

# **Original Research Article**

## **Students' Mathematics Interest Development in Ghana the Role of Parental Involvements and Agents of student Motivation.**

### **Abstract**

Parental influence on the student's mathematics interest development process cannot be neglected if student achievement in mathematics is connected to interest in mathematics. The advances in research made regarding parental association to their children interest in terms of achievement, attitude and beliefs proves that parental values and beliefs system shapes students values and performance. The study which aims at exploring the effect of parent's level of education, Parent's mathematics Interest ,as well as determining the role parental motivation play on student's mathematics interest development. The study as part of it aim is to determine the effect of student's agent of motivation on student interest in mathematics.1263 respondent were selected randomly from ten randomly selected secondary schools in Ghana. Questionnaires were used to investigate parental involvement in student's interest in mathematics.Chi-square test of independence was used to investigate the effect of parental factors on student's interest. The findings suggest that student interest in mathematics is influenced by the parent's educational background, parent's interest in mathematics, and the agent of student motivation but independent on parental motivation. The study concluded that parental involvement is very keen in the interest development process and when taken seriously it will translate to improve performance.

Keywords: Parents interest, Parental influence, Mathematics interest, students interest ,Ghana,.

### **1. Introduction**

In this section we review brief background on effect of parental influence on student interest in mathematics. This study recognize the theories of parental involvement as paramount in the development of student academic interest with parent participation affecting students learning and create better foundation for future (Epstein, 1991; Hong & Ho, 2005).The study by (Fan, 2001) exposed some parental involvement factors such as communication and educational aspiration as influence student academic achievement.

The study of parental association to their children interest has been taken by many early authors in the field. The socialization model of parental effects on achievement, attitude and belief by (Frome & Eccles, 1998; Simpkins, Fredricks, & Eccles, 2012; Wigfield & Eccles, 1994) suggested that parental values and beliefs system shapes students' own values and performance. It has been proved that promotive parenting strategies and parent efficacy may encourage as well as providing successful developmental path way for the children(Bandura, 1997; Eccles, Wigfield, & Harold, 1993). The theoretical assumptions were based upon by (Harackiewicz, Rozek, & Hulleman, 2012) during their theory-based interventional study aiming at helping parents to convey the importance of mathematics and science to their secondary school children. It was interesting to find that the intervention had an indirect effect on students' perceived value for mathematics and science through mothers' perceived utility value and conversations. Although longitudinal studies reveal relations between parents' value of mathematics and students' mathematics interest(A. C. Frenzel, Goetz, Pekrun, & Watt, 2010) it has been suggested that parents' domain-specific value motivates students extrinsically (Lorenz & Wild, 2009). The study by (Hong & Ho, 2005) affirms that parental involvement plays significant role in student academic success and it is a priority in American education. In addition to interest development, parental involvement in children education has been found to positively influence student academic achievement(Paratore, Melzi, & Krol-Sinclair, 1999).

Self-Determination Theory suggests that intrinsic motivation such as interest is needed to enhance students' internal needs for competence, autonomy and relatedness in learning situations is supported and facilitated by supportive behaviors'(Deci & Ryan, 1985). This theory has provoked many researches in most part of the world. The study by (Ing, 2013) demonstrated the theory of self-determination and concluded that as parent exhibit positive beliefs and expectation as well as they encourage their children influence their mathematical achievement.(Aunola, Viljaranta, Lehtinen, & Nurmi, 2013a) showed that high levels of actual maternal support of their children's needs for autonomy and relatedness predicted mathematics interest of their children. There are mixed findings concerning the role of student gender in perceptions of parental support: some studies suggest higher levels of perceived parental support for girls(Rice,

Barth, Guadagno, Smith, & McCallum, 2012) whereas (Malecki & Demaray, 2003) did not find gender-related differences in perceived parental support of secondary students.

## 1.1 Interest Development Process.

The theorist of interest in recent times suggests that students' interest develops in statistics and for this context mathematics as the students gain expertise in the area of mathematics. The views expressed earlier has further been affirmed by (Alexander, 2003) in the model of Domain learning that students will develop interest in a given subject or object will increase as the knowledge of the person in that field increase. It was further suggested by the model that the very beginning of the learning process is characterized by less individual interest and that as the learning progress the interest level increases by introduction of situational interest. As the student progress from less knowledgeable to come expertise of the subject or object of interest. This developmental process will rely greatly on individual interest for student motivation with less emphasis on situational interest. It is further deduced that there exist relationship between student's individual interest and situational interest with individual interest emerging from situational interest (Hidi & Renninger, 2006). The study by Silvia (2001) explained the transformation situational interest to individual emerging interest and finally individual enduring interest. The argument was further expanded with proposal that, student interest will occur when the student resolves the cognitive conflict emanated from the student's interaction with object or subject of interest. The points made by (Krapp, 2002) suggest that students will develop new interest as they increased differentiation of an aspect of existing interest. The interest development review further suggests that interest also develops as learners are aroused to resolve the conflict created by some collating variables such as novelty, uncertainty and complexity. Despite the wide range of research on parental involvement around the globe, more of such studies are required and moreover country specific results are needed to be able to make localized decision to ascertain it global conformity.

The role parents play in their children Mathematics development process cannot be under estimated. Studies in Mathematics have suggested that parents' educational background

influence their children Mathematics achievement. The higher the parents level of education the earlier their children are introduced to mathematics(Arthur, Aseidu-Addo, & Annan, 2015; Bicer, Capraro, & Capraro, 2009). Further studies in Mathematics education has indicated that the parents level of education and involvement plays significant role in their children's early and later development in Mathematics achievement (Bicer et al., 2009; Farooq, Chaudhry, Shafiq, & Berhanu, 2011; Martha, 2009).The studies also indicated that parent with low educational background does not imply they don't care about their children' Mathematics achievement and interest but due to their limitation in education, they feel helpless to help their children in solving problem related to Mathematics.(Bicer et al., 2009; Xiang, McBride, & Bruene, 2003)

## **2. Research Objective**

The study aimed at the following objectives

1. To explore the effect of parent's level of education on student interest in mathematics
2. Examine the effect of Parent's mathematics Interest on Student Interest in Mathematics.
3. Understand the role of parent's motivation on student's interest in mathematics.
4. Determine the Effects of Students Agents of Motivation on Interest In Mathematics.

## **3. Research Questions**

The study presented the following research questions to help addressed the stated objectives. The questions posed include

1. Does the data collected suggest that parent's level of education significantly influence student's interest in mathematics?
2. Is there any are reason to suggest that student interest in mathematics is influenced by the parent's interest in mathematics.
3. Can parent's motivation of the student's influence the student's interest in mathematics?
4. Does the student interest in mathematics depend on the agents of students motivation?

## **4. Research Hypothesis**

The study proposed the following hypothesis to help answer the research question hence to specifically address the objectives stated.

H1: Students interest in mathematics is independent on the level of education of the parents of the student.

H2: Student interest in mathematics is independent on the parent interest in mathematics

H3: Student interest in mathematics is independent of the parent's motivation on the students.

H4: Student interest in mathematics is independent on the student agents of motivation in their pursuit of the course.

## 5. Research Methodology

In this study, quantitative descriptive non-parametric chi-square test of independent was deployed to assess the effect of parental influence on the student interest in mathematics. The study as well used the descriptive statistical technique such as percentages and embedded in tables as part of its statistical analysis. The population from which the participants were selected includes all senior high school students in the Ashanti region of Ghana. The study begun with the random selection of ten senior high schools from the region and secondly selection of participants from the selected schools. A total of one thousand five hundred students were selected from the schools to participate in the study but only one thousand two hundred and sixty three were fit for the purpose of analysis representing 84.2% response rate. The study used instrument developed by researchers which forms part of a bigger research instrument. One hundred level hundred undergraduate students were used for the pre-test of the instrument. The data analysis was performed using spss version 16 for both descriptive and inferential analysis. The descriptive statistics was used to ascertain the participant's demographic characteristics and their views of the parent's interest and motivation in mathematics. The study further analyzed the effects of parental characteristics variables on student interest using chi-square test of independent at 5% level of significance.

## 6. Results and Findings

### Demographic Characteristics

#### Table 1

146 *Gender of Participants*

| CATEGORIES               | Frequency | Percent | Valid Percent |
|--------------------------|-----------|---------|---------------|
| Male                     | 551       | 43.6    | 44            |
| Female                   | 700       | 55.4    | 56            |
| Total Valid Participants | 1251      | 99      | 100           |
| Non Response             | 12        | 1       |               |
| Total Participants       | 1263      | 100     |               |

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148 Table 2

149 *Age Categories of Participants*

| CATEGORIES               | Frequency | Percent | Valid Percent |
|--------------------------|-----------|---------|---------------|
| 14 – 16                  | 238       | 18.8    | 19            |
| 17 – 19                  | 566       | 44.8    | 45.1          |
| 20 – 22                  | 294       | 23.3    | 23.4          |
| 23 and above             | 156       | 12.4    | 12.4          |
| Total Valid Participants | 1254      | 99.3    | 100           |
| Non Response             | 9         | 0.7     |               |
| Total Participants       | 1263      | 100     |               |

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151 Table 3

152 *Participants Views about their Basic School Attended*

| CATEGORIES               | Frequency | Percent | Valid Percent |
|--------------------------|-----------|---------|---------------|
| Public School            | 692       | 54.8    | 56.8          |
| Private School           | 526       | 41.6    | 43.2          |
| Total Valid Participants | 1218      | 96.4    | 100           |
| Non Response             | 45        | 3.6     |               |
| Total Participants       | 1263      | 100     |               |

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154 Table 4

155 *Participants Views about their Parents Highest Qualification*

| RESPONSE CATEGORIES      | Frequency | Percent | Valid Percent |
|--------------------------|-----------|---------|---------------|
| Uneducated               | 139       | 11      | 11.1          |
| 'O' or 'A' Level         | 303       | 24      | 24.3          |
| Graduate                 | 419       | 33.2    | 33.6          |
| Others                   | 386       | 30.6    | 31            |
| Total Valid Participants | 1247      | 98.7    | 100           |

|                    |      |     |
|--------------------|------|-----|
| Non Response       | 16   | 1.3 |
| Total Participants | 1263 | 100 |

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Table 5

*Participants Views about their Parents Interest in Mathematics*

| RESPONSE CATEGORIES      | Frequency | Percent | Valid Percent |
|--------------------------|-----------|---------|---------------|
| YES                      | 649       | 51.4    | 52.2          |
| NO                       | 116       | 9.2     | 9.3           |
| DON'T KNOW               | 479       | 37.9    | 38.5          |
| Total Valid Participants | 1244      | 98.5    | 100           |
| Non Response             | 19        | 1.5     |               |
| Total Participants       | 1263      | 100     |               |

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Table 6

*Participants Views about their Parents Motivation to Study Mathematics.*

| RESPONSE CATEGORIES      | Frequency | Percent | Valid Percent |
|--------------------------|-----------|---------|---------------|
| YES                      | 910       | 72.1    | 72.5          |
| NO                       | 345       | 27.3    | 27.5          |
| Total Valid Participants | 1255      | 99.4    | 100           |
| Non Response             | 8         | 0.6     |               |
| Total Participants       | 1263      | 100     |               |

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Table 7

*Effect of Parents Educational Background on Student Interest In Mathematics*

|                   |     | Parents Educational Background |                  |          |        | Total | Test Statistics | P-Value |
|-------------------|-----|--------------------------------|------------------|----------|--------|-------|-----------------|---------|
|                   |     | Uneducated                     | 'O' or 'A' Level | Graduate | Others |       |                 |         |
| STUDENTS INTEREST | YES | 87                             | 250              | 307      | 334    | 978   | 42.16           | 0.001   |
|                   | NO  | 52                             | 53               | 110      | 49     | 264   |                 |         |
| Total             |     | 139                            | 303              | 417      | 383    | 1242  |                 |         |

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160 The effect of parents' educational background on student interest in mathematics was  
 161 investigated to ascertain its influence on mathematics interest. The study categorized the  
 162 education background into four ranging from uneducated, ordinary and advanced level  
 163 certificates, graduate and others. Out of the 139 participants whose parents were uneducated, 87

of them said they are interested in mathematics while 52 of the respondent were not interested in mathematics. From the 303 participants whose parents have ordinary and advanced level certificates, 250 of the participants were interested in mathematics while 53 were not interested in mathematics. Also from the 417 participants whose parents were graduate from tertiary institutions, 307 of the participant were interested in mathematics while 110 were not interested in mathematics but out of the 383 participants whose parents level of education fell on the others categories 334 of the participants were interested in mathematics while 49 of them were not interested in mathematics. The study further investigated the effect of parental educational background on the student interest in mathematics. The results from the study reveals that, student interest in mathematics depends on the level of education of any of the parent with  $p$ -value  $< 0.05$ . The results further explains that although the student in Mathematics interest is dependent upon the level of education of the respondent yet in some cases the students may not have their parents educated at all or to some level but may be interested in Mathematics. This suggest that parents with high level of education will turn to influence their children better (Arthur et al., 2015; Bicer et al., 2009). The reasons for which parental educational background may influences the students interest in mathematics may include the fact that, parents with high educational background turn to instill academic discipline in their children at their early stages in their academic career. Moreover, parents with higher academic background will turn to instill positive Mathematics feeling and attitude as compared to parents who may not have been educated. The study further suggests that parents with higher educational background will turn to instill Mathematics interest in their children as compared to children whose parents educational background is lower.

Table 8.0  
*Effect of Parents Interest on Student Interest In Mathematics*

|                   |     | Parents Interest In Mathematics |     |            | Total | Test Statistics | P-Value |
|-------------------|-----|---------------------------------|-----|------------|-------|-----------------|---------|
|                   |     | YES                             | NO  | DON'T KNOW |       |                 |         |
| STUDENTS INTEREST | YES | 527                             | 78  | 370        | 975   | 11.85           | 0.003   |
|                   | NO  | 121                             | 38  | 103        | 262   |                 |         |
| Total             |     | 648                             | 116 | 473        | 1237  |                 |         |

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The parent interest in mathematics is a very important factor that needs consideration and how the like or dislike of mathematics by parents influence their interest in mathematics. The study constructed an item in the instrument that seeks to know whether the participant's parents are interested in mathematics. They participant were made to respond to category range of YES, NO or DON'T KNOW whether parents are interested in mathematics or not. Out of the 1237 valid respondents, 648,116 and 473 participant responded that YES their parent like mathematics, NO their parent don't like mathematics and DON'T KNOW whether their parent like mathematics or not respectively. The further explain that, out of the 648 participant whose parents are interested in mathematics 527 were also interested in mathematics and121 were not interested in mathematics. Furthermore, out of the 116 participant who responded that their parents don't like mathematics had 78 of the participant interested in mathematics while 38 of them were not. Also from the 473 participants who did not know whether or not their parents were interested in mathematics, 370 were interested in mathematics and 103 were not interested in mathematics. The study explains further by the chi-square test of independence that, student interest in mathematics is affected by the parent's interest in mathematics with p-vale< 0.05 as shown in the Table 8.0.The result showed consistency with the study by (Frenzel, Goetz, & Pekrun, 2010) that parental value for mathematics influence student interest in mathematics since parents domain value motivates students extrinsically(Lorenz & Wild, 2009).

Table 9  
*Effect of Parental Motivation on Student Interest In Mathematics*

|                      |       | Parental Motivation |           | Total | Test Statistics | P-Value |
|----------------------|-------|---------------------|-----------|-------|-----------------|---------|
| STUDENTS<br>INTEREST | YES   | YES<br>712          | NO<br>270 | 982   | 0.051           | 0.821   |
|                      | NO    | 191                 | 75        | 266   |                 |         |
|                      | Total | 903                 | 345       | 1248  |                 |         |

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207 The effect of parental motivation in the search of factors that contribute to building student

208 interest cannot be over looked. The study tries to investigate the effect of parental motivation to

209 study mathematics on the student interest in mathematics. From the results available from the

210 survey, 712 participants who were interested in mathematics were motivated by their parent to

211 study mathematics while 191 participants whose parent motivates them to study mathematics are

212 not interested in mathematics. The study further informs that from the 345 participants whose

213 parent does not motivates them to study mathematics, 270 of the participant are interested in

214 mathematics and 75 of the participant were not interested in mathematics. To answer the

215 question of whether parental motivation influence student interest in mathematics, the study used

216 chi-square test of independence to investigate whether student interest in mathematics is

217 influenced by the parental motivation. The study reveals that the student interest in mathematics

218 is influenced by the parental motivation demonstrated. With p-value < 0.05, the hypothesis that

219 student interest is independent on the parental motivation was rejected. This result disagree with

220 the study (Adedeji Tella, 2007) that parental motivation significantly influence gender academic

221 success.

222 The result of the present study was supported by (Ing, 2013) findings that parental demonstration

223 of positive beliefs and expectations and encouragement given by the parent will influence their

224 children's interest in mathematics. The findings were further strengthened by the study (Aunola

et al., 2013a) and specifically affirmed that maternal motivation for children' need for autonomy and relatedness is a predictor of student interest in mathematics.

Table 10

*Effects of Students Agents of Motivation on Interest in Mathematics*

|                   |     | Agent of Students Motivation |          |         | Total | Test Statistics | P-Value |
|-------------------|-----|------------------------------|----------|---------|-------|-----------------|---------|
| STUDENTS INTEREST |     | Parent                       | Teachers | Friends |       |                 |         |
|                   | YES | 277                          | 548      | 141     | 966   | 80.99           | 0.001   |
|                   | NO  | 72                           | 92       | 103     | 267   |                 |         |
| Total             |     | 349                          | 640      | 244     | 1233  |                 |         |

The student needs motivation in other to ignite their self-determination. The quest to understand the role of the agents of motivation namely: The parent, the teacher and the Friends was investigated to ascertain the effect of this agent of motivation on the student interest in mathematics. From randomly selected valid participant of 1233. Out of 349 participants who were motivated by the parents, 277 of the participant who were of the views that, parents are their agent of motivation were also interested in mathematics while 72 of them did not like mathematics. Out of the 640 participants who saw teachers as their agent of motivation, 548 of the participant were interested in mathematics while 92 were not interested in mathematics. From the 244 participant who saw Friends as their agent of motivation found 141 participants being interested in mathematics while 103 participant not being interested in mathematics .The chi-square test of independence to investigate the effect of these agent of motivation on the student interest development process was found to be significant with p-value <0.05 meaning that, the student interest in mathematics depends on these agents of motivation. The study also further extends that, the teacher remain the greater agent of motivation with the peers being the next agent of student motivation. The study however found the parent factor as the least of the agents

of student motivation. This results although is partly consistent with the findings of Siana et al (1998) that this study rated friends as second agent of motivation and further disagree with the same Siana et al (1998) that parent are more important in contribution to student academic success. This result state empirically that the teacher remain the greatest motivator to the Ghanaian student interest in mathematics.

## 7. Conclusion

The parental involvement in student interest in mathematics development process has been empirically proven by this study to be very essential. The study finally concluded that student interest in mathematics will be enhanced significantly and dependent on the parent interest in mathematics, parent's educational background and the agent of student motivation .The finding which is consistent with the study (A Tella, 2007) that parental motivation significantly influence gender academic success. Parents are to note that, demonstration of positive beliefs and encouragement has influence on their children's interest in mathematics (Ing, 2013).The findings were further strengthened by the study (Aunola, Viljaranta, Lehtinen, & Nurmi, 2013b) and specifically affirmed that maternal motivation for children' need for autonomy and relatedness is a predictor of student interest in mathematics. The relationships established should be fundamental element in the student interest development process since the parents forms integral parts of their children's development.

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