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Impact of Intrinsic Motivation on Junior Secondary School Students' Academic Performance in Mathematics despite Family Background in Ohimini Local Government Area of Benue State, Nigeria

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Abstract

This study employs an ex-post facto research design to examine the relationship between intrinsic motivation to learn mathematics and Junior Secondary School students' academic performance in mathematics despite family background in Ohimini Local Government Area of Benue State, Nigeria. Four research questions were raised to guide the study and one hypothesis was formulated and tested at 0.05 level of significance. The sample

comprises 219 Junior Secondary School students in Ohimini Local Government Area. A modified instrument tagged Intrinsic Motivation for Mathematics Academic Performance despite Family Background Questionnaire (IMMAPDFBQ) was used to gather data. Data collected were analyzed using percentage, mean, standard deviation and t-test statistics techniques. The findings revealed that the parents' educational level fall between secondary school level and ND/NCE, the parents engage much in farming and earn between twenty to fifty thousand naira (₦20,000.00 - ₦50,000.00) monthly. The result also indicates high cluster mean of 3.15 (above the decision benchmark of 2.50) for students' intrinsic motivation to learn mathematics implying the students' high intrinsic motivation to learn mathematics despite their lower class family background. The students' performance in mathematics was high ($\bar{x} = 53.03$; $SD = 4.25$). The test of hypothesis indicated there was a strong positive significant relationship between the students' intrinsic motivation to learn mathematics and their academic performance in mathematics. These findings have shown that with intrinsic motivation, it is possible for a student to set a high academic standard in mathematics as an objective and achieve it irrespective of the good or poor background and environment in which he finds himself.

Keywords: Intrinsic Motivation, Family Background, Socio-Economic Status, Resilience, Academic Tenacity, Mathematics Education, Basic Education

Introduction

Every nation of the world is desirous of achieving high level of technological development in order to achieve the collective prosperity and wellbeing of their citizenry. This underpins the necessity for the development of mathematical knowledge which is the basis for technological advancement. Mathematics is the science of numbers applied in proffering solution to problems. Awofala (2014) asserts that mathematics involves magnitudes and numbers, quantity and space' together with logical reasoning and judgment. Mukhtar in Gimba and Agwagah (2012) defines mathematics as the science of structure, order, number, space, and quantity whose relationship revolves around the elementary practice of counting, measuring and describing the shapes of objects. As a field of study and a discipline, mathematics involves the use of figures, symbols and statements in carrying out analytical procedures in problem situations in arriving at definite logical conclusions and by extension solutions to problems. Mathematics is a language through which scientists expressed their ideas, laws and principles (Gimba & Agwagah, 2012).

Mathematical processes pervade the entire spectrum of human existence from the point of conception to the point of death and burial. The importance of mathematics in our everyday life as related to personal/family budget and spending, schooling and education, and the various professional/occupational engagements cannot be overemphasized. Awofala (2014) itemized the universal applicability of mathematics in our everyday life that is at home, when travelling, at the store, at school, at work, and at pastimes. Mathematics is as old as man, as it can be seen in the various works of art, instruments, weapons, houses, palaces, ships and more of the pre-history and the medieval periods. A case in point is the construction of pyramids in the early civilization of Egypt which was a great mathematical/engineering accomplishment. According to Awofala, Lawani and Adeyemi (2020) mathematics is as old as mankind in that God being the greatest mathematician ever framed the world with the idea of mathematics and as such

mathematics plays an indispensable role in the lives of people and the world at large, for a person can go on well in life without being literate but cannot go on well without being numerate. The subject mathematics is the bedrock of all technological advancements for example space exploration, computer technology, motor vehicles, electrical and electronic equipment, dams and irrigation systems and more are all products of series of mathematical operations. Azuka in Gimba and Agwagah (2012) sees mathematics as the bedrock of science, technology and modern development. Azuka is of the opinion that the survival of a nation hinges on technological development which is only achievable through effective teaching and learning of mathematics. In view of this, the National Policy on Education (2004) accords mathematics a high place of prominence in the nation's educational policy. It is one of the core subjects to be studied at the primary, junior and senior secondary school levels as stated in the policy.

In spite of its importance, mathematics involves steps and principles which sometimes present it as a difficult subject. Mathematics which involves rigorous processes and elaborate computations is often considered to be highly abstract and students tend to develop a phobia for it (Awofala, 2017; Awofala & Odogwu, 2017). The fear for mathematics developed by many students keeps them away from understanding the importance and roles of mathematics. Many Nigerian students seem not to develop and demonstrate a deep understanding of and capacity to do mathematics (Awofala, 2017). The anxiety regarding mathematics is not unconnected to the reduced level of motivation in learning mathematics and motivation is considered an important key to achieving success in any human learning endeavor (Awofala & Falolu, 2017 in Awofala, Lawani & Adeyemi, 2020).

Ogunmoyero and Omasheye (2012) assert that human beings are characterized by tendencies towards learning and thus, human beings are naturally teachable and curious. In spite of this, there is usually the need to motivate people for achieving success in learning. According to Glynn and Koballa (2006), motivation is an internal state which involves the arousal, direction and sustenance of students' behaviors. This explains why students work hard to achieve high academic performance in science subjects in particular mathematics. It also explains the depth and length of time involved in such endeavors and the feelings and emotions applied in achieving success in such subjects. Glynn and Koballa (2006) explain that 'motivation to learn' encompasses students' resolve to attach meaning and value to an academic activity with a view to obtaining the benefits accruing from such activity. In this regard, students need to be motivated and inspired in order to arouse and sustain their interests in learning mathematics. This is necessary in view of the abstractions and complexities involved in mathematical operations. However, motivation arises as a result of drive towards a goal. The major dimensions of motivational constructs involved in the study of motivation to learn science subjects (and by extension mathematics), consist of intrinsic motivation, extrinsic motivation, goal orientation, self-determination, self-efficacy and assessment anxiety (Glynn & Koballa, 2006).

Intrinsic motivation usually occurs as a result of a student's internal drive for superior academic performance while extrinsic motivation occurs as a response to given external stimuli e.g. award, peer recognition and acceptance, teachers' praises and other

positive reinforcements (Glynn & Koballa, 2006). Intrinsic motivation involves a student's pursuit of personal interests and the 'exercise of capabilities' and this engenders deep internal satisfaction and joy (Glynn & Koballa, 2006). Schiefele (1991) defines intrinsic motivation as an inner force that motivates students to engage in academic activities, because they are interested in learning and they enjoy the learning process as well. Harter (1978) explained that intrinsic motivation is the true drive in human nature, which drives individuals to search for and to face new challenges as the students' abilities are put to the test and they are eager to learn even when there are no external rewards to be won. Therefore with intrinsic dimension of motivation one can achieve high academic performance in mathematics without minding the external factors that could militate the academic performance.

Another area of contention is the issue of family background in academic performance in mathematics. Family background refers to all the conditions and circumstances in the family which influence the child physically, intellectually and emotionally (Muola, 2010). Coleman (1997) proposed that family influence can be separated into components such as socio-economic, human and social capital. Socio-economic status of parents means educational level of parents, the income of family, environment in the family and standard of living of the family (Amarveer & Jai, 2014). Socio-economic background of parents plays an important role in the academic achievement and social behavior of the students. Ibalaoro (2012) indicated that socio-economic status of family is based on family income, parental educational level and parental occupation. Chidubem and Carol (2018) explained that socio-economic status of a family is usually linked with family's income, parental education level, parent's occupation and social status among their kindred and even at global level. However, this concept (parental socio-economic status) does not necessarily suggest the dominance of family background over the success in academic performance in mathematics because family background is external factor to student's intrinsic motivation to learn mathematics.

Studies have found out that parent's socio-economic background has positive relationship with students' academic performance (Ogunsola & Adewale, 2012) as rich parents could provide financial, moral and social supports for their children. According to Harrison, Anthony and Melaye (2019), the family is always the first point of contact for the child, it lays the foundation of education before the child goes to school and the personality that the child takes to school is determined by the home, therefore, it is not out of place to imagine that parents' socio-economic background can have possible effects on the academic performance of children in school. Whatsoever affect the development environment of children would possibly affect their education. Onocha (1985) found out that a child from a well learned family with high socio-economic status is more likely to perform better than a child from an illiterate family. This is because the child from an educated family has a lot of support such as a decent and good environment for academic work, parental support and guidance, enough textual and academic materials and decent feeding as he or she is likely to be sent to a good school where well experienced teachers will handle his/her subjects (Harrison, Anthony & Melaye, 2019). Osunloye (2008) says parent's social status in terms of educational attainment and occupation also play significant role in children's academic performance. Parent's socio-economic background

affects student's school achievement (Adekeyi, 2002; Ogunsola & Adewale, 2012) as rich parents could afford high-fee for schools, textbooks, extra lessons, good feeding and upkeep money at school and domestic servants at home to relieve the students of house chores; while students from poor homes take up part-time jobs to supplement their income while in school. However, other studies (Udida, Ukwayi & Ogodo in Isidore, Adelaye, Adubasim & Adim, 2014) argued that children from rich families record poor academic performance in schools. Dweck, Walton & Cohen (2014) explained that it is undoubtedly important to provide students with material and human resources, such as a safe learning environment, committed and effective teachers, and a solid curriculum. However, addressing the psychology of the student is also critical and can galvanize students to seize the opportunities for learning that exist in their school environment' which mostly is the case of students from good socio-economic background who most times get over excited with learning opportunities provided for them and underlook effort towards good academic performance in mathematics.

Weirich, Cannice & Koontz (2008) refers to motivation as a general term applying to the entire class of drives, desires, needs, wishes and similar forces. Moula (2010) observes that motivation is one of the factors that contribute to academic success. Though it has been posited by previous literature (Ogunsola & Adewale, 2012; Osunloye, 2008) that parent's socio-economic background influences children's academic performance in school; however, self-motivation can aid or hamper these variables' relationship because a student from a good parental socio-economic background may not achieve high academic performance if he/she is not determined to work hard. This is in line with the findings of Udida, Ukwayi and Ogodo in Isidore, Adelaye, Adubasim and Adim (2014) who discovered that students from rich homes perform poorly academically. c discovered that parent's poor socio-economic background had insignificant relationship with child's academic performance and self-motivation (intrinsic motivation) moderates the relationship between parent's poor socio-economic background and children's academic performance as child's self-motivation had significant influence on child's academic performance. Osuafor and Okonkwo (2013) reveals that family background which including family structure, parental occupation and parental education level had no significant influence on students' academic achievement. The implication of this is that parents of this age are more aware and serious about giving their children the best education they can irrespective of their own shortcomings.

As noted in the above studies, it is not out of place to say that both students from poor and good socio-economic background can perform well academically if they work hard or record poor academic performance if they are not determined to work hard. Therefore, high academic performance in mathematics is achievable despite students' good or poor family background. Good academic performance in mathematics could majorly depend on the student's intrinsic motivation to learn mathematics and unwillingness to yield (i.e. academic tenacity) on learning mathematics and not dominantly on family background of the student.

According to Dweck, Walton and Cohen (2014) academic tenacity is about working hard, and working smart, for a long time. More specifically, academic tenacity is

about the mindsets and skills that allow students to look beyond short-term concerns to longer-term or higher-order goals, and withstand challenges and setbacks (like poor family background) to persevere toward these goals. In other words this implies that student's willingness to learn mathematics comes from within and not wholly on external factors such as family background of the student.

Students with a growth mindset will often perceive challenge or setback in an entirely different light as an opportunity to learn, as a result they respond with constructive thoughts (for example "Maybe I need to change my strategy or try harder"), feelings (such as the excitement of a challenge), and behavior (persistence) - this mindset allows students to transcend momentary setbacks (such as poor family background) to focus on long-term learning (Dweck, Walton & Cohen, 2014). Dweck, Walton and Cohen (2014) further explained that in our pursuit of educational reform, something essential has been missing which is the psychology of the student. Psychological factors often called motivational or non-cognitive factors can matter even more than cognitive factors for students' academic performance. These may include students' beliefs about themselves, their feelings about school, or their habits of self-control. Student with these motivational factors could do well academically not minding the setback that may befall him/her from the family background, for when these non-cognitive factors are in place, students will look and be motivated (Dweck, Walton & Cohen, 2014) without been hampered by the family background.

It is in the light of this that these frank realities that this present study seek to investigate the impact of intrinsic motivation on junior secondary school students' academic performance in mathematics despite family background in Ohimini Local Government Area of Benue state, Nigeria.

Statement of the Problem

Failure in mathematics is a major problem for educators, teachers and school administrations, and parents because it slows down the academic/intellectual development of students. Also at the senior secondary school level, this problem prevents students from gaining admission into tertiary institutions. One of the major causes of failure in mathematics at the junior secondary school level is attributable to lack of adequate motivation and interest to learn the subject bearing in mind the rigorous and abstract nature of mathematical operations. It has also been observed that family background is a factor influencing students' success in academic performance (success in mathematics).

However, more recent studies have unveiled that despite socio-economic background, some students are intrinsically boosting their performance in mathematics. This unique dynamics has great implications for mathematics education at the junior secondary school level, particularly in Ohimini Local Government Area of Benue State, where the socio-economic demographics are rather homogenous. This study, therefore, sets out to investigate the impact of intrinsic motivation on junior secondary school students' academic performance in mathematics despite family background in Ohimini Local Government Area of Benue State, Nigeria.

Literature Review

Theoretical Frame Work

Theoretical framework is a model showing how a set of theories within the discipline relate to a given study. According to Abah (2020), theoretical framework is a treatise on educational theories, psychological theories of learning, theoretical models, and traditional paradigms related to the topic under consideration. The theoretical framework of this study will be based on Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being (Richard & Edward, 2000).

Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being (Richard & Edward, 2000).

According to Richard and Edward (2000) Self-Determination Theory is an approach to human motivation and personality that uses traditional empirical methods while employing an organismic meta-theory that highlights the importance of humans' evolved inner resources for personality development and behavioral self-regulation. Thus, its arena is the investigation of people's inherent growth tendencies and innate psychological needs that are the basis for their self-motivation and personality integration, as well as for the conditions that foster those positive processes (Richard & Edward, 2000). Inductively, using the empirical process, Richard and Edward have identified three of such needs which are the needs for competence, relatedness and autonomy that appear to be essential for facilitating optimal functioning of the natural propensities for growth and integration (Richard & Edward, 2000).

Motivation as explained by Richard and Edward concerns energy, direction, persistence and all aspects of activation and intention and because of the importance of motivation it is therefore of preeminent concern to those in roles such as manager, teachers, religious leader, coach, health care provider, and parent that involve mobilizing others to act.

Richard and Edward see intrinsic motivation as phenomenon which reflects the positive potential of human nature, the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn. Developmentalists acknowledge that from the time of birth, children, in their healthiest states, are active, inquisitive, curious, and playful, even in the absence of specific rewards (Harter as cited in Richard & Edward, 2000). Richard and Edward continued that the construct of intrinsic motivation describes this natural inclination toward assimilation, mastery, spontaneous interest, and exploration that is so essential to cognitive and social development and that represents a principal source of enjoyment and vitality throughout life.

For Richard and Edward the contexts of autonomy, competence, and relatedness were found to foster greater internalization (interest from within). According to Deci in Shroff, Vogel, Coombes and Lee (2007), competence involves understanding how to attain various external and internal outcomes and being efficacious in performing the requisite actions and that the need for relatedness involves developing secure and satisfying

connections with others in one's social milieu. The major implication of Richard's and Edward's theory is that learning (in particular mathematics) can greatly depend on and speeded by student's intrinsic motivation.

The tenets of the Self-Determination Theory has indicated that students' intrinsic motivation stand to boost their academic performance in mathematics of junior secondary school students in Ohimini Local Government Area of Benue state, Nigeria. The intrinsic motivation helps the students to continue striving for mathematical knowledge without minding all external obstacles like family background.

The components of the Self-Determination Theory such as Energy shows students' ability to produce a desired amount of an effect (self-efficacy) in learning mathematics minding not the pressures of poor family background or over confidence of rich family background. Agreeing with this fact Awofala, Lawani and Adeyemi (2020) added that Self-efficacy refers to the students' self-confidence about their ability to achieve high performance in a subject (in preference mathematics). Direction as the component of Self-Determination Theory displays students' focus on academic performance in mathematics that cannot be shifted no matter the shortcoming of the student's parents. In support of this, direction in students help them (Onyekwere, Okoro & Eugene, 2018) to engage in both mental and physical activities holistically, making them remain highly focused throughout the learning activities with clearly defined goals and relax mindset without fear. The component Persistency, reveals students' academic tenacity in pursuing high academic performance in mathematics which is not easily drag down by student's family socio-economic status. Academic tenacity is about the students' skills that allow him/her to withstand challenges and setbacks to persevere toward the goals (Dweck, Walton & Cohen, 2014). Autonomy and Competency are other key components of the Self-Determination Theory that explain how students grow independently in learning and the mastery of these learning experiences respectively. Autonomy and Competency as projected by Richard and Edward (2000) facilitate optimal functioning of the natural propensities for growth and integration, as well as for constructive social development and personal well-being. Richard and Edward added that Autonomy and Competency enhance the natural activity and curiosity of human nature referred to as intrinsic motivation.

Conceptual Framework

Intrinsic Motivation and Mathematics Learning

The concept of intrinsic motivation according to Shroff, Vogel, Coombes and Lee (2007) originated with William James who used the terms "interest and instincts of constructiveness" to explain different types of human behaviour. "Interest" and "instincts of constructiveness" reflect the concepts of self-determination and competence, which today define intrinsic motivation.

Intrinsic motivation as defined by researchers is the inner force that drives students towards achieving a specific academic goal. Intrinsic motivation according to Awofala, Lawani and Olayinka (2020) usually occurs as a result of a student's internal drive for superior academic performance. Schiefele (1991) defines intrinsic motivation as an

inner force that motivates students to engage in academic activities, because they are interested in learning and they enjoy the learning process as well. Harter (1978) explained that intrinsic motivation is the true drive in human nature, which drives individuals to search for and to face new challenges as the students' abilities are put to the test and they are eager to learn even when there are no external rewards to be won. Richard and Edward (2000) define intrinsic motivation as phenomenon which reflects the positive potential of human nature, the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn.

Intrinsic motivated students are driven by specific objective to achieve some level of academic performance. Csikszentmihalyi and Nakamura as cited in Onyekwere, Okoro and Eugene (2018) stated that intrinsically motivated students possess the following characteristics: They engage in both mental and physical activities holistically, they remain highly focused throughout these activities with clearly defined goals, they are self-critical, they self-reflect on their own actions realistically, and they are usually relaxed and not afraid to fail during learning. A research study done by Stipek in Onyekwere, Okoro and Eugene (2018) concluded that intrinsically motivated students learn independently and always choose to do challenging tasks. They persevere to complete the tasks they have undertaken. They integrate the knowledge acquired in school with their experiences gained from outside school. They often ask questions to broaden their knowledge and learn regardless of any external push factors or help from teachers, and they take pride in their work and express positive emotions during the learning process. Highly intrinsically motivated students are able to learn new concepts successfully and show better understanding of the subject matter (Stipek in Onyekwere, Okoro and Eugene, 2018).

Students' educational goal, specified objective (for example graduating with good result), drives towards academic performance and desires for specific skills, activity and knowledge could be the greater causes of intrinsic motivation in students. Glynn and Koballa (2006) assert that intrinsic motivation involves a student's pursuit of personal interests and the exercise of capabilities and this engenders deep internal satisfaction and joy. An activity is intrinsically motivating if it provides a challenge to the participant and if it stimulates curiosity in the student (Shroff, Vogel, Coombes & Lee, 2007).

Observing from the characteristics of intrinsically motivated students, it is not out of place to say that intrinsic motivation in students can provides the following importance (Shroff, Vogel, Coombes & Lee, 2007):

- i. It helps the student to remain focus in learning until the inner desires are achieved.
- ii. It helps the student to withstand challenges and setback in learning processes.
- iii. It increases curiosity in students which compels the students to cover wider learning contents on their own.
- iv. It makes teaching and learning easier as students are eager to understand the concepts.

According to James and Brad (2014) intrinsic motivation in students can be sustained through experimental learning. The implication of this is when students continue to practice some learning experiences it become interesting, real to them and also part of them which enhance intrinsic motivation in the students.

Family Background as (Non-)Determinant of Students' Academic Performance in Mathematics

It is widely reported that parents' socio-economic background affects student's academic performance (Adekeyi, 2002; Ogunsola & Adewale, 2012) as rich parents could afford high-fee for schools, textbooks, extra lessons, good feeding and upkeep money at school and domestic servants at home to relieve the students of house chores; while students from poor homes take up part-time jobs to supplement their income while in school. According to Ipaye in Isidore, Adelaye, Adubasim and Adim (2014), many male students on campus from poor economic background took part-time jobs and entrepreneurship to support themselves and even their younger ones; while the female ones took to prostitution, the act took much of their time and were left with less time for studies. Such students neither have access to extra learning opportunities like extra-moral lessons and road-side computer training, nor can they afford instructional materials in their chosen careers, and these led to poor academic performance.

However, other studies (Udida, Ukwai & Ogodo in Isidore, Adelaye, Adubasim and Adim, 2014) are of different opinion that poor academic performance in schools is recorded more with students coming from good family background. Dweck, Walton and Cohen (2014) explained that providing educational resources for children's education is highly important but the opportunity of many good resources around children could over-excite them beyond focusing on high academic performance. Osuafor and Okonkwo (2013) explained further that family background had no significant influence on students' academic achievement as parents of this age are more aware and serious about giving their children the best education they can irrespective of their own shortcomings. This line of thought on family background as non-determinant of students' academic performance in mathematics education are covered exhaustively in Abah (2017) and Abah, Awen and Kuse (2018).

Empirical Studies

Onyekwere, Okoro and Eugene (2018) investigated influence of extrinsic and intrinsic motivation on pupils' academic performance in mathematics. Descriptive research design was adopted for the study. A Sample size of 200 primary six pupils was selected for the study in Owerri Education zone of Imo State. Simple random sampling technique was used in selecting four schools out of the nine schools. The instruments used for data collection was Academic Motivation Scale and Mathematics Achievement Test. The instruments have reliability co-efficient of 0.89 and 0.92 determined using tests-retest method. Data generated was analyzed with the aid SPSS. Inferential statistics of t-test and Pearson Product Moment Correlation were used to test the hypotheses at 0.05 level of significance. The study concludes that motivation improves academic performance of the pupils and there is gender difference in motivation type and academic performance. However, the study of Onyekwere, Okoro and Eugene (2018) differs from this present

study in dimensions of motivation. This present study is not concerned majorly with extrinsic motivation and the population of interest of the present study focuses on junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria. Also in terms variables of interest, this present study sought to determine the relationship between intrinsic motivation to learn mathematics and academic performance in mathematics despite family background among junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria.

Awofala, Lawani and Adeyemi (2020) carried out study on Motivation to Learning Mathematics and Gender as Correlates of Senior Secondary School Students' Performance in Mathematics. The sample consisted of 315 students from two government senior secondary schools in Lagos State, Nigeria using the quantitative research method within the blueprint of the descriptive survey research design. Data collected were analysed using percentages, means, standard deviation, independent samples t-test, Pearson Product Moment Correlation Coefficient (PPMCC) and standard and stepwise multiple linear regression analysis. Findings from the study revealed that there was a very high level of motivation to learn mathematics among senior secondary schools' students in Nigeria. Although the study of Awofala, Lawani and Adeyemi (2020) deals with motivation like, it failed to emphasize the place of family background. this present study differ in Dimensions of motivation. This present study is concerned majorly with intrinsic motivation. The Population of interest of the present study focuses on junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria. Also in terms of variable, this present study sought to determine the relationship between intrinsic motivation to learn mathematics and academic performance in mathematics despite family background among junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria.

Adedeji (2007) investigated on the impact of motivation on students' school academic achievement in mathematics in secondary schools using motivation for academic preference scale ($\alpha = 0.82$) as a measuring instrument and achievement test in mathematics (ATM). Two hypotheses were tested for significant at 0.05 margin of error using t-test and analysis of variance (ANOVA). The study's participants were 450 secondary school students drawn from 10 schools in Ibadan North-West and Ibadan South-West Local Government areas of Oyo State of Nigeria. Result indicates significant difference when extent of motivation was taken as variable of interest on academic achievement in mathematics based on the degree of students' motivation. The findings reported in this study justify the importance of motivation to academic performance and recommends that the teachers of mathematics should try as much as they could to motivate their students during the course of instructions. The parents as well as the government should engage in programs that can motivate the students to improve their academic performance. Though focusing on motivation like (Adedeji, 2007), the present study is not focusing wholly on achievement in mathematics (which could be determind only at the end of a partacular learning endeavour) but perfomace in mathematics (which could be determined in the overall learning process). In terms of population of interest, the present study focuses on junior secondary school students in Ohimini Local Government Area of Benue State,

Nigeria. The present study uses quantitative research method which differs from the study of Adedeji (2007).

Isidore, Adelaye, Adubasim and Adim (2014) examined the moderating effect of self-motivation on the relationship between parent's socio-economic backgrounds on their children's academic performance at Nigerian. A quantitative research method (survey) was employed to collect data from final year undergraduate students of three University's Business Faculties in the North, East and West regions of Nigeria from 2012 to 2013. Using stratified proportionate random sampling. From a total population of 563 final year students from the three university business faculties, a total sample size of 275 students was used. After data cleaning, 130 data were analyzed using descriptive statistics and hierarchical regression. One of the results indicated that student's self-motivation (hard work) and rich parental socio-economic background are needed to achieve academic success; though self-motivation appears to be a more critical success factor. The paper recommended that the government and the authorities of Nigerian universities should intensify effort at counseling the students on the need to study hard in order to achieve academic success rather than relying on their parents' socio-economic background. The study of Isidore, Adelaye, Adubasim and Adim (2014) is a premise for this present study in its projection of the role of self-motivation. However, it failed to explore the dynamics of a much poorer socio-economic demographics, as obtainable in Ohimini Local Government Area of Benue State, Nigeria.

Osuafor and Okonkwo (2013) carried out a study on influence of family background on academic achievement of secondary school biology students in Anambra state. A survey design was adopted for the study. Five hundred and forty-six (546) Senior Secondary Two (SS2) biology students were drawn by simple random sampling from 14 schools within Awka, Nnewi and Onitsha Education Zones, in Anambra State. Data were collected using a researcher constructed questionnaire and students SS1 and SS2 school results. The results revealed that family structure, parents occupation and educational level of parents, did not have significant influence on students' achievement in biology. Based on the findings, the paper concludes that family background did not have much influence on students' achievement in science (biology) as against what most previous studies portrayed. Outcomes such as this call for further investigation into the role of motivational factors other than family background in academics performance, particularly in mathematics. The present study sought to determine the relationship between intrinsic motivation to learn mathematics and academic performance in mathematics despite family background among junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria.

The review of literature has considered Self-Determination Theory as a foundation for investigation into the impact of intrinsic motivation on junior secondary school students' academic performance in mathematics despite family background. The concepts of intrinsic motivation and family background were also review. The review of empirical studies has shown that many Mathematics educators and scholars emphasized the significance of intrinsic motivation to learn mathematics in the academic performance of the learners. However, these studies failed to explore the dynamics of intrinsic motivation

within a not-so-rich population like obtained among the rural dwellers of Ohimini Local Government Area of Benue State, Nigeria. This present study intends to fill this gap.

Purpose of the Study

The main aim of this study is to investigate the impact of intrinsic motivation on junior secondary school students' academic performance in mathematics in Ohimini Local Government Area of Benue State. Specifically, the study sought to:

- i. Find out the pattern of family background of junior secondary school students' in Ohimini Local Government Area of Benue State, Nigeria.
- ii. Ascertain the level of junior secondary school students' intrinsic motivation to learn mathematics despite family background in Ohimini Local Government Area of Benue State, Nigeria.
- iii. Find out the level of junior secondary school students' academic performance in mathematics despite family background in Ohimini Local Government Area of Benue State, Nigeria.
- iv. Determine the relationship between intrinsic motivation to learn mathematics and academic performance in mathematics among junior secondary school students in mathematics in Ohimini Local Government Area of Benue State, Nigeria.

Research Questions

The following research questions guided the study:

- i. What is the pattern of family background of junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria?
- ii. What is the level of intrinsic motivation to learn mathematics among junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria?
- iii. What is the level of academic performance in Mathematics among junior secondary school students despite family background in Ohimini Local Government Area of Benue State, Nigeria?
- iv. What is the relationship between intrinsic motivation to learn mathematics and junior secondary school students' academic performance in mathematics in Ohimini local government area of Benue state, Nigeria?

Research Hypotheses

The following research hypothesis was formulated and tested at 0.05 level of significance:

- i. There is no significant relationship between intrinsic motivation to learn mathematics and junior secondary school students' performance in mathematics in Ohimini local government area of Benue state, Nigeria.

Methodology

Design of the Study

Ex-post facto research design was adopted for this study. The ex-post facto research design is a research in which the independent variable of interest has already occurred and in which the researcher begins with the observation on a dependent variable, followed by a retrospective study of possible relationship and impact (Abah, 2020). The ex-post facto design was considered appropriate for the study due to its scope of coverage in explaining existing relationships and developing trends.

Area of the Study

The area of this study is Ohimini Local Government Area of Benue State, Nigeria. Ohimini Local Government is one of the twenty-three (23) Local Government Areas in Benue State which has an estimated population of seventy one thousand four hundred and eighty two (71,482) and covers a land mass of 632 km² (National Population Census, 2006). Geographically, Ohimini lies between latitudes 7⁰N and longitudes 7⁰E of the equator (Benue State Ministry of Land and Survey, 2010). The Local Government Headquarter is Idekpa. Ohimini is bounded by two Local Government Areas; Otukpo Local Government Areas on the North-south and Okpokwu Local Government Area on the South-west. The inhabitants of Ohimini are engaged primarily in agriculture as well as other activities such as petty trading, artisans and few civil servants. The Local Government is predominantly a subsistence agricultural producing area. Ohimini Local Government has ten (10) council wards, which are Agadagba, Awume Ehaje, Awume Icho, Ehatokpe, Idekpa, Ochobo, Oglewu Ehaje, Oglewu Icho, Onyagede Ehaje and Onyagede Icho. Ohimini Local Government is preferred as area for this present study because the reviewed literature shows that in relation to this new topic under study, there is a greater gap to be filled.

Population of the Study

The target population for the study comprised of four hundred and eighty five (485) junior secondary school three (JSS III) students in Ohimini Local Government Area of Benue State, Nigeria. Ohimini has twenty five (25) approved secondary schools (Ohimini Local Government Education Office, 2021).

Sample and Sampling Technique

The sample of the study comprises 219 Junior Secondary School (JSS III) Students in Ohimini Local Government Area. Taro Yamane's formula (Yamane, 1967) was used to determine the sample size. The participants were drawn from ten (10) secondary schools selected at using stratified random sampling, one school from each council ward in Ohimini Local Government Area. A simple random sampling technique was then used to select the JSS III students within each school.

Instruments for Data Collection

A modified instrument tagged Intrinsic Motivation for Mathematics Academic Performance despite Family Background Questionnaire (IMMAPDFBQ) was used to gathered data on the study. Items on motivation in the instrument were adapted from Science Motivation Questionnaire (SMQ) (Glynn, Taasoobshirazi & Brickman, 2009) and

others which sought information on the students' family background were adapted from Isidore, Adelaye, Adubasim and Adim (2014). The instrument was divided into four parts. The first part (A) requires the participants' demographic information like sex and name of school. The second part (B) contains the items related to family background. The third part (C) contains items related to intrinsic motivation to learn mathematics despite family background; while the fourth part (D) seeks participants' academics performance in mathematics (obtained by the researchers from school academic records). Two items in part A was designed using two point dichotomous scale as follows: YES = 1 and No = 2; while part C was designed using four point likert scale as follows: Strongly agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2 and Strongly Disagree (SD) = 1.

Validation of the Instrument

The instrument was subjected to content validation by five experts; three lecturers from the Department of Mathematics Education, JOSTUM and two mathematics teachers from St Paul Secondary School, Otukpo, who are experts in measurement and evaluation, curriculum and instruction, and Mathematics Education. This is to ensure that the instrument measure what is intended to. The items in the questionnaire were vetted in terms of appropriateness of wordings, clarity and adequacy of items for the study. The comments were used to modify the instrument for data collection.

Reliability of the Instrument

A trial-testing was carried out on IMMAPDFBQ using a different sample episode which has similar characteristics with the sample of interest in other to determine its reliability. This study involved twenty (20) participants from St. Paul's Secondary School, Otukpo, Benue State, Nigeria. The reliability of items of the IMMAPDFBQ was analyzed using Cronbach Alpha method and a coefficient $\alpha = 0.81$ was obtained, indicating that the instrument has good level of internal consistency.

Method of Data Collection

Data collection is done through administering of IMMAPDFBQ by the researcher to the respective participants whose academic records in mathematics have been obtained by the researcher. The researcher guides the individual participant to understand the items on the IMMAPDFBQ and retrieved the filled IMMAPDFBQ. The same procedure was maintained for all the ten (10) schools selected.

Method of Data Analysis

Data analytical techniques used in this study include, charts, percentages, mean, standard deviation, Pearson product Moment Correlation Coefficient (PPMCC) and T-test of correlation. These techniques were used to answer the research questions and test the hypothesis at 5% level of significance. Decision making was based on the benchmark mean response of 2.50 for part C of the instrument, such that mean equal to or above 2.50 was regarded as "Agree" while mean rating less than 2.50 was regarded as "Disagree".

Results

The presentation of data for this study is done according to the research and hypothesis.

Research Question One

What is the pattern of family background of junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria?

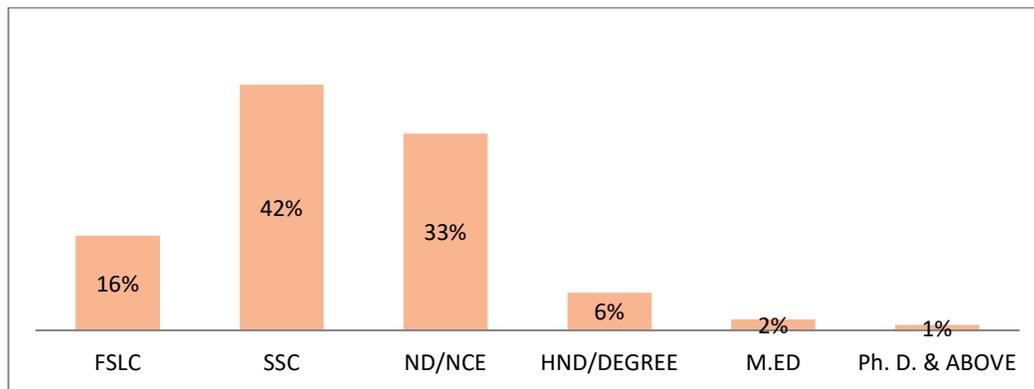


Figure 1: Parents' Educational Level

Figure 1 showed the parental educational level of the students in this study. 16 percent of the parents attended only primary school. 42 percent of the students' parents attained secondary school level. 33 percent of the parents' have ND or NCE. 6 percent are HND or Degree holders. 2 percent are M. ED holders and 1 percent are Ph. D holders. This implies that the parents' educational level is an average one.

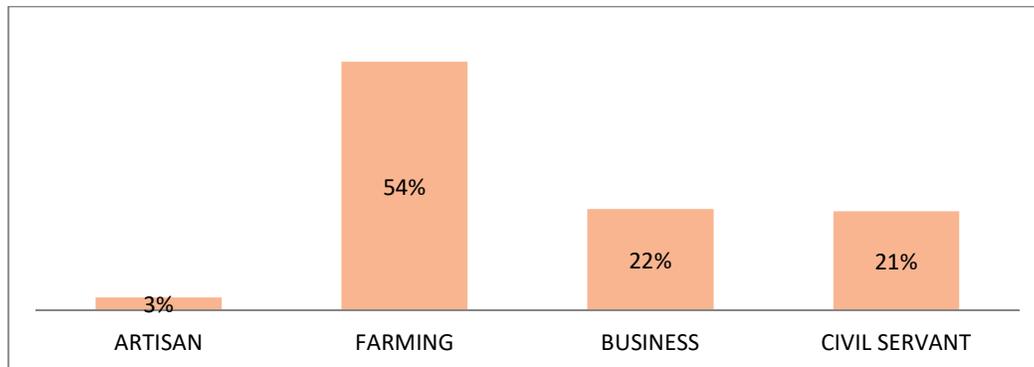


Figure 2: Parents' Occupational Status

Figure 2 presented the parental occupational status. 3 percent of the parents are artisans, 53 percent are farmers, 21 percent are in different kind of petty businesses and 10 percent of the parents are civil servants. This points out that majority of parents are farmers.

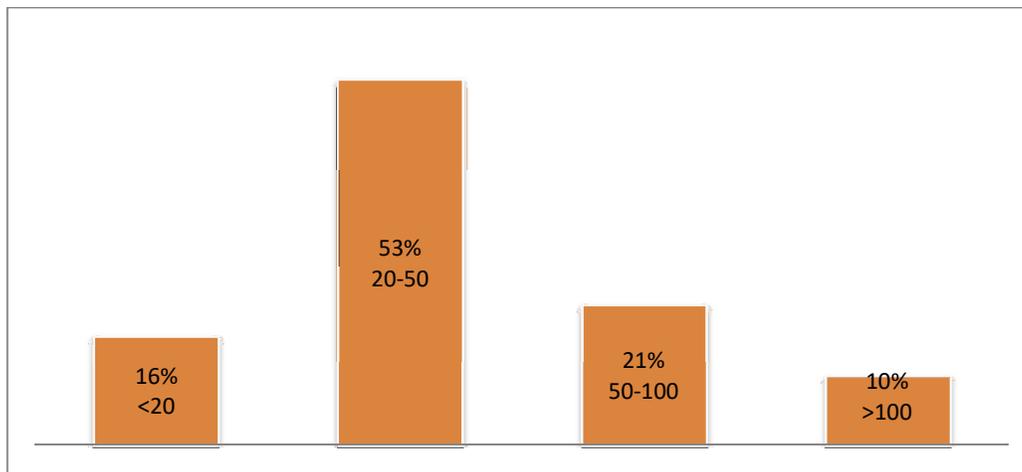


Figure 3: Parents' Monthly Income Status (in Thousand Naira)

Figure 3 showed the parental income status. 16 percent of the parents have average income level of less than twenty thousand naira every month. 53 percent earn between twenty to fifty thousand naira monthly. 21 percent earn between fifty to hundred thousand naira monthly and 10 percent earn above hundred thousand naira every month. As shown in Figure 3, the parents earn averagely between twenty to fifty thousand naira monthly.

Table 1: Descriptive Analysis of the students' view of family background as the determinant of good academic performance in mathematics

Family Background as determinant of good academic performance in math.	YES	NO
Do you think that parental educational level is the reason for good performance in mathematics?	50 (23%)	169 (77%)
Do you think that parental income status make one do well in mathematics?	45 (21%)	174 (79%)

In relation to the students' family background as determinant of good academic performance in mathematics, Table 1 showed that the students in this study area have different opinion of the belief as exhibited by the result of the table. 77 percent were of the opinion that parental educational level is not the reason for good performance in mathematics. Similarly, 79 percent assert that parental income status does not make one do well in mathematics.

Research Question Two

What is the level of intrinsic motivation to learn mathematics among junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria?

Table 2: Descriptive Analysis of Intrinsic Motivation to learn Mathematics

S/N o	Intrinsic Motivation to Learn Mathematics	MEAN	SD	REMAR K
1	I enjoy learning mathematics despite my family background.	3.18	0.81	AGREE
2	Learning to acquire knowledge in mathematics is important to me despite my family background.	3.27	0.70	AGREE
3	I find learning mathematics interesting despite my family background.	3.15	0.96	AGREE
4	I like mathematics because it challenges me irrespective of my family background.	3.34	0.76	AGREE
5	Understanding mathematics gives me a sense of accomplishment despite my family background.	3.16	0.84	AGREE
6	I put enough efforts into learning mathematics despite my family background.	3.49	0.65	AGREE
7	I believe I can master the knowledge and skills in mathematics despite my family background.	3.34	0.73	AGREE
8	Irrespective of my family background, I like to do better than other students in mathematics Tests and Exams.	3.06	0.78	AGREE
9	I believe I can earn an “A” grade in mathematics despite my family background.	2.66	1.02	AGREE
10	I use strategies that ensure I learn mathematics well despite my family background.	3.17	0.58	AGREE
11	I prepare well for mathematics Tests and Exams despite my family background.	3.33	0.77	AGREE
12	If I am having trouble learning mathematics, I try to figure out why.	3.21	0.79	AGREE
13	I think about how learning mathematics can help my future career.	3.22	0.79	AGREE
14	I think about how the mathematics I learn will be helpful to me in the future.	3.28	0.85	AGREE
15	Coming out with a good grade in	3.11	0.86	AGREE

mathematics is important to me.

16	The mathematics I learn has practical value for me.	2.63	0.97	AGREE
17	The mathematics I learn relate to my personal goals.	2.98	0.87	AGREE
CLUSTER MEAN		3.15		AGREE

Table 2 showed the analysis of intrinsic motivation to learn mathematics among junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria. As exhibited in the table with the cluster mean of 3.15, the students in this study have high intrinsic motivation to learn mathematics despite their family background. This is because the cluster mean of 3.15 is above the benchmark mean of 2.50.

Research Question Three

What is the level of academic performance in Mathematics among junior secondary school students despite family background in Ohimini Local Government Area of Benue State, Nigeria?

Table 3: The mean score showing the level of academic performance of the students

Variable	N	Mean	SD
Students' Academic performance in Math.	219	53.03	4.25

Table 3 showed the academic performance of junior secondary school students despite family background in Ohimini Local Government Area of Benue State. As shown in the table the students in this study area have good performance in mathematics as exhibited by the mean of 53.03 and standard deviation of 4.35.

Research Question Four

What is the relationship between intrinsic motivation to learn mathematics and junior secondary school students' academic performance in mathematics in Ohimini local government area of Benue state, Nigeria?

Table 4 Correlation between intrinsic motivation to learn mathematics and students' academic performance in mathematics

Variable	N	Mean	SD	r	Remark
Intrinsic motivation to learn Math.	219	3.15	0.81	0.79	Strong Positive Correlation
Academic performance in Math.	219	53.03	4.25		

The result in Table 3 above showed the relationship between the students' intrinsic motivation to learn mathematics and academic performance in mathematics of the students. The result showed that there was a strong positive correlation between the students' intrinsic motivation to learn mathematics and their academic performance in mathematics.

Hypothesis One

There is no significant relationship between intrinsic motivation to learn mathematics and junior secondary school students' performance in mathematics in Ohimini local government area of Benue state, Nigeria.

Table 5: t-test of correlation coefficient between students' intrinsic motivation to learn mathematics and their academic performance in mathematics despite family background

Variable	n	Mean	STD	r	df	t-cal	p-value	t-critical	Decision
Intrinsic motivation to learn Math.	219	3.15	0.81	0.79	218	2.23	0.00	1.65	H_0 is Rejected
Academic performance in Math.	219	53.03	4.25						

$\alpha = 0.05$

The analysis in table 5 above revealed the result of t-test conducted on the intrinsic motivation to learn mathematics and the junior secondary school students' performance in mathematics. From the table, the result showed that the p-value of 0.00 was less than the α - value of 0.05. Therefore, the null hypothesis was rejected. This implies that, statistically there is enough evidence to infer that there is a significant relationship between intrinsic motivation to learn mathematics and junior secondary school students' performance in mathematics in Ohimini local government area of Benue state, Nigeria.

Discussion of Findings

The analysis of research question one reveals the pattern of family background of junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria. The result of the analyses revealed that the parents have average level of education, engage majorly in agriculture (i.e Farming) and earn averagely from twenty to fifty thousand naira monthly as shown in the Figures 1, 2 and 3 respectively. This implies that the pattern of family background of junior secondary school students in Ohimini is a lower class one. But despite the lower class pattern of these students' family background, they still believe that family background is not a determinant of one's good academic performance in mathematics neither does parental income status make one do well in mathematics (as shown in Table 1). This finding is in line with that of Osuafor and Okonkwo (2013) which affirms that family background did not have much influence on students' achievement in science. However, this outcome disagrees with the findings of Ogunsola and Adewale (2012) which portrayed that family background determines students' good academic performance. These students' zeal to learn mathematics may be due to the fact that they have realized the importance, need and role of mathematics education in their life, future and the society at large, therefore they strive passionately beyond the setback of poor family background, to attain a good performance in mathematics. Again, intrinsic motivation increase students' academic tenacity which is another means of enhancing students' performance in mathematics. Dweck, Walton and Cohen (2014) saw it that the motivational factors that promote long-term learning and achievement can be brought together under the label academic tenacity. Dweck, Walton and Cohen (2014) explained further that students with academic tenacity view effort positively, they are not derailed by difficulty and see a setback as an opportunity for learning or a problem to be solved rather than as a humiliation, a condemnation of their ability or worth, a symbol of future failures, or a confirmation that they do not belong. The implication of this is that, if poor family background truly influences students' performance as portrayed by other studies reviewed in this study, then it will be seen by intrinsically motivated student as an overcoming setback and opportunity to learn and not a hindrance of good performance.

The result in Table 2 (research question two analysis) reveals that the students in Ohimini have high intrinsic motivation to learn mathematics despite their family background. This finding revealed that with intrinsic motivation one can be successful in any learning endeavour or life general, most especially learning mathematics irrespective of the family background or any environmental factors that may appear as hindrances. This finding is in connection with that of Abah (2017) who carried out study on the original higher education experience of graduating students of mathematics in Nigeria. One of the conclusions of Abah (2017) is that the ultimate outcome of learning depends heavily on the individual student. The finding is also linked with study of Abah, Awen and Kuse (2018) on Correlating University Students' Academic Attainment and Sense of Hope in Science Education. The work of Abah, Awen and Kuse (2018) shows students with intrinsic motivation demonstrating strong desire to become professional teachers, positioning for favourable career pathways, and broadly acquiring knowledge to contribute to society building. To further affirm this statistical fact, the study of Awofala, Lawani and Olayinka (2020) explained that intrinsic motivation occurs as a result of a student's internal

drive for superior academic performance. Intrinsic motivation in the life these students under study help them to define their dream of good performance in mathematics in an achievable way and also press on with zeal in achieving this set dream as shown in Table 3. Therefore, with intrinsic motivation it is possible for a student to set a high academic performance in mathematics as an objective and achieve it irrespective of the good or poor background and environment in which he found himself. Harter (1978) added that intrinsic motivation is the true drive in human nature, which drives individuals to search for and to face new challenges. This drive Harter continued, put students' abilities to the test and they are eager to learn even when there are no external rewards to be won. These imply that intrinsic motivation which can also be referred to as self-motivation is the key for every good academic performance both in mathematics and other subject areas.

The result in Table 4 showed that there is a strong positive relationship between intrinsic motivation to learn mathematics and academic performance in mathematics of the students in Ohimini local Government Area, Benue State, Nigeria. This positive relationship indicates that if the level of these students' intrinsic motivation to learn mathematics increases then their academic performance in mathematics will also increase as well pointing out one fact which is, to attain the high level of academic performance in mathematics dreamt by many schools in Nigeria, the mathematics students must be intrinsically motivated. To further prove this claim, the t-test of correlation indicates that there is a significant relationship that exists between these students' intrinsic motivation to learn mathematics and their academic performance in mathematics revealed in Table 5.

Conclusion

Based on the study, these conclusions are drawn:

- i. Intrinsic motivation to learn mathematics has positive impact on the academic performance of junior secondary school students in Ohimini Local Government Area of Benue State, Nigeria.
- ii. Intrinsic motivation is key to good academic performance in mathematics.
- iii. Family background (whether rich or poor) is not a sole determinant of good academic performance in mathematics.

Recommendations

Based on the findings, the following recommendations were made:

- i. Mathematics teachers in their daily delivery of mathematics knowledge should emphasize on the need and role of intrinsic motivation in learning mathematics and intensify effort at counseling students towards achieving good performance in mathematics.
- ii. School administrators should put together series of programmes that will enlighten students on intrinsic motivation to learn mathematics such as seminars, orientation and motivational speeches.

- iii. Educational authorities should create an agendum that will help encourage intrinsic motivation among secondary school students.
- iv. Curriculum developers should modify the curriculum to train students on self-love for mathematics.
- v. Parents should regularly encourage students to develop interest for mathematics on their own and work hard instead of relying on their good background or cast blame on their poor background.

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