample based on the demographic survey. Data collected were analyzed using SPSS. Quantitative data analysis involved multiple regressions and Variation of dependent variable in the variability of independent variables was also used to explain the coefficient of determination.

RESULTS

The results of data analysis are presented in accordance with the stated research questions as shown in the following tables:

Table 1: Home Background and Parents' Educational Status

| Variables | Categories /Groups | Freq | Percentage (%) |
|-----------------------------|---------------------------|------|----------------|
| Home Background | With my father and mother | 137 | 43.8 |
| | With only my father | 18 | 5.8 |
| | With only my mother | 40 | 12.7 |
| | With my Husband | 15 | 4.8 |
| | With my uncle | 92 | 29.4 |
| | With my Guardian | 10 | 3.5 |
| | Total | | 312 |
| Father's educational status | Uneducated | 29 | 9.3 |
| | Primary (FSLC) | 77 | 24.7 |
| | Secondary (SSCE) | 84 | 26.9 |
| | NCE and above | 122 | 39.1 |
| | Total | | 312 |
| Mother's educational status | Uneducated | 51 | 16.4 |
| | Primary (FSLC) | 90 | 28.8 |
| | Secondary (SSCE) | 70 | 22.4 |
| | NCE and above | 101 | 32.4 |
| | Total | | 312 |

As it could be observed from the home background of the respondents, Table 1 above showed

that (43.8%) of respondents were living with their father and mother while (5.8%) of respondents lived with their

father only. (12.7%) of them said they lived with their mother only (4.8%) of participant lived with their husband and (29.5%) of the respondents lived with their uncle and (3.5%) of the respondents lived with their guardian. It could also be observed that (9.3%) of

respondents' fathers were uneducated (illiterate) and (90.7%) of respondents parents were educated (literate), while (16.4%) of mothers were uneducated (illiterate) and (83.6%) of respondents mother were educated (literate).

Table 2: Parents' Occupation/Profession and Daily Income Earning

| Variables | Categories/Groups | Freq. | Percentage (%) |
|--------------------------------|-------------------|------------|----------------|
| Parents' occupation/profession | Employee | 135 | 43.3 |
| | Unskilled laborer | 27 | 8.7 |
| | Trader | 45 | 14.4 |
| | Others | 105 | 33.6 |
| | Total | 312 | 100 |
| Parents' Daily income earning | < 600 | 80 | 25.6 |
| | 600-1400 | 75 | 24 |
| | 1400 -2500 | 86 | 27.6 |
| | > 2600 | 66 | 21.2 |
| | No Response | 5 | 1.6 |
| | Total | 312 | 100 |

In respect of parents' occupation or profession, it could be observed from Table 2 above that (43.3%) of parents were employees and (14.4%) of

parents were traders while (8.7%) of parents were daily unskilled laborers. While the remaining respondents of (33.6%) of parents were indicated as others.

Table 3: The Mean (X) of Achievement Test of Parents' Educational Status.

| Variables | Categories | Mean(X) |
|-----------------------------|--------------------------|---------|
| Father's educational status | Uneducated | 31.94 |
| | Primary (FSLC) | 37.63 |
| | Secondary (SSCE) | 43.27 |
| | NCE/Equivalent and above | 47.15 |
| Mother's educational status | Uneducated | 31.60 |
| | Primary (FSLC) | 37.0 |
| | Secondary (SSCE) | 42.11 |
| | NCE and above | 49.47 |

The analysis of table 3 above revealed that female students, whose fathers are uneducated

(illiterate) have the mean score of 31.94 and those who completed primary school have the mean score of 37.63

on achievement test. Similarly, those fathers who completed secondary school scored 43.27 and female students whose fathers were NCE holders and above scored 47.15. In addition to fathers' educational status, if one observes mothers' educational status, the findings indicated that those female students who have uneducated (illiterate) mothers scored 31.60 and female

students with those mothers who completed primary scored 37.00 on mathematics achievement test. More so, female students whose mothers completed secondary school scored 42.11 on mathematics achievement test. Finally, female students whose mothers had NCE and above, scored 49.47 on achievement test.

Table 4: The Mean (X) of Achievement Test of Parents' Occupation and Daily Income

| Variables | Categories/Groups | Mean (X) |
|--------------------------------|-------------------|----------|
| Parents' occupation/profession | Employee | 42.52 |
| | Unskilled laborer | 37.94 |
| | Traders | 42.52 |
| Parents' Daily income earning | < 600 | 33.83 |
| | 600-1400 | 35.89 |
| | 1400-2500 | 42.97 |
| | > 2600 | 50.93 |

Keys: < = less than, > = greater than

Similarly, table 4 above indicated that, female student whose parents' were employed scored an average of 42.52 on mathematics achievement test and female students whose parents' were traders scored 39.54 on mathematics achievement test. While female students from unskilled daily laborer families scored an average of 37.94 on mathematics achievement test.

Also, table 4 indicated that female students from parents whose daily income was less than 600

Naira per day scored an average of 33.83 and female students whose parent's daily income was from 600 to 1400 Naira scored 35.89 on achievement test. Female students whose parents' daily income was from 1400 to 2500 Naira scored 42.97 on achievement test. Finally, female students whose parents' daily income was greater than 2600 Naira had the mean score of 50.93 on achievement test

Table 5: Result of Regression of Independent Variables on Achievement Test

| Variables | Regression weight | Standard error | Beta coefficient | t | p |
|------------------------------------------|-------------------|----------------|------------------|-------|------|
| Individual factors (y ₁) | 0.11 | 0.02 | 0.25 | 6.17 | 0.00 |
| Home Related Factors (y ₂) | -0.12 | 0.02 | -0.26 | -4.94 | 0.00 |
| School Related Factors (y ₃) | -0.21 | 0.03 | -0.43 | -7.32 | 0.00 |

Constant = 52.11, P<0.05, R= 0.821, R²= 0.674

From the data analysis in table 5, the raw score regression of the estimation model equation is given as: $= 52.11 + 0.11y_1 - 0.12y_2 - 0.21y_3$. Table 5 showed that the independent variables (individual /personal factors, home related factors and school related factors) had a significant contribution to female students' achievement test in mathematics in Damaturu secondary schools. 34 Multiple correlations ($R_{yx123} = 0.821$.) which indicate strong relation between independent out of school variables (home related) factors, in school and personal factors and dependent Y variable achievement test. Bluman (1995) stated that if there is strong relation between the dependent and independent variables then the correlation coefficient r will be close to $+1$. Therefore, personal factors, home related (out of school) factors and school related factors were strongly correlated with female students' mathematics achievement in Damaturu Secondary Schools. This could also be observed from coefficient of multiple determination that ($R^2 = 0.674$), 67.4% of the variation in female students mathematics achievement test at Damaturu Secondary Schools was accounted by variability in three of the predictors personal factor, home related (out of school) factors and school related factors as a group.

The above multiple regressions result in Table 5 for every increment in personal factors like attitude, motivations self-esteem and of female students was resulted in mathematics score by 0.11. That is if female students show a positive attitude or motivation to study mathematics subject their achievement test score would increase by 0.11 grades. Whereas, for every increments of home related factors female students' mathematics achievement test score would decrease by 0.12 grades. That is if the parents of female students are not willing to facilitate their daughters' to attend and study mathematics, it could be resulted in decreasing their daughters' mathematics achievement test grade by 0.12 in Damaturu Secondary Schools.

DISCUSSION

So far, this study was conducted to assess the factors affecting female students' mathematics performance. The findings of data analysis showed that the socio economic status such as education, occupation or profession, and daily income of parents was the most dominant out of school variable to affect female secondary school students' mathematics performance. Particularly it could be seen that female students who have well educated mothers scored better than females of illiterate mothers. This present findings is in line with that of Eamon (2005) who hinted that the parents level of income and education was correlated with students' mathematics achievement scores.

Also, this study agreed with Sanabary (1993) as cited in Alemayehu (2006) who revealed that, family's socio economic status influences their daughters' education through financial and moral support for own schooling and indirectly through a set of variables that include the daughter's physical, cognitive, and psychological development as well as her motivation, aspiration, and expectations.

Also, female students those, who had educated (literate) mothers, score better than those with illiterate mothers. More specifically, mothers' education was slightly affecting female students' mathematics achievement in Damaturu Secondary Schools than fathers' education. It was seen from the findings that females whose mothers are quite educated scored more than those who have illiterate fathers. Judging from the mean scores, (47.15) of female students' whose fathers were NCE holders and female students (49.47) whose mothers were NCE holders and above on grades in mathematics achievement test. It could be observed that mothers' education is slightly affecting female students' mathematics achievement in Secondary Schools.

From the multiple regressions analysis of dependent variable (mathematics achievement test) on independent variables such as, personal factors, home

related factors and school related factors was indicated that personal factors was positively related to female students mathematics achievement whereas, home related factors and school related factors was related negatively to female students mathematics achievement by their high grade of 0.11 and low grade of 0.12.

CONCLUSIONS

The purpose of this study was to assess both in school and out of school factors that affect female students' mathematics performance in Damaturu Secondary Schools. Consequently, the findings indicated that socio economic status (education, and daily income) of parents' and unpleasant home environment was out of school factors that significantly affect female secondary school students' mathematics performance.

Likewise, shortage of school library, pedagogical center, unsafe school environment like unavailability of water latrines, latrines, shortage of well-qualified and experienced teachers and unorganized instructional leadership and unavailability of guidance and counseling were in school factors that significantly affect female students' mathematics performance at Damaturu Secondary Schools. Furthermore, female students' positive self-esteem, positive attitude or motivation to study or learn mathematics subject were personal factors that significantly affect their mathematics achievement in Secondary Schools.

RECOMMENDATIONS

In respect of the findings in this study, the following recommendations are made:

- i. School administrators should encourage students to partake in co-curricular activities such as Mathematics club, natural science club, and extra moral classes. This would attract and motivate female students toward the subject and to solve the problems adequately.

- ii. School administrators should always alert the parents about the importance of mathematics to other science and technology fields. Consequently, this would smooth the relationship between parents and their daughters and facilitate attractive environment to study and solve mathematical problems at home.

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