



## Self-efficacy, Self-monitoring and Senior Secondary School Students' Interest in Mathematics

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### Abstract

*Most secondary school students are losing interest in Mathematics due to poor performance in the subject. The causes are traceable to many factors among which are teachers' factor which include teachers' pedagogy and subject know how while others are students' factors such as students' self-efficacy, self-monitoring and interest in the subject. This study investigated the relationship among senior secondary school students' self-efficacy, self-monitoring and interest in mathematics. Survey design of correlational type was used to answer three research questions. The population comprised all the Senior Secondary School II students in Atiba Local Government Area of Oyo state out of which 250 were randomly selected. The study sample responded to three standardized research instruments: Self-Efficacy Scale (SES;  $r=0.74$ ); Self-Monitoring Scale (SMS;  $r=0.86$ ) and Interest in Mathematics Scale (IMS;  $r=0.70$ ). Multiple regression analysis was used to answer the research questions at 0.05 level of significance. The result revealed that the two dependent variables (Self-efficacy and self-monitoring) made joint ( $F_{(2,249)} = 280.32$ ) contribution of 69.2% to the variation of students interest in mathematics creativity. The study also revealed that both variables (students' self-efficacy:  $\beta = 0.71$ ,  $t = 15.78$  and self-monitoring:  $\beta=0.17$ ,  $t=3.85$ ) had relative contributions to students' interest in mathematics with self-efficacy having higher contribution followed by self-monitoring. Based on the findings of the study, it was recommended that students should monitor their own performance and progress in mathematical knowledge and also develop high mathematical ability in this age of technological development.*

**Key-Words:** Self-efficacy, Self-monitoring, Interest, Mathematics, Secondary school

### Introduction

Mathematics is a virtual and pillar of almost all streams of knowledge. It is a subject with many parts in science, technology, business and commerce. Mathematics is a valuable tool for academic development and choice of carrier. The act of counting, notation,

addition subtraction, multiplication, division, weighing, measuring, selling and buying are some fundamental process of Mathematics that are usually applicable in day-to-day activities of man. Odogwu (2015) emphasized the importance of Mathematics as a subject that makes



one's life orderly and free of chaos. The central role of modern culture according to her, demands some basic understanding of Mathematical concepts by all for effective living and livelihood. She emphasized that everybody needs Mathematics but each person needs it for different purposes depending on the new orientation of view and perception of Mathematics by all especially students. Many people who were not given the opportunity to complete primary or secondary education for diverse reasons may find themselves learning different vocations or apprenticeship as the case may be. They find the knowledge of Mathematics useful in their various vocations. The basic understanding of geometry is also needed in learning of vocations like carpentry, bricklayers and welding.

Students are required to learn Mathematics from the basic class through secondary schools since the skill of Mathematics computation is essential in every walks of life and that is why it's teaching cut across all levels and it's curricular geared towards real-life problem-solving. Through Mathematics, learners are challenged to make discoveries of Mathematical relationships and these discoveries will lead them to analyse and interpret their experiences and to make generalizations which they can subsequently apply in new situations (Aguale & Usman, 2007).

However, regardless of the importance of Mathematics, the state of

Mathematics education in Nigeria is decline which implies that students' achievement in Mathematics at the primary through tertiary levels are poor. The uproar over students' poor performance is more intense at the senior secondary level because a credit pass in Mathematics is a pre-requisite for getting admission into some courses in higher institution. Apart from the inability of many students to proceed into higher institution because of their inability to pass Mathematics at the secondary school, majority of the Nigerian child dread Mathematics. In fact, most of them consider it difficult, complex and abstract (Ajani & Olabode, 2017). The problem of poor performance in Mathematics has been traced to several factors such as motivational orientation, self-esteem, self-efficacy, emotional problems, study habits, student interest and teachers' factors.

Self-efficacy is an individual's belief about his or her inherent ability to produce designated levels of performance which implement authority over events that influence their lives. It is the confidence an individual have in his/her ability to execute courses of action or attain specific performance outcome. A strong sense of efficacy enhances human achievement and personal well-being in many traditions. An individual with high assurance in his/her capability to approach difficult tasks set themselves challenging goals and uphold strong commitment to them while people with weak sense of efficacy doubt their capabilities and



shy away from difficult task. Bandura (1986) in Lane & Lane (2001) described self-efficacy as the personal judgment of how well one can execute courses of action required to deal with prospective situations. He emphasized that individuals who have high self-efficacy sufficient effort that if well executed will lead to successful outcomes, whereas those with low self-efficacy are likely to cease effort early and fail.

Self-efficacy affects every area of human endeavour by determining the beliefs a person holds regarding his/her power to affect situations. It strongly influences both the power a person actually has to face challenges competently and the choices a person is most likely to make. The development of self efficacy over lifespan starts from infants exploratory experiences in which they see themselves produce effects by their actions and provide the initial basis for developing a sense of responsibility while the next stage is the gaining of self-knowledge by breaking areas of performance in capabilities. An individual efficacy testing experiences change considerably as they move into the larger community and through peer influences. Aremu and Tella (2009) in a study observed a no significant difference in student gender and self-efficacy score but a strong positive relationship between Mathematics self-efficacy and achievement in Mathematics. Riconscente (2014) examined the effects of perceived teacher practices on Latino high school students' interest, self-efficacy and

achievement in Mathematics and observed that teacher variables made unique contributions to students' interest, self-efficacy and achievement after controlling for demographics and initial level of interest and self-efficacy.

Self-monitoring as highlighted by Rose and Kim (2011) is a type of metacognitive instructional strategy that will enable children to determine and manage previously used problem solving strategies while working on the problems through the introduction of internal dialogue and self questioning. It is the capacity to observe and evaluate one's behaviour as well as an important component of executive functioning in human behaviour. Executive functioning is part of cognitive processing which includes a person's ability to connect past knowledge with present experiences in a way that allows the individual to plan, organise, strategise, pay attention to details and manage time. Wilmot, DeYoung, Stillwell and Kosinski (2016) identified self- monitoring as a strategy that allows an individual to measure his or her behavioural outcomes against a set of standards. Those who monitor themselves in a highly meticulous manner are considered high self- monitors. High self- monitors are social chameleons as they can easily adapt their attitude and behaviour to different situations. They are better in presenting themselves in socially desirable ways and are able to adjust to new situations more effectively than low self –monitors. Low self- monitors on the other hand



tend to regulate themselves according to their own internal beliefs and are typically less concerned with social context. They tend to project an image true to their inner selves and care little about adjusting their behaviour to the social situation and keep the same beliefs and attitudes regardless of others' opinions. Those who do not self-monitor at all may become pushy, aggressive and uncompromising. This may cause others to be less receptive toward them and lead to feelings of anger, low self-worth, depression and isolation (Wilmot, De Young, Stillwell and Kosinski, 2016).

Interest is a psychological state of engaging or the tendency to reengage in a particular content in the course of time. Interest is a cognitive and affective motivational factor that guides attention and facilitate learning in different contexts. Affective variety of interest depends to a certain degree on the phase or level interest of an individual (Renninger & Hidi, 2011). Interest is related to learning and achievement outcomes in students at all levels. It is an important factor when students' performance in Mathematics is being discussed. Renniger and Hidi (2011) emphasized this in their view that interest development of students is supported by the tasks and the organization of the learning environment. An interesting notion regarding situational and individual factors of interest development is that a person who already maintains a more developed individual interest towards a specific domain and experience related situational interest. Odo and

Ugwuda (2014) reviewed a significant better achievement and interest when students are taught with games than normal conventional teaching. Saarentaus (2014) observed an interest and self-efficacy belief in learning by exploring the experiences of math students.

### **Statement of the Problem**

Mathematics is an important subject that is practically put into use by all and sundry on a daily basis. It is the foundation of science and technology without which a nation's economic development will be slow and backward. It was because of this importance that made the subject to be integrated into Nigerian school curriculum at primary through tertiary institutions. It was however revealed that students dread the subject at different level leading to poor performance in the subject. This poor performance has been attributed to different factors, among which are students' factors and teachers' factors. Among the students' factors are students' self-efficacy, self-monitoring and student interest in the subject. It was discovered that while some students are eager to learn and willing to tackle new challenges, some seem uninterested and unmotivated. This shows that the unwilling and unmotivated students have low self-efficacy. Some of the students do not have trust in their own ability and have the belief that they cannot do anything on their own without the assistance of other people. This attitude did not give most of them opportunity of monitoring their academic



performance which eventually made them to lose interest in mathematics which later result in poor academic performance. Mathematics is a subject that actively involves students' participation which will result into students' self efficacy and proper self monitoring for better academic performance. It was revealed that majority of secondary school students lack this self efficacy and proper self monitoring which makes them to perform poorly in the subject thereby losing interest in the subject believing that the subject is difficult and meant for some selected few. This study however sought to find out the extent to which the independent variables (self efficacy and self monitoring) affect the development of senior secondary school students interest in Mathematics in Atiba Local Government Area of Oyo State.

### **Purpose of the Study**

Students' performance in Mathematics in the recent time has not been encouraging and this performance has been linked to various factors which according to researchers include students' self-efficacy, self-monitoring, self-esteem, students' attitude to Mathematics and students' interest in Mathematics. The purpose of this study is to find out how students' self-efficacy, which is the belief in their ability and what they can do as well as their ability in monitoring their own performance in Mathematics can affect their interest in Mathematics, which will eventually lead to good performance in Mathematics.

### **Research Questions**

1. What is the relationship between the independent variables (self-efficacy and self-monitoring) and senior secondary school students' interest in mathematics?
2. What is the joint contribution of independent variables (self- efficacy and self-monitoring) to senior secondary school students' interest in mathematics?
3. What is the relative contribution of each of the independent variables (self-efficacy and self-monitoring) to senior secondary school students' interest in mathematics?

### **Research Method**

The design of the study is survey research design. There are 14 secondary schools in Atiba Local Government Area of Oyo state out of which five were randomly selected using multistage sampling procedure. From the selected schools, 250 students were randomly selected in this study. The study sample responded to three instruments. They are Self-Efficacy Scale (SES), Self-Monitoring Scale (SMS) and Students' Interest in Mathematics Scale (SIMS). The items were subjected to face and content validity by giving copies to experts in Psychology and Mathematics education. The reliability index was determined after validation using Cronbach Alpha measure for both (SES) and (SMS) and the instruments yielded a reliability index of 0.74, 0.86 and 0.70 respectively. Multiple regression analysis was used to test for



joint and relative significant effect. Its effect and a correlation matrix showing relationship among the variables was

tested. The correlation coefficient was tested at 0.05 level of significance.

## Results

**Research Question 1:** What is the relationship between the independent variables (self-efficacy and self-monitoring) and senior secondary school students' interest in mathematics

**Table I:** Zero order contribution tables of relationship between self-efficacy and self-monitoring on senior secondary school students' interest in Mathematics.

Variable	Mean	Standard Deviation	1	2	3
Students' interest	36.8240	2.9386	1.000		
Self-efficacy	31.0000	2.8227	0.822	1.000	
Self-monitoring	36.5880	2.4987	0.621	0.627	1.000

Table I revealed the relationship between self-efficacy, self-monitoring and students' interest in Mathematics. From the table, students' interest has significant positive and strong relationship with students' self-efficacy ( $r=0.822$ ,  $P < 0.05$ ). In the same vein, students' interest also has high and significant positive correlation with students' self-monitoring ( $r=0.627$ ,  $P < 0.05$ ). It implies that positive increase in both behaviours will elicit an improvement

in students' interest in Mathematics. Student self-efficacy however has higher influence on senior secondary school students' interest in Mathematics than student self-monitoring.

**Research Question 2:** What is the joint contribution of independent variables (self-efficacy and self-monitoring) to senior secondary school students' interest in Mathematics.

**Table 2:** Summary of regression of joint contributions of self-efficacy and self-monitoring on students' interest in Mathematics

<b>R</b> = 0.833					
<b>R<sup>2</sup></b> = 0.694					
<b>Std</b> = 1.632					
Model	Sum of Square	Df	Mean Square	F	Sig.
Regression residual	1492.640	2	746.320	280.317	0.000
Residual	657.616	247	2.662		
<b>TOTAL</b>	2150.256	249			



Table 2 showed that both self-efficacy and self-monitoring jointly contribute significantly to senior secondary school students' interest in Mathematics. Both self-efficacy and self-monitoring jointly accounted for 69.4% variation in students' interest in Mathematics. The remaining 30.6% not accounted for is being caused by some other factors not mentioned in the present study. There is statistical significant joint effect of the independent variables (self-efficacy and self-monitoring) on the development of the dependent variable (students' interest in Mathematics). The multiple regression co-efficient  $R=0.833$  and

adjusted  $R$  square= $0.694$ . The analysis of variance reveals a significant joint effects of senior secondary school students' interest in Mathematics ( $F(2,249)=280.32$ ;  $P<0.05$ ). In conclusion, in accordance with the result and findings of this study, there is significant joint contribution of students' self-efficacy and students' self-monitoring on students' interest in Mathematics.

**Research Question 3:** What is the relative contribution of each of the independent variables (self-efficacy and self-monitoring) to senior secondary school students' interest in Mathematics?

**Table 3:** Summary of regression of relative contribution of self-efficacy and self-monitoring on senior secondary school students' interest in Mathematics.

Model	Un-standardized co-efficient	Standardized co-efficient			
	B	Std. Error	Beta	T	Significant
Constant	6.332	1.536		4.122	0.00
Self-efficacy	.742	.047	.713	15.78	0.00
Self-monitoring	.204	.053	.174	3.847	0.00

Table 3 showed the model regression analysis of relative contributions of each of the independent variables (self-efficacy and self-monitoring) to the development of students' interest in Mathematics. From the table, self-efficacy is the largest contributor to students' interest in Mathematics ( $\beta =0.713$ ,  $t =15.78$ ,  $p<0.05$ ) followed by self-monitoring ( $\beta =0.174$ ,  $t = 3.84$ ,  $p<0.05$ ).

### Discussion of Findings

The study revealed according to research question one that students' interest has relationship with both

students' self-efficacy and students' self-monitoring but with positive and strong relationship with self-efficacy at ( $r = 0.822$ ,  $p<0.05$ ), while the relationship with self-monitoring is also strong and positive but a bit lesser at ( $r = 0.627$ ,  $p<0.05$ ).

The study also revealed from research question two that both self-efficacy and self-monitoring accounted for 69.4% variation in students' interest in Mathematics. There is significant joint contribution of students' self-efficacy and students' self-monitoring on students' interest in Mathematics as the variation is far above 50%.



Research question three revealed a relative contribution of both self-efficacy and self-monitoring with self-efficacy as the largest contributor to students' interest in Mathematics with 71.3% contributions. This is in relation with Yu and Singh (2016) that interest might not be a predictor of Mathematics performance and it could be due to the reciprocal effects with personal variables of self-efficacy and self-regulation or school related variables such as classroom practices.

### Conclusion

There are different factors that are capable of improving students' achievement. The factors are categorized as external and internal. The external ones involve the teachers, the school, availability of materials and government involvement while the internal factors have to do with the students. Some of the students' factors include self efficacy, self monitoring and students' interest in mathematics. For students to be able to develop good interest in Mathematics, they must have good performance in the subject. This good performance is dependent on students self-efficacy i.e their belief in their ability and they must be able to monitor their own performance in order for them to be able to improve on their performance.

### Recommendations

Based on the study, it is recommended that students should be given the opportunity to exercise their self efficacy. Mathematics is a practical subject that requires active

involvement of the students. Students should be encouraged to develop deeper interest in the activities in which they participate and recover quickly from setbacks and disappointments that comes their way in the process of solving mathematical problems.

Students should be encouraged to form strong and sense of commitment to their interests and activities and view challenging mathematical problems as tasks to be mastered and not to be ignored.

Students should be persuaded to believe that they have the skills, capabilities and emotional reactions to perform excellently well in any mathematical challenge.

### References

- Aguele, L. I. & Usman, K. O. (2007). Mathematics education for dynamic economy in Nigeria in the 21<sup>st</sup> century. *Journal of Social Science*. 15(3); 293-296.
- Ajani, T. O. & Olabode, J. O. (2017). Investigation of students' achievement in Mathematics. Proceeding of August 2017, 54<sup>th</sup> MAN Annual Conference. Pg. 476–480.
- Aremu, A. & Tella, A. (2009). The relationship between Mathematics self-efficacy and achievement in Mathematics. *Procedia Social and Behavioural Sciences* 1(2009), 953-957.





- Bandura, A. (1986). Social foundations of thought and action: A social cognitive approach, Englewood Cliffs, Prentice-Hall Inc. *Current Psychology*, 30,,202-214.
- Lane, J. & Lane, A. (2001). Self-efficacy and academic performance. *Social Behaviour and Personality*, 29, 687-694.
- Odo, J.A. & Ugwuda, A.O. (2014). Effect of Mathematics games on students' achievement and interest in Mathematics. Proceedings of Mathematical Association of Nigeria (MAN). 151-157
- Odogwu, H.N. (2015). A comprehensive guide for teaching mathematics in secondary schools. Lagos: Sibon books limited.
- Renninger, K.A. & Hidi, S. (2011). Revisiting the conceptualization, measurement, and generation of interest. *Educational Psychologist* 46(3), 168-184.
- Riconscente, M. M. (2014). Effects of perceived teacher practices on Latino high school students' interest, self-efficacy, and achievement in Mathematics. *The Journal of Experimental Education* 82(1), 51-73.
- Rose, P. & Kim, J. (2011). Self monitoring, opinion seeking : a socio motivational approach.
- Saarentaus, E.A. (2014). Interest and self-efficacy beliefs in learning exploring the experiences of math students. Unpublished Master Thesis submitted to General and Adult Education Department, University of Helsinki.
- Willmot, M.P., Deyoung, C.G, Stillwell D & Kosiski, M. (2016). Self monitoring and the metatraits. *Journal of Personality*, 84(3), 335-347.
- Yu & Singh (2016). Teacher support, instructional practices, student motivation and mathematics achievement in high School. *The Journal of Educational Research*, 34(4), 1-14.