

ASSESSMENT OF THE IMPACT OF INTEGRATING EMOTIONAL INTELLIGENCE ON PUPILS' ATTITUDES TOWARD MATHEMATICS

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Abstract

This study assessed the impact of Integrating Emotional Intelligence on Pupils' Attitudes Toward Mathematics. Based on the purpose of the study two research questions and two hypotheses were formulated and tested at 0.05 level of significant. The study adopted a pre-test, post- test non-equivalent control group of Quasi-experimental research design. The population of the study comprised of all the 1,367 primary six pupils in Alvan Ikoku Federal College of Education demonstration school in Owerri, Imo State. A sample size of 135 pupils participated involving simple random sampling technique. The experimental group comprise of 65pupils while control group comprise of 70 pupils. The instrument used for data collection was Attitudes Toward Mathematics Inventory (ATMI). The validity of the instrument was done by three experts two from Measurement and Evaluation and one from Mathematics Education. The reliability of the instrument was 0.97 using Cronbach alpha reliability co-efficient. Data collected were analyzed using mean and standard deviation for the research questions while t-test was used to test the hypotheses at 0.05 level of significance. The study indicated that the integration of emotional intelligence in teaching and learning process has significantly increased pupil' attitude towards Mathematics irrespective of gender. Consequently, it is recommended that Mathematics teachers should be trained through intensive seminars, workshops and in-service trainings on the use of emotional intelligence for teaching and learning of mathematics.

Keywords: Assessment, Emotional Intelligence, Attitudes and Mathematics

Introduction

Assessment is an essential tool in the educational process because it measures the students' understanding (Marsh, 2009). Assessment plays a crucial role in the school system especially in teaching and learning process. Without assessment teachers cannot discover the areas of strengths and weaknesses of their students and the extent of which teaching objectives have been achieved. Assessment involves the

collection of information about an individual's knowledge, skills, attitudes, judgement, interpretation and using the data for taking relevant decisions about the individual instructional process, curriculum or programme (Adomi & Anie 2006.). Assessment can be formative or summative in nature. The teachers or researchers can use any type of assessment suitable for their study or programme. Assessment can be used to determine programme achievement. In the primary school learners need to be assessed especially in mathematics.

Mathematics is a subject that is globally recognized as important because of its relevance to science and technology. It has been described as the backbone of all scientific investigations and all activities of human development (Kurumeh, 2007). Mathematics has continued to play a significant role in the development of both individuals and nations. Therefore, for any nation to survive and develop it has to improve on the teaching and learning of mathematics; a subject that has become the bedrock of any technological development. Stressing the importance of Mathematics to national development, Iji (2006) opined that any country that aspires for national growth in science and technology must not neglect mathematics. Mathematics has important role to play in a modern life. The significance of mathematics is further strongly expressed through the Federal Government policy of making mathematics a compulsory subject at both primary and secondary school levels (Eniayeju, 2005). Expressing the everyday life use of mathematics, George (2007) stated that mathematics is used either directly or indirectly in providing solution to daily basic human problems for example in building, quantity of materials required can be calculated and other applications by other professionals like engineers, doctors, pharmacists among others. However, despite the importance and relevance of mathematics to the individual and the nation in general, the pupils' performance in mathematics both at internal and external examination has continued to deteriorate year after year (Galadima & Okogbemon, 2012). Agwagh (2006) has posited that the mass failure and consistence poor performance of pupils in mathematics shown over a decade cast down on the country's high attainment in science and technology.

Salman (2002) and Bala & Musa (2006) have all lamented on the poor performance of pupils in mathematics at unity schools' examinations, posting that some even score as low as zero in such examinations. Seweje (2010) confirmed that the methods adopted by teachers in most cases include the traditional approach with very little innovative practices. There is therefore, a need to source for alternative strategies of teaching mathematics that are suitable and efficient for enhancing learners' level of understanding of the subject. This situation calls for effective method that could facilitate confidence, self-control, the ability to communicate, and the ability to cooperate with others, cognitive and intellectual development leading to learners having better understanding of how to learn and this understanding requires emotional intelligence.

Emotional intelligence is a confluence of developed abilities to: know and value self; build and maintain a variety of strong, productive and healthy relationships; get along and work well with others in achieving positive results; and

effectively deal with the pressures and demands of daily life and work (Maraichelvi & Rajan, 2013; Nelson & Low, 2003). Salovey and Mayer in Hamdallat, Abdurraheem Amosa (2015) defined emotional intelligence as the subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions. Similarly, Goleman (2006) defined the emotional intelligence as recognizing and managing feelings, self-action, the ability of understanding the others' feelings and to conduct the relationships. Thus, emotional intelligence in the academic and professional spheres contributes to individual cognitive-based performance over and above the level attributable to general intelligence (Romanelli, Cain & Smith, 2006). Teachers and students with higher emotional intelligence displayed more positive social functioning in interpersonal relationship and are regarded by peers as prosocial, less antagonistic and conflictual (Brackett, Rivers & Salovey, 2011). In his own view, Bar-On (2006) posited that emotional intelligence is an array of non-cognitive capabilities, competencies and skills that influence one's ability to succeed in coping with environmental demands and pressures. These attributes improved social competence and quality relationships that could facilitate cognitive and intellectual development leading to better academic performance.

According to Goleman (2006) the five domains was collapsed into four which are self-awareness, self-management, social awareness and relationship management. Self –awareness is the ability to identify one's own internal states, preferences, resources, and intuition. Self-awareness involves recognizing one's emotions and their effects, accurate self-assessment which involves knowing one's emotions and their effects, as well as self-confidence which refers to a strong sense of strength and limit.

Self-management is the ability to manage one's internal states, impulses and resources. It is the ability to regulate distressing effects like anxiety and anger and to inhibit emotional impulsivity. Social-awareness is the ability to sense, understand and react to others' emotion while comprehending social networks. In other words, social awareness is the ability to understand the feelings of others and why they act in the way they do. Social awareness competencies determine how we handle relationships. Relationship management is the ability to inspire, influence and develop others while managing conflict. The relationship management domain contains competencies that have the most direct effect on interactions with other learners Goelman (2006). Orluwene and Wachukwu (2014) stated that relationship management is the ability to manage emotions in others. Hidi, Renninger and Krapp, (2004) asserted that positive emotion will promote positive attitudes toward learning. Emotional intelligence is capable in encouraging pupils to possess positive attitude towards Mathematics. The integration of emotional intelligence in teaching Mathematics is important and should be emphasized because emotional intelligence promote motivation and the development of other psychological aspects of the learner especially attitude.

The development of a positive attitude toward science especially mathematics is one of the most important goals of teaching and learning (Thomas, Koballa & Crawley in Oguoma, Okebaram & Unamba 2018). Attitudes are general dispositions that stand behind people's evaluations and emotional feelings. Attitudes arise from human needs and express people's intellectual process (Wheeler, Goodale, & Deese in Oguoma, Okebaram & Unamba 2018). Oguoma, Okebaram & Unamba (2018) define attitude as a state of readiness leading the individual to perceive things and individuals around him in certain ways; that is to be more ready with certain categories and interpretations than with others. Attitudes are not innate, they are learned, they develop and they are organized through experience. These states of readiness are relatively enduring but they are modifiable and subject to change. According to Hannula (2002) "Attitude is not seen as a unitary psychological construct, but as a category of behavior that is produced by different evaluative processes. Sorenson as cited in Balama (1992) explains that individuals/students acquire attitudes from their environment. He further explained that if a student has a positive attitude towards a course he may amaze the teacher with an ability to learn it that out-strip what might have been expected of him. Reverse is the case when a student holds negative attitude towards a course, he may strongly resist learning such that the teacher's effort no matter how thorough and ingenious becomes futile.

Attitude plays a very important role in determining the learning behaviours of pupils in schools. This calls for continued effort by the teachers to make sure that learners develop positive attitudes and behaviour towards education. Taylor (2004) conducted a study which involved 745 secondary school students in Southern California. It was found that there exists a positive relationship between learning environment and attitudes toward Mathematics. Therefore, the teachers' role is to creatively create a learning environment in the classroom to integrate emotional intelligence during the lesson.

Studies on gender differences have shown that no significant difference in attitudes towards mathematics (Finn, Clegg, Gilbert, Duncan, Ngemeza, Clifford, Fennema in Kaino & Salani 2004). Contrarily, it is argued that there is a significant difference (Goddard-Spear, Fennema and Fennema, in Mohamed and Waheed (2011)).

Akinsola and Olowojaiye (2008) examined the effect of behavioral objective-based instructional strategies (BOBIS) and study question based instructional strategies (SQBIS) on students' attitudes toward Senior Secondary Mathematics. Quasi experimental design was used which involved three treatment groups and a total of 312 students. Students' Attitude Questionnaire (SAQ) was used to measure students' attitudes toward Senior Secondary Mathematics. The findings of the study showed that there was a significant difference in attitudes between BOBIS group and the control group. The BOBIS group showed better attitudes toward Mathematics compared to the control group. Similarly, there was a significant difference in attitude between SQBIS group and the control group. The BOBIS group also showed better attitude towards Mathematics compared to the control group. Thus, it is shown that teachers' method of instruction in the classroom could promote students' attitude

towards Mathematics. Mohamed and Waheed (2011) had explored the students' attitude towards mathematics and gender differences in attitudes toward Mathematics in a selected school of Maldives. A questionnaire was used to collect data from 200 secondary students who were involved as sample of the study. The results showed that the students' attitude towards mathematics is medium and there was no difference in their attitudes across gender. Brearley (2001) stated that although emotional intelligence cannot be taught, it can be learnt. This has demanded the teachers' role to creatively create classroom instruction that integrate emotional intelligence. Hence, in planning Mathematics instruction teachers should take into consideration the emotional intelligence aspects to be integrated either via students' activities or exercises so as to improve learners' attitude towards Mathematics. Therefore, this study will assess the impact of integrating emotional intelligence in teaching instruction on pupils' attitude towards Mathematics. The main purpose of the study is to assess the Impact of Integrating Emotional Intelligence on Pupils' Attitudes toward Mathematics. Specifically, it seeks;

- i. Examine the impact of Integrating Emotional Intelligence on Pupils' Attitudes toward Mathematics.
- ii. Whether there is difference between male and female Integrating Emotional Intelligence on Pupils' Attitudes Toward Mathematics.

Research Questions

1. What is the mean score of the Attitudes toward Mathematics between the group of pupils who received classroom instruction which integrates emotional intelligence and the group of pupils who received conventional classroom instruction?
2. What is the mean score of the Attitudes toward Mathematics between male and female pupils who received classroom instruction which integrates emotional intelligence?

Hypotheses

Ho1: There is no significant difference in the mean score of the Attitudes Toward Mathematics between the group of pupils who received classroom instruction which integrates emotional intelligence and the group of pupils who received conventional classroom instruction.

Ho2: There is no significant difference in the mean score of the Attitudes Toward Mathematics between the male and female pupils who received classroom instruction which integrates emotional intelligence.

Methodology

This study adopted a pre-test, post-test non-equivalent control group of Quasi-experimental research design. The population of the study consists of all primary six (6) pupils of Alvan Ikoku demonstration primary school of department of primary education studies in Owerri Municipal Council Area of Imo state with a population size of 509 pupils. The sample of the study, consist of one hundred and thirty-five (135). Simple sampling technique was used to select four intact class comprising two experimental and two control groups. The experimental group had 65 pupils while control group had 70 pupils. The instrument used for data collection was Attitudes Toward Mathematics Inventory (ATMI) that measure pupil's attitudes toward Mathematics by Tapia (1996). Originally, it consists of 40 items and uses 5-point Likert scale i.e. Strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5). The ATMI was validated by two (2) experts in measurement and evaluation and two (2) experts in mathematics education. Their inputs were considered in restructuring the instrument. The reliability of ATMI was determined by a pilot test administered to a group of students who were not involved as samples in the research. The α -Cronbach value is 0.96. Finally, only 38 items were retained in the instrument used to measure students' attitudes toward Mathematics in this study. In administering the instrument, the control group and the experimental group were pre-tested with ATMI to ensure equity in their cognitive background. After that the experimental group was taught mathematics by trained research assistant who was a teacher in the school. The treatment to the experimental group was integrated with emotional intelligence. Pupils in this experimental group were given time to discuss the main points of their segment and rehearsed the presentation they made to their group. During the instruction participant in the experimental group were encouraged to ask question and clarification. The research assistant floated move around in order to observe the process and intervened when the experimental group had trouble such as a member being dominating or disruptive while the control group receives normal classroom instruction prepared by the teacher. After the treatment, both the control and experimental groups were given the post- test on the ninth week. Their responses were scored with the help of scoring key prepared by the researchers. The ATMI was given for 45 minutes. After ten days, both the control and experimental groups were given the delayed post- test. The test was given for 45 minutes. The data collected were analyzed using ANCOVA tested at 0.05 level of significant.

Results

Research Question One: What is the mean score of the Attitudes Toward Mathematics between the group of pupils who received classroom instruction which integrates emotional intelligence and the group of pupils who received conventional classroom instruction.

Table 1: Mean and standard deviation on Pre-test and Post-test Scores

Group	N	Pre-test		Post test	
		Mean	SD	Mean	SD
Experimental	65	22.31	10.04	71.25	8.00
Control	70	21.84	10.52	52.80	5.42
Mean difference				18.45	2.58

Results in table 1 shows that pretest mean score of experimental group was 22.31 while that of control group was 21.84. these suggest that both groups were almost of equal ability at the beginning of the experiment. In the post test experimental group had a mean score of 71,25 while the control group had a mean score of 52.80. Apparently, the two groups achieved higher in the posttest than the pretest indicating that learning took place. However, the posttest mean score of the experimental group was higher than that of the control group with mean difference of 18.45 and SD 2.58 in favour of the experimental group.

Research Question Two: What is the mean score of the Attitudes toward Mathematics between male and female pupils who received classroom instruction which integrates emotional intelligence

Table 2: Mean and standard deviation on attitude towards emotional intelligence

Gender	N	Mean	SD	Mean difference
Male	30	38.37	2.27	0.15
Female	35	38.52	2.48	

Result in table 2 shows that mean score of the male pupils is 38.37 and SD of 2.27 While female pupils had mean score of 38.52 and SD of 2.48 with mean difference is of 0.15. The slight difference is favour of the female pupils in the experimental study.

Hypothesis One: There is no significant difference in the mean score of the Attitudes Toward Mathematics between the group of pupils who received classroom instruction which integrates emotional intelligence and the group of pupils who received conventional classroom instruction.

Table 3: t-test analysis showing difference in Attitudes toward Mathematics between experimental and control group

Group	N	MEAN	SD	df	t-cal	t-tab	Decision
Experimental	65	71.25	8.00	132	5.45	1.96	Reject H_0
Control	70	52.80	5.42				

The result of the t-test presented in table 3 shows the calculated t-value of 5.42 is significant at ($P < 0.05$) the null hypothesis is rejected and the researchers concludes that there is significant difference on the Attitudes Toward Mathematics between the group of pupils who received classroom instruction which integrates emotional intelligence and the group of pupils who received conventional classroom instruction.

Hypothesis Two: There is no significant difference in the mean score of the Attitudes Toward Mathematics between the male and female pupils who received classroom instruction which integrates emotional intelligence.

Table 4: t-test analysis showing difference on Gender on emotional intelligence

GENDER	N	MEAN	SD	Df	t-cal	t-tab	Decision
MALE	30	38.37	2.27	65	0.05	1.96	Accept HO
FEMALE	35	38.52	2.48				

The result of the t-test presented in table 2 shows the calculated t-value of 0.05 is not significant at ($P > 0.05$) the null hypothesis is upheld and the researchers concludes that there is no significant difference in the Attitudes Toward Mathematics between the male and female pupils who received classroom instruction which integrates emotional intelligence.

Discussion of findings

The results of the study revealed that, attitude of pupils towards mathematics was improved with a high mean difference of 18.45 after integrating emotional intelligence. A test of the hypothesis one showed that a significant difference exists between the group who received classroom instruction which integrates emotional intelligence and the group of pupils who received conventional classroom instruction. Hidiet al. (2004) also stated that positive emotions will promote positive attitude towards learning. Thus, this study had proved that pupils with positive emotional intelligence will acquire positive attitude towards Mathematics. In teaching and learning process, the effort to promote learners' emotional intelligence could be done by integrating emotional intelligence in teaching instructions. The result of this study is in line with those conducted by Akinsola and Olowojaiye (2008) and Taylor (2004). Therefore, lessons which integrate emotional aspect could promote students' attitudes toward Mathematics.

Also, the results of the study revealed that no significance difference between male and female pupils who received classroom instruction which integrates emotional intelligence. The findings also indicated the successfulness of integrating emotional intelligence via teaching instruction to promote pupils' attitudes toward Mathematics is true for both genders.

Conclusion

The evidence from this study indicates a positive implication in teaching and learning of Mathematics. Therefore, teacher could creatively modify their instructional strategies to integrate emotional intelligence in teaching and learning process as the study proved that Mathematics instructions which integrate emotional intelligence has statistically significant effects on pupils' attitudes toward Mathematics. Generally, the study shows that the integration of emotional intelligence in teaching and learning process has significantly increased pupil' attitude towards Mathematics irrespective of gender.

Recommendations

Based on the findings of this study, the following recommendations are made;

1. Mathematics teachers should be trained through intensive seminars, workshops and in-service trainings on the use of emotional intelligence for teaching and learning of mathematics.
2. Mathematics laboratories should be provided in schools for effective teaching and learning of mathematics.

References

- Agwagah, U., N., V. (2006). Teaching number bases in Junior Secondary Schools. *ABACUS: The Journal of Mathematics Association Nigeria (MAN)*. 19(1), 81-87.
- Akinsola, M., K. and Olowojaiye, F., B. (2008). Teacher instructional methods and student attitudes towards mathematics. *International Electronic Journal of Mathematics Education*, 3(1): 61-73.
- Bala, A, & Musa, B. (2006). Effect of the Use of number base Game on Senior Secondary School Achievement in Number Base. *ABACUS: The Journal of Mathematics Association Nigeria (MAN)*. 31 (1), 103-114.
- Bar-On, R., (2006). The Bar-On model of Emotional–social intelligence (ESI). *Psicothema* 18 (Suppl.), 13–25.
- Brackett, M. A., Rivers, S.E., & Salovey, P. (2011). Emotional intelligence: Implications for personal, social, academic, and workplace success. *Soc Personal Psychol Compass*, 5, 88–103.
- Brearley, M., (2001). Emotional intelligence in the classroom: Creative learning strategies for 11 –18s. Wales: Crown House Publishing
- Eniayeju, A., A. (2005). Training and retention of mathematics teachers in Nigeria. In Ale, S. O. & Adetula, L. O. (Eds.), *Reflective and Intellectual Position Papers on Mathematics Education issues*. Abuja: Marvelous.
- Galadima I, & Okogbemon A., A. (2012). The effect of Mathematical games on academic performance and attitude of senior secondary students towards mathematics in selected schools in Sokoto State, *ABACUS: The Journal of Mathematics Association Nigeria (MAN)*. 37(1), 30-37.

- George, H., H. (2007). Assessment and grading in high school Mathematics classrooms. *Journal of Mathematics Association of Nigeria* 33(2), 412-418.
- Goleman, D. (2006), Duygusal Zeka Neden IQ'dan Daha Önemlidir? B. S. Yüksel (Trans.) (33. Ed.) stanbul:Varlık Yayınlar.
- Hamdallat T., Y., Abdulraheem Y., Amosa I., G (2015) Emotional Intelligence of Student - Teachers in Relation to Their Future Productivity. The African Symposium: *An online journal of the African Educational Research Network* 15, (1), 25-34.
- Hannula, M.S., (2002). Attitude towards mathematics: Emotions, expectations and values. *Educational Studies in Mathematics*, 49(1): 25-46.
- Hidi, S., K.A. Renninger and A. Krapp, (2004). Interest, a motivational variable that combines affective and cognitive functioning. In Dai, D.Y. & Sternberg, R.J. (Eds.). *Motivation, emotion and cognition: Integrative perspectives on intellectual development and functioning*. New Jersey: Lawrence Erlbaum Associates, Inc. pp: 89-115.
- Iji, C., O. (2006). Challenges of primary mathematics for Universal Basic Education (UBE), *ABACUS: Journal of Mathematics Association of Nigeria* 32(1), 14-23.
- Kurumeh, M., S. (2007). Effect of ethno-mathematics approach on students' interest in geometry and menstruation, *ABACUS: Journal of Mathematics Association of Nigeria* 32(1), 103-114.
- Kaino, L.M. and Salani, E.B (2004). Students' Gender Attitudes Towards the Use of Calculators in Mathematics Instruction. Proceedings of the 28th Conference of the International Group for the Psychology of Mathematics Education 113-120.
- Maraichelvi, A. & Rajan, S. (2013). The relationship between emotional intelligence and the academic performance among final year undergraduates. *Universal Journal of Psychology*, 1(2), 41-45. Available online at <http://www.hrpub.org>.
- Marsh, C. J. (2009). *Key Concepts for Understanding Curriculum*. London: Routledge.
- Mohamed, L. and H. Waheed, (2011). Secondary students' attitude towards mathematics in a selected school of Maldives. *International Journal of Humanities and Social Science*, 1(15), 277-281
- Nelson, D., & Low, G. (2003), *Emotional intelligence: Achieving academic and career excellence*. Upper Saddle River, PA: Prentice Hall, Pp 12, 102.
- Oguoma, C.,** Okebaram, H, & Uamba, E., C. (2018). Assessment of Science Students Attitude towards Entrepreneurship Education for Sustainable Governance. *ABSU journal of Education studies*. 4, (1) 277-285.
- Orluwene, G. W., & Wachukwu, T. (2014). Dimensions of emotional intelligence as predictors of job involvement among teachers. *International Journal of Development and Emerging Economics*, 2(1), 8-18.

- Peter Salovey, Marc, A., Brackett, B., John D. & Mayer, C. (2004). Emotional Intelligence: Key Readings on the Mayer and Salovey Model. NY: Dude Publishing, p. 5.
- Romanelli, F, Cain, J., Smith, K.M. (2006). Emotional intelligence as a predictor of academic and/or professional success. *American Journal of Pharmaceutical Education*, 70(3), 69.
- Salman, A., H. (2002). Looking towards the 21st century: Challenges of education, theory and practice, *Education Research*, 28(7), 4-14.
- Seweje, B.C. (2010). *The Effects of Polya's Language Techniques in Teaching Problem Solving in Mathematics on Secondary School Students Interest*. Proceedings of Annual Conference of MAN of Nigeria, 15-36.
- Tapia, M. and Marsh., E., G. (2004). An instrument to measure mathematics attitudes. *Academic Exchange Quarterly*, 8(2): 16-21.
- Taylor, B.A. (2004). The influence of classroom environment on high school students' mathematics anxiety and attitudes. Unpublished PhD Thesis, Curtin University of Technology.
- Adomi, E. E. & Anie, S. O. (2006). *An assessment of computer literacy skills of professionals in Nigerian university libraries*. *Library HiTech News*, 23 (2), 10-14..