



INFLUENCE OF MOTIVATION ON ACADEMIC ACHIEVEMENT IN MATHEMATICS AMONG STUDENTS OF HASSAN USMAN KATSINA POLYTECHNIC, KATSINA STATE

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Abstract

This study investigated the Influence of Motivation on Academic Achievement in Mathematics among ND II Students of Hassan Usman Katsina Polytechnic, Katsina State. The study has four objectives, one of which seeks to examine the relationship between intrinsic motivation and students' academic achievement. Second, one seeks to find out the relationship between extrinsic motivation and students' academic achievement. This is guided by four research questions, and four hypotheses respectively. The study adapted survey design. A sample size of 338 was selected randomly from a population of 2800 ND II students of Hassan Usman Katsina Polytechnic. One Instrument known as Harters Scale of intrinsic versus extrinsic Motivation was Adopted and validated by experts to guide in the data collection. The study presented the results and discussion of findings. Four research hypotheses were tested in the use of t-test and PPMCC at 0.05 level of significance. Statistical software called SPSS version 27.0 helped in the analysis of data obtained. From this result, it was found that there is significant relationship between motivation and students' academic achievement. The results obtained further disclosed that there is no significant relationship between extrinsic motivation and students' academic achievement. The results further confirmed no significant difference in the intrinsic motivation of male and female students, and also there is no significant difference in the extrinsic motivation of male and female students in the study area. The study concluded that students' intrinsic motivation is effective in improving academic achievement in this study.

Keywords: Influence, Motivation, Academic Achievement, Mathematics, Katsina State

Introduction

Societies all over the world have used education as an instrument for the achievement of their national interests and objectives. Put it simply, education is an instrument per excellence for effective national development of individual. It fosters the worth and development of the individual, for the individual's sake and for the general development of the society (National Policy on Education 2013). All these call for functional education to effect the promotion of a progressive and united country. Therefore, school programmes need to be relevant, practical and comprehensive. This is because interest in education ability determines the individuals' direction in all spheres of life. In Nigeria, for example, in order to achieve the goals and objective of education, the government set up three levels of education: primary education, secondary education and tertiary education (National Policy on Education 2013). For the purpose of this research, the discussion is limited to tertiary education.

On its part, Tertiary education is the third level of education in Nigeria. According to National policy on Education (2013), Tertiary education is the education young adults receive after secondary education and before the tertiary stage. The goals of tertiary education are to prepare the individual for:

- Useful living within the society

- Higher education
- Equipped them for useful manpower
- Prepare them to take mantle of leadership

The questions which this research raised are: is our tertiary education fulfilling the objectives for which it is set up? Again, how useful are those who pass through our tertiary education to themselves, their parents, their society, the state and the nation as a whole? Another question to is; how has our tertiary education prepared our youths for higher education up to university level? looking at the number of students that graduate from tertiary schools every year, It appears that tertiary education is not realizing the goals and objectives for which is set up due to lack of students motivation. It is the opinion of Rusillo and Arias, (2004), that there is significant influence of academic motivation on learning at school. In the same vain, Awanbor (2005) holds that students, who lack sufficient level of academic motivation, elicit a weak drive in pursuit academic goals. Such students manifest signs and symptoms of indifference and apathy towards schools. Majority of such students, if not all, are those who are involved in examination malpractices.

Furthermore, Awanbor (2005) noted that because of poor motivation due to inadequate salary, poor teaching environment as a result of lack of basic teaching materials, inexperienced and unmotivated learners in the classroom, among others, the teachers have become the endangered species in their own profession. They no longer teach and students in turn no longer learn. He also suggested that students should be academically motivated as this will go a long way to solving most of the problems faced in education system and also increase student's academic achievement. Continue he further remarked that motivating students will help them to be more responsible and have more interest in their studies. This underscores that motivating of students will reduce high school dropout rates, low enrolment rates, cultism, etc. Every education needs to be concerned about motivation of learners. It is a quality that students, teachers, parents, school administrators and the community at large, must have if our educational system is to prepare young people adequately for the challenges and demands of the coming century. Of course, the way this various groups of individuals generate and use motivation differs greatly. Students need motivation to learn, parents need it to track the educational progress of their sons and daughters, and teachers need it to become better teachers as well as school administrators if they are to ensure that every facet of the schools they manage continue to improve (Renchler, 1992).

Motivation is an important subject in education which affects academic achievement on the part of individual or as the behaviour of the students. It is pursuit is necessary because human organism is a complex system. And pursuance will enable us to understand the complexities of behaviour of human organism in a better fashion. Changes in human behaviour can be easily discerned when mechanism of motivation are fully understood. Studying motivation has significant impact for everyone who is interested in human beings. It also been observed, most parents have neglected or abandoned their duties and responsibilities towards academic activities of their children, and do not often motivate their children to learn (Ligon, 2006).

Similarly, Some teachers from their own part are not adequately motivating students in the teaching and learning processes by not attending classes regularly or allowing their students to ask questions after lessons using review techniques that could enhances students understanding, giving class work, home works and assignment, field trips, encouraging group discussions among students, giving them group work to do, praising students for a job well done, discouraging negative behaviours by apportioning blame on those who offend as well as punishing them and Rewarding students who performed well in the exams.

Some authorities failed to motivate students by way of recruiting qualified and enough teachers, and provide adequate classrooms for teaching and learning to take place, and also providing adequate furniture in the schools, available instructional materials, teachers' welfare. According to Mangal, (2012), many teachers fail in creating, stimulating and sustaining students' interest and enthusiasm to learn.

Again, Lack or inadequate motivation affect students academically especially in examination which may result to poor academic performance, students dropout among others. Therefore, all the aforementioned inadequacies need to be seriously tackled by researchers, academic, and education stakeholders for effective and productive teaching and learning environment. Based on this background, the researcher sought to investigate the influence of motivation on academic achievement in Mathematics among students of Hassan Usman Katsina Polytechnic, Katsina State.

The following objectives have been set for this study;

1. To find out the relationship between intrinsic motivation and students' academic achievement in Mathematics among Students of Hassan Usman Katsina Polytechnic, Katsina State.
2. To find out the relationship between extrinsic motivation and students' academic in Mathematics among Students of Hassan Usman Katsina Polytechnic, Katsina State.
3. To find out the difference in the intrinsic motivation of male and female students of Hassan Usman Katsina Polytechnic, Katsina State.
4. To find out the difference in the extrinsic motivation of male and female students of Hassan Usman Katsina Polytechnic, Katsina State.

The following research questions were raised to guide the study;

- 1) What is the relationship between intrinsic motivation and students' academic achievement in Mathematics among Students of Hassan Usman Katsina Polytechnic, Katsina State?
- 2) What is the relationship between extrinsic motivation and students' academic achievement in Mathematics among Students of Hassan Usman Katsina Polytechnic, Katsina State?
- 3) What is the difference in the intrinsic motivation of male and female students of Hassan Usman Katsina Polytechnic, Katsina State?
- 4) What is the difference in the extrinsic motivation of male and female students of Hassan Usman Katsina Polytechnic, Katsina State?

Based on the research questions raised the following hypotheses were formulated;

- (1) There is no significant relationship between intrinsic motivation and students' academic achievement in Mathematics among Students of Hassan Usman Katsina Polytechnic, Katsina State.
- (2) There is no significant relationship between extrinsic motivation and students' academic achievement in Mathematics among Students of Hassan Usman Katsina Polytechnic, Katsina State.
- (3) There is no significant difference in the intrinsic motivation of male and female students of Hassan Usman Katsina Polytechnic, Katsina State.
- (4) There is no significant difference in the extrinsic motivation of male and female students of Hassan Usman Katsina Polytechnic, Katsina State.

The findings of this research will help students, teachers, parents, administrators, government and other relevant authorities for their input in motivating students. Equally, this research will assist parents and the community in general on how to motivate their children to become useful and meaningful members of the community and as well contribute towards the development of their community and the nation as a whole.

The study is aimed at investigating the influence of motivation on academic achievement among students of Hassan Usman Katsina Polytechnic, Katsina State. The scope of the study covered all ND II students of the polytechnic in the 2023/2024 academic session.

Literature Review

In a study by Adedeji (2007), on the impact of motivation on students' academic performance and learning outcomes among secondary school students' in Nigeria, using motivation for academic preference scale, the study

participants were 450 secondary school students (SS 2) drawn from 10 schools in two local governments area in Ibadan. The finding shows that motivation has impact on academic performance of secondary school students in mathematic with respect of gender the result revealed that highly motivated student performed better academically than the lowly motivated students.

Stipek and Ryan (1997) found a weak relationship between motivation and young children's achievement. It was also revealed that both disadvantaged and advantaged children entered school with positive motivation profiles. However, the motivation of the more advantaged children showed a tendency to decline over the first year. Overall, little or no relationship was found between young children's motivation and their academic achievement. Moreover, Stipek and Ryan (1997) found that children's cognitive skills were far better predictors of end-of-the-year achievement than motivation.

Gottfried, (2001) in his study demonstrated the significance of academic intrinsic motivation for children's education in the results of three studies. The participants of study 1 were 141 white, middle-class children attending fourth and seventh grades in a Suburban public school district. Participants of study 2 were 260 black and white middle-class children in grades 4 through 7 of an integrated, public school. One hundred and sixty six (166) white, middle-class boys and girls comprise the sample of study 3 using survey research design, by random sampling. They attended grades 5 through 8 at a private school. Gottfried hypothesized that academic intrinsic motivation was positively related to school achievement. She also used the third study to determine the correlation between the Children's Academic Intrinsic Motivation Inventory (CAIMI) and Harter's (1980, 1981) Scale of Intrinsic Versus Extrinsic Orientation in the Classroom. It was hypothesized that the CAIMI is positively related to Harter's measure.

According to Gottfried (2001), the results supported the hypothesis that academic intrinsic motivation is positively and significantly related to children's school achievement as measured by both standardized achievement tests and teacher grades. Children who reported higher academic intrinsic motivation had significantly higher school achievement (Gottfried, 2001). The findings also revealed that the CAIMI subscales were positively correlated with Harter's measure of intrinsic motivation.

In a research paper comprised of several field studies and laboratory experiments, Boggiano et al. (1992) revealed that academic motivation positively influenced academic performance. Fifth grade children participated in a field study conducted over a 2-year period and examined whether extrinsic and intrinsic children's achievement in an experimental setting paralleled their achievement in the classroom. Motivation orientation was assessed using Harter's (1980, 1981) scale. The assessment of academic achievement was more detailed. It involved three different sessions over the 2-year period. After training problems in math were undertaken to ensure that all children could solve the problems equally well, children worked on a set of four test problems, which were unsolvable (Boggiano et al., 1992). Children's verbalizations during the final two failure problems were recorded as well as their attributions for their performance. National percentile scores for the math and reading portions of the Iowa Test of Basic Skills were obtained as well. It was found that motivational orientation predicted children's standardized achievement scores (Boggiano et al., 1992). Specifically, children with an intrinsic motivational orientation had higher reading and math scores and higher overall achievement scores than their extrinsic counterparts.

According to Boggiano and his colleagues (1992), results indicate that adopting an intrinsic vs. extrinsic motivational orientation affects a host of achievement-related behaviours and cognitions in addition to standardized test scores. Children who were extrinsically motivated showed marked performance deterioration. Their data suggest that motivational orientation may be a determinant of attributions and perceptions of competence that undoubtedly contribute to students' achievements (Boggiano et al., 1992).

Ligon (2006) studied achievement motivation of 175 males and females in elementary, junior high, and high school from a white, middle-class, Suburban school district in New York. The participants in this study were selected from the 4th, 7th, and 10th grades. Ligon wanted to specifically analyze differences in students' levels of achievement motivation based on gender and developmental level. The study used the Achievement Motivation Profile (AMP), Achievement Motivation Profile Jr. (AMP Jr), and the Student's Perception of Achievement Motivation Question. The results of the study indicated that achievement motivation across developmental level was significant, but no gender differences were found. This study is particularly important, since it is the only study examining gender differences that uses the AMP model for defining achievement motivation. While only one study has used this specific domain to assess gender differences in achievement motivation. equally related research has focused on constructs such as academic self-concept and attributions for success.

Methodology

The research design used for this study was descriptive survey research design. Survey method was employed in carrying out the research because the study involved the use of questionnaires which the respondents in the study filled. The survey research method was a very valuable tool for assessing opinions and trends even on a small scale such as local government or small businesses, judging opinions with carefully methodical surveys can dramatically change strategies. The population for the study consists of all ND II students of Hassan Usman Katsina Polytechnic, Katsina State with total population of 2800. The population is as follows:

Table 1: Distribution of the Population according College and Gender

S/N	College	Male Students	Female Students	Total
1	College of Administration and Management Studies	250	150	400
2	College of Agriculture	350	50	400
3	College of Engineering	398	02	400
4	College of Environmental Studies	395	05	400
5	College of Liberal Studies	200	200	400
6	College of Science and Technology	200	200	400
7	College of Vocational and Technical Education	340	60	400
Total				2800

Source: Academic Office, Hassan Usman Katsina Polytechnic (2024).

The sample for this study is three hundred and seventeen (338) students drawn from the main population of one thousand eight hundred and thirteen (2,800) using Research Advisor (2006), table for determine sample size.

Table 2: Distribution of the Sample Size

S/N	College	Male Students	Female Students	Total
1	College of Administration and Management Studies	35	15	50
2	College of Agriculture	36	12	48
3	College of Engineering	48	02	50
4	College of Environmental Studies	45	05	50
5	College of Liberal Studies	25	25	50
6	College of Science and Technology	25	25	50
7	College of Vocational and Technical Education	30	10	40
Total				338

The sampling techniques used in reaching the research sample from the main population were cluster sampling which covered the seven colleges in the polytechnic. Each college was made a cluster from which sample of students was reached through simple random sampling technique. The technique gives equal chance to each of the students of the department of being included in the sample. The instrument used in the data collection in this study was Harters scale of Intrinsic Versus Extrinsic Motivation modified and adapted from Harters (1993). The instrument contains thirty items (30) placed on five Likert scale ranging from strongly agree to Strongly Disagree (Strongly Agreed-SA; Agreed-A; Undecided- UD; Disagreed- D; Strongly Disagreed- SD). The marks allocated to the responses are from 5 – 1 starting from strongly Agreed 5 to strongly disagreed 1. And the other data used was Mathematics Achievement Test (MAT). The face validity of the research instruments is ascertained by some experts in the department of education Umaru Musa Yar’adua University Katsina. The reliability of the research instrument is established through pilot study conducted at College of Arts and Islamic Studies (CAIS) Tudun Wada, Katsina. The students that conducted the test are fifty in number. The result obtained was analyzed using the computer SPSS Package and the value of $r = 0.83$ was obtained. The instrument is therefore reliable and can be used in the study. The researcher administered the questionnaire; Harters scale of Intrinsic Versus Extrinsic Motivation modified and adapted from Harters (1993). for measuring students’ intrinsic and extrinsic motivation were used in the sample schools in collecting information about students Motivation. The researcher collected the completed questionnaire from the students and analysed. The data obtained was analyzed using the computer package of SPSS version 27.0. Hypotheses one and two were tested using Pearson Product Moment Correlation Co-efficient (PPMCC). While Hypotheses three and four were tested using t-test for independent sample.

Four null hypotheses raised in this research were tested and analysed using inferential statistics and presented in Tables 3, 4, 5, and 6 respectively. Computer statistics software, SPSS, (Statistical Package for Social Sciences) is used in the analysis. The result and analysis of data obtained were presented as follows:

Null Hypothesis One

H₀₁: There is no significant relationship between Intrinsic Motivation and students’ academic achievement.

Table 3: Correlation Analysis of intrinsic motivation and students’ academic achievement.

Variable	N	Mean	SD	r-value	p-value	Decision
Intrinsic Motivation	338	60.7161	9.66961	.787	.000	Significant
Academic achievement	338	2.6425	1.10640			

P. value < .05

The analysis showed that the r-value computed is .787 and the p-value of 0.00 is observed (P. value < 0.05). Since the critical p-value of 0.00 is less than the alpha value of 0.05. This implies that the null hypothesis was rejected, meaning that, there is a significant relationship between intrinsic motivation and students’ academic achievement.

Null Hypothesis Two

H₀₂: There is no significant relationship between extrinsic motivation and students’ academic achievement.

Table 4: Correlation Analysis of extrinsic motivation and students’ academic achievement.

Variable	N	Mean	SD	r-value	p-value	Decision
Extrinsic Motivation	338	52.9054	8.95155	.061	.276	Not Sig.
Academic achievement	338	2.6425	1.10640			

P. value > 0.05

The analysis of results showed that the r-value of .061 is obtained and the p-value observed is .276 (P. value > 0.05). This indicated that the critical p-value of .276 is greater than the alpha value of 0.05. This implies that the

null hypothesis is retained, meaning that there is no significant relationship between extrinsic motivation and students' academic achievement.

Null Hypothesis Three

H₀₃: There is no significant difference in the intrinsic motivation of male and female Students.

Table 5: t-test analysis Results of intrinsic motivation in Male and Female students.

Variable	N	Mean	SD	DF	t-value	p-value	Decision
Male	244	60.7427	9.8998	336	.067	.947	Not Sig.
Female	94	60.6667	9.2710				

P. value > 0.05

As the result obtained in the analysis above it is observed that the t-value of .067 is obtained and the p-value observed is .947 (P. value >0.05), at the degree of freedom of 336. This indicated that the critical p-value of 0.947 is greater than the alpha value of 0.05. This implies that the null hypothesis is retained, meaning that there is no significant difference between male and female intrinsic motivation.

Null Hypothesis Four

H₀₄: There is no significant difference in the extrinsic motivation of male and female Students.

Table 6: Result of t-test analysis Results of extrinsic motivation of Male and Female students.

Variable	N	Mean	SD	DF	t-value	p-value	Decision
Male	244	53.0097	8.9546	336	.282	.778	Not Sig.
Female	94	52.7117	8.9832				

P. value > 0.05

As the result obtained in the analysis above, it is observed that the t-value of .282 is obtained and the p-value observed is .778 (P. value >0.05), at the degree of freedom of 336. This indicated that the critical p-value of 0.778 is greater than the alpha value of 0.05. This implies that the null hypothesis is retained, meaning that there is no significant difference between male and female extrinsic motivation.

Summary of the Major Findings

The findings of the analysed data for this research are summarized as follows;

1. In hypothesis one, the findings revealed that there is a significant relationship between intrinsic motivation and students' academic achievements. A significant relationship implies rejection of null hypothesis.
2. In hypothesis two, the findings revealed that there is no significant relationship between extrinsic motivation and students' academic achievements. This implies that null hypothesis was hereby retained.
3. In hypothesis three, the findings revealed that there is no significant difference in the intrinsic motivation of male and female students. This implies that the null hypothesis was retained.
4. Hypothesis four revealed that there is no significant difference in the extrinsic motivation of male and female students. This implies that the null hypothesis was retained.

Discussion of the Results

The identification of some of the variables motivation affecting academic achievement of ND II students and their influence on achievement has been the major concern of this discussion. From the findings in null hypothesis one, it was revealed that there is a significant relationship between intrinsic motivation and students' academic achievement. A significant relationship implies rejection of null hypothesis and retaining alternate hypothesis.

Therefore, null hypothesis states that there is no significant relationship between intrinsic motivation and students' academic performance is rejected. The significant relationship indicates that intrinsic motivation yield excellent academic achievement. In essence the result shows that high level of intrinsic motivation influence good academic achievement. This finding is supported by Gottfried (2001) that the academic intrinsic motivation is positively and significantly related to school achievement as measured by standardized achievement tests and teachers grade. Gottfried found that academic intrinsic motivation is a valid construct for young children. Across both studies positive correlation between motivation and achievement were obtained specifically, young children with higher academic intrinsic motivation had significantly achieved a high level of intellectual performance (Gottfried, 2001).

The significant relationship between intrinsic motivation and academic achievement is in line with the finding of Fortier (2005). It was found that perceived academic competence was positively related to intrinsic motivation and the result shows that intrinsic motivation has influence on academic performance. The results revealed that highly intrinsically motivated students performed better academically than the lowly motivated students.

The finding in null hypothesis one, revealed that the significant relationship between intrinsic motivation and academic achievement is contrary to the finding of Niebuhr (1995), in that the finding indicate that student motivation showed no significant effect on academic achievement. Niebuhr (1995) finding suggest that the elements of both school climate and family environment have a stronger direct impact on academic achievement. In the same vein, Goldberg and Cornell (2008) revealed that intrinsic motivation did not directly influence subsequent achievement.

The finding in null hypothesis two revealed that there is no significant relationship between extrinsic motivation and students' academic achievement. This implies that the null hypothesis is retained, meaning that there is no significant relationship between extrinsic Motivation and students' academic achievement. Therefore, the null hypothesis that stated, there is no significant relationship between extrinsic motivation and students' academic achievement is retained. This implies that extrinsic motivation has no or little influence on students' academic achievement in this study. This finding is supported by Stipek and Ryan (2000) that found a weak relationship between extrinsic motivation and achievement. In the same vein, they found little or no relationship between student's motivation and their academic achievement.

Moreover, they found that student's cognitive skills were far better predictors of end of the year achievement than extrinsic motivation. The findings in null hypothesis three revealed that there is no significant difference in the intrinsic motivation of male and female students. This finding was supported by Ligon (2006), who found no gender difference in the domain of intrinsic motivation, supported by other study that examined similar trait variables related to intrinsic motivation was found.

The finding revealed that no significant difference in the intrinsic motivation of male and female students in null hypothesis three was contrary to the finding of Martin (2004), revealed that there were some gender difference in intrinsic motivation, however, the effect sizes were small. The results showed that girls were more likely than boys to adapt learning or mastery oriented styles, study more effectively, and persist longer with challenge than boys were likely to experience anxiety in academic situation in this study than girls.

The finding in null hypothesis four revealed that there is no significant difference in the extrinsic motivation of male and female students. This finding is supported by Lightbody, Siann, Stocks, and Walsh (2006), the researchers suggested that attributions are more likely to be associated with age rather than gender, and thus no significant gender difference were found in terms of attributions for academic success.

The finding in null hypothesis four that revealed no significant difference in extrinsic motivation of male and female students is contrary to the finding of Thorkildsen and Nicholls (1998), they suggested that academic success was more central for males in defining themselves. The study also found the boys had higher beliefs that success was caused by extrinsic factors. And also girls scored higher than boys on the task orientation scale, and their beliefs related to success were caused by interest and effort factors.

The following conclusions were drawn Based on the findings of this study;

That intrinsic motivation had a significant relationship with Students academic achievement. This emphasized that highly motivated students performed more academically better than the unmotivated students. This brought the urgent need for those who are responsible in motivating the students to address the issue adequately. Motivation of students will play great role in minimizing examination malpractices, school dropout and go a long way in seeing to the realization of educational objectives.

Results of this study revealed that no significant relationship between extrinsic motivation and Students academic achievement. Another Results of this study revealed that no significant difference in the extrinsic motivation of male and female Students in this study. Lastly, the high level of intrinsic motivation has a significant impact in enhancing and improving students' academic achievement in this study.

The following recommendations were made;

1. The parents, teachers, school administrators, government and stakeholders in education should ensure that adequate motivation is given to Students.
2. Schools at all levels should imbibe the idea of awarding the best students in academia as this will encourage the weaker ones to excel in their academic endeavor.
3. Governments at all levels should make sure that there is adequate and relevant infrastructures and facilities in the schools. And also endeavour to pay the salaries, allowances of the teachers promptly and make sure that teachers are sending to the seminars, training, workshops and in-service so as to improve their knowledge and up to date in their duty.

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