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THE EFFECTS OF INTEGRATING EMOTIONAL INTELLIGENCE ON STUDENTS' ATTITUDES TOWARD MATHEMATICS

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ABSTRACT

The paper discusses the findings of a study which examine the effects of integrating emotional intelligence on students' attitudes toward Mathematics. The research employed a quasi-experimental design involving two non-equivalent study group samples receiving different treatment. Focus was on the Mathematics subject at the lower secondary level in Malaysia. A total of 253 students were involved as research participants. The research involved two groups: a control group and an experimental group. The experimental group received teaching instruction which integrates emotional intelligence while the control group received normal teaching instruction by teacher. Data were collected over a period of nine weeks. A pre-test was conducted in the first week followed by seven weeks of instruction. A post-test was carried out in the final week. The Attitudes toward Mathematics Inventory was used to gauge students' attitudes toward Mathematics. Research results show that the experimental group received teaching instruction which integrates emotional intelligence has statistically significant effects on students' attitudes toward Mathematics. Generally, research results showed that the integration of emotional intelligence in teaching and learning process has significantly increased students' attitudes toward Mathematics.

Keywords: Emotional intelligence, Teaching instruction, Teaching and learning, Mathematics subject, Attitudes toward mathematics, Quasi-experimental design.

Contribution/ Originality

This study is one of very few studies which have investigated the effect of integrating emotional intelligence in teaching and learning on students' attitudes toward Mathematics. The

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results had proved that teachers could creatively plan to integrate emotional intelligence in teaching and learning, and this should also be carried out in other subjects at school level.

1. INTRODUCTION

Education plays a vital role in the development of a country. It can't be denied that the successful of an education system depends on a number of factors and one of the most important factors is the curriculum implemented to achieve the goals. One's success in life does not depend solely on intellectual intelligence. According to (Goleman, 1995; 1998) Intelligence Quotient (IQ) contributes only about 20% of success in life whereas Emotional Quotient (EQ) contributes another 80%. Thus, today's curriculum should contain added value in order to prepare the students with competencies to face complex global challenges.

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1.1. Background of Study

Several studies had shown that treatments given to groups of students will effect on their attitudes toward Mathematics (Smith, 2001; Olson, 2002; Curtis, 2006; Akinnoglu and Tandogan, 2007). Furthermore, studies of students' attitudes toward Mathematics had shown that teaching and learning environment did promote students attitude towards Mathematics. Learning environment depends largely on teaching methodology and instruction prepared by teacher. Rimm-Kaufman (2006) found that students who followed the Responsive Classroom under the emotional intelligence program showed more positive attitude towards school, teachers and peers than students from control schools.

Hidi *et al.* (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 in teaching Mathematics is important and should be emphasized because emotional intelligence is related to attitude and feeling towards Mathematics which promote motivation and the development of other aspects of an individual.

1.2. Problem Statement

Teachers play an important role in classroom teaching and learning. Payton et al. (cited in Pasi (2001)) had stated that curriculum instructions which focus on academic aspect failed to assist students as responsible, caring and competent learners. Thus, in the process of curriculum implementation, emphasis should not on the development of cognitive aspects but affective aspects as well.

Methods chosen by teachers and students engagement in the learning process will effect students attitudes toward learning. Research by Akinsola and Olowojaiye (2008) found out that teachers teaching methods could change students attitudes toward Mathematics. Brearley (2001) acknowledged that students attitude can be observed as a result of emotional intelligence implemented. Thus, the effort to integrate emotional intelligence in classroom instruction and its effect on students' attitudes toward Mathematics should be explored. The purpose of this study is to investigate the effect of classroom instruction which integrate emotional intelligence on students' attitudes toward Mathematics.

2. RESEARCH HYPOTHESIS

The null hypotheses of the study are as follows:

Ho1 : There is no significant difference in the adjusted mean score of the Attitudes Toward Mathematics between the group of students who received classroom instruction which integrates emotional intelligence and the group of students who received normal classroom instruction prepared by the teacher.

Ho2 : There is no significant difference in the adjusted mean score of the Attitudes Toward Mathematics between the group of male students who received classroom instruction which integrates emotional intelligence and the group of male students who received normal classroom instruction prepared by the teacher.

Ho3 : There is no significant difference in the adjusted mean score of the Attitudes Toward Mathematics between the group of female students who received classroom instruction which integrates emotional intelligence and the group of female students who received normal classroom instruction prepared by the teacher.

3. LITERATURE REVIEW

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. Students may express liking or disliking of Mathematics because of emotions, expectations or values" (pg. 30). Hannula describes attitudes toward Mathematics as consists of four evaluation processes. These four processes are emotion, emotional disposition, mathematical situation and related goals. Tapia and Marsh (2004) also considered four constructs related to attitude towards Mathematics. The constructs are self confidence, value, enjoyment and motivation.

Taylor (2004) conducted a study which involved 745 secondary school students in Southern California. It was found that there exist positive relationship between learning environment and attitudes toward Mathematics. Therefore, the teachers' role is to creatively create learning environment in the classroom to integrate emotional intelligence during the lesson.

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 demand 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 students' attitude towards Mathematics. According to Brearley, "Attitudes, habits and beliefs become the observable outcomes of emotional intelligence" (pg. 63).

Thus, this study will investigate the effect of integrating emotional intelligence in teaching instruction on students' attitude towards Mathematics.

4. METHODOLOGY

4.1. Research Design

This research uses quasi-experimental design. In quasi-experimental design, researcher can manipulate independent variables to study the effect on dependent variables (Gay & Airasian, 2000; Myers and Hansen, 1997; Mertens, 1998; Wiseman, 1999). The method chosen is *Nonequivalent Control Group Design* which involves two groups, the experimental group and the control group. Both groups received different treatments. The experimental group receives classroom instruction which integrates emotional intelligence whereas the control group receives normal classroom instruction prepared by the teacher. In this study, the independent variable is classroom instruction and the dependent variable is students' attitude towards Mathematics. Pre-test and post-test were administered to the samples in both groups.

4.2. Research Procedure

The quasi experiment study was conducted over a period of nine weeks. Pre-test was administered to the experimental group and the control group in the first week of the study. From the second week to the eighth week the experimental group receives classroom instruction which integrates emotional intelligence while the control group receives normal classroom instruction prepared by the teacher. On the ninth week, post-test was administered to both groups.

4.3. Sampling

For experimental research, it is suggested that each group consists of minimum 30 respondents (Gay and Airasian, 2000). In this research, the experimental group consists of 123 students; 61 males and 62 females. The control group consists of 130 students; 62 males and 68 females. The demographic data are presented in Table 1.

Table-1. Distribution of Samples by Group and Gender

Treatment Group	Gender		Total
	Male	Female	
Experimental Group	61	62	123
Control Group	62	68	130
Total	123	130	253

4.4. Instrument

Attitudes Toward Mathematics Inventory (ATMI) is an instrument to measure students 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 English version of ATMI was translated into the Malay language. The translation were reviewed by experts. 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 .96. Finally, only 38 items were retained in the instrument used to measure students' attitudes toward Mathematics in this study.

4.5. Data Analysis Procedure

Data of this study were gathered during pre-test and post-test. Inferential statistic were analyzed by employing SPSS software. In choosing the classes for the experimental group and the control group, there was no random selection among the students; random selection only involved in selecting the intact group to treatments. The inability to randomly assigned the students for treatment groups causes difficulty in controlling the difference of group samples at the beginning of the study. Thus, to statistically equate the groups, analysis of covariance (ANCOVA) was used.

The use of ATMI as instrument in pre-test and post-test will cause cause a phenomenon known as ceiling effect i.e. students with very low scores in pre-test will have better opportunity to show higher gain score, whereas students with very high scores in pre-test have only small opportunity to show better gain score. Thus, ANCOVA was used to solve the problem associated with gain score.

5. DATA ANALYSIS

Ho1 : There is no significant difference in the adjusted mean score of the Attitudes Toward Mathematics between the group of students who received classroom instruction which integrates emotional intelligence and the group of students who received normal classroom instruction prepared by the teacher.

Table 2 shows the result of the Levene's Test.

Table-2. Levene's Test of Attitude Towards Mathematics

Dependent Variable: Post-test Attitude Towards Mathematics

F	df1	df2	Sig.
1.293	1	251	.257

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a Design: Intercept+pramnsk+Instruction

Levene's test result is not significant showing that the error variances appear to be equal across groups.

Table 3 shows the adjusted mean scores of students in control and experimental groups on attitudes toward Mathematics.

Table-3. Mean Score of Attitude Towards Mathematics Post-test According To Treatment Group
Dependent Variable: Overall Post-test Attitudes Toward Mathematics

Treatment Group	Mean	Std. Error
Control Group	3.746[a]	.009
Experimental Group	3.946[a]	.010

a Covariates appearing in the model are evaluated at the following values: Mean Pre-test – Attitudes Toward Mathematics= 3.3094.

Table 3 indicates the adjusted mean score of the post- test of the attitudes toward Mathematics for the control group and the experimental group. The adjusted mean score of the control group is 3.746 (S.D. = .009). The adjusted mean score of the experimental group is 3.946 (S.D. = .010). Hence, there is a difference of 0.200 between the adjusted mean score of the control group and the experimental group. Table 4 shows the ANCOVA result.

Table-4. ANCOVA Result Showing The Effects of Instructions On Attitudes Toward Mathematics
Dependent Variable: Attitudes Toward Mathematics Post-Test

Source	Type III Sum of Squares	df	Mean square	F	Sig.
Corrected Model	37.658[b]	2	18.829	1616.414	.000
Intercept	4.399	1	4.399	377.658	.000
Overall Pre-test	36.500	1	36.500	3133.456	.000
Instruction	2.523	1	2.523	216.617	.000
Error	2.912	250	.012		
Total	3777.169	253			
Corrected Model	40.570	252			

a Computed using alpha = .05

b R Squared = .928 (Adjusted R Squared = .928)

Table 4 shows that there was a significant difference at the level $p < .05$ between the adjusted mean score of attitudes toward Mathematics of subjects in experimental group and the adjusted mean score of overall Mathematics achievement of subjects in control group ($F_{(1, 250)} = 216.617$, $p = .000$). Thus, Ho1 is rejected. As a result, it is concluded that the students in the experimental group possessed better attitudes toward Mathematics compared to the students in the control group.

Ho2 : There is no significant difference in the adjusted mean score of the Attitudes Toward Mathematics between the group of male students who received classroom instruction which integrates emotional intelligence and the group of male students who received normal classroom instruction prepared by the teacher.

Table 5 shows the result of the Levene's Test.

Table-5. Levene's Test of Attitudes Toward Mathematics of Male Students

Dependent Variable: Post-test Attitudes Toward Mathematics

F	df1	df2	Sig.
1.034	1	121	.311

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a Design: Intercept+pramnsk+Instruction

Levene's test result is not significant showing that the error variances appear to be equal across groups of male students.

Table 6 shows the adjusted mean scores of students in control and experimental groups on attitudes toward Mathematics of male students.

Table-6. Mean Score of Attitude Towards Mathematics Post-test of Male Students According To Treatment Group

Dependent Variable: Male Students' Attitudes Toward Mathematics Post-Test

Treatment Group	Mean	Std. Error
Control Group	3.702[a]	.014
Experimental Group	3.923[a]	.014

a Covariates appearing in the model are evaluated at the following values: Mean Pre-test – Attitudes Toward Mathematics= 3.2995

b. Gender = Male

Table 6 indicates the adjusted mean score of the post-test of the male students' attitudes toward Mathematics for the control group and the experimental group. The adjusted mean score of the control group is 3.702 (S.D. = .014). The adjusted mean score of the experimental group is 3.923 (S.D. = .014). There is a difference of 0.221 between the adjusted mean score of the control group and the experimental group. Table 7 shows the ANCOVA result.

Table-7. ANCOVA Result Showing The Effects of Instructions On Male Students' Attitudes Toward Mathematics

Dependent Variable: Attitudes Toward Mathematics Post-Test

Source	Type III Sum of Squares	df	Mean square	F	Sig.
Corrected Model	19.604[b]	2	9.802	781.887	.000
Intercept	2.356	1	2.356	187.948	.000
Overall Pre-test	17.571	1	17.571	1401.672	.000
Instruction	1.492	1	1.492	119.012	.000
Error	1.504	120	.013		
Total	1808.143	123			
Corrected Model	21.108	122			

a Computed using alpha = .05

b R Squared = .929 (Adjusted R Squared = .928)

c. Gender = Male

Table 7 shows that there was a significant difference at the level $p < .05$ between the adjusted mean score of attitudes toward Mathematics of male students in the experimental group and the adjusted mean score of attitudes toward Mathematics of male students in the control group ($F_{(1, 250)} = 216.617$, $p = .000$). Therefore, Ho2 is rejected. As a result, it is concluded that the male students in the experimental group possessed better attitudes toward Mathematics compared to the male students in the control group.

Ho3 : There is no significant difference in the adjusted mean score of the Attitudes Toward Mathematics between the group of female students who received classroom instruction which integrates emotional intelligence and the group of female students who received normal classroom instruction prepared by the teacher.

Table 8 shows the result of the Levene's Test.

Table-8. Levene's Test of Attitudes Toward Mathematics of Female Students

Dependent Variable: Post-test Attitudes Toward Mathematics

F	df1	df2	Sig.
3.588	1	128	.060

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a Design: Intercept+pramnsk+Instruction

Levene's test result is not significant showing that the error variances appear to be equal across groups of female students.

Table 9 shows the adjusted mean scores of students in control and experimental groups on attitude towards Mathematics of female students.

Table-9. Mean Score of Attitudes Toward Mathematics Post-test of Female Students According To Treatment Group

Dependent Variable: Female Students' Attitudes Toward Mathematics Post-Test

Treatment Group	Mean	Std. Error
Control Group	3.784[a]	.012
Experimental Group	3.970[a]	.013

a Covariates appearing in the model are evaluated at the following values: Mean Pre-test – Attitudes Toward Mathematics= 3.3189

b. Gender = Female

Table 9 shows the adjusted mean score of the post-test of the female students' attitudes toward Mathematics for the control group and the experimental group. The adjusted mean score of the control group is 3.784 (S.D. = .012). The adjusted mean score of the experimental group is 3.970 (S.D. = .013). Thus, there is a difference of 0.186 between the adjusted mean score of the control group and the experimental group. Table 10 shows the ANCOVA result.

Table-10. ANCOVA Result Showing The Effects of Instructions On Female Students' Attitudes Toward Mathematics

Dependent Variable: Attitudes Toward Mathematics Post-Test

Source	Type III Sum of Squares	df	Mean square	F	Sig.
Corrected Model	17.994[b]	2	8.997	928.058	.000
Intercept	2.071	1	2.071	213.670	.000
Overall Pre-test	17.978	1	17.978	1854.458	.000
Instruction	1.070	1	1.070	110.321	.000
Error	1.231	127	.010		
Total	1969.026	130			
Corrected Model	19.226	129			

a Computed using alpha = .05

b R Squared = .936 (Adjusted R Squared = .935)

c. Gender = Female

Table 10 shows that there was a significant difference at the level $p < .05$ between the adjusted mean score of attitudes toward Mathematics of female students in the experimental group and the adjusted mean score of attitudes toward Mathematics of female students in the control group ($F_{(1, 250)} = 216.617$, $p = .000$). Therefore, Ho3 is rejected. It is concluded that the female students in the experimental group possessed better attitudes toward Mathematics compared to the female students in the control group.

6. DISCUSSION

The findings of the study had proved Brearley (2001) ideas where attitude is stated as one of the outcomes of emotional intelligence and teacher's role in influencing students' attitudes toward Mathematics. Hidi *et al.* (2004) also stated that positive emotions will promote positive attitude towards learning. Thus, this study had proved that students with positive emotional intelligence will acquire positive attitude towards Mathematics. In teaching and learning process, the effort to promote students' 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. The findings also indicated the successfulness of integrating emotional intelligence via teaching instruction to promote students' attitudes toward Mathematics is true for both genders.

This study had embarked in teaching instructions for lower secondary Mathematics. It is recommended that the effect of integrating emotional intelligence in classroom instruction to be carried out in other subjects at school level or done in certain courses at the higher education level.

7. CONCLUSION

The evidence from this study indicates a positive implication in teaching and learning 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 positively on students' attitudes toward Mathematics. Generally, the study shows that the integration of emotional intelligence in teaching and learning process has significantly increased students' attitude towards Mathematics.

The evidence from this study indicates a positive implication in teaching and learning Mathematics. Therefore, teacher could creatively modify their instructional strategies to integrate emotional intelligence in teaching and learning process to meet students' needs.

REFERENCES

Akinnoglu, O. and R.O. Tandogan, 2007. The effects of problem-based active learning in science education on students' academic achievement, attitude and concept learning. Eurasia Journal of Mathematics, Science and Technology Education, 3(1): 71-81.

Akinsola, M.K. and F.B. Olowojaiye, 2008. Teacher instructional methods and student attitudes towards mathematics. International Electronic Journal of Mathematics Education, 3(1): 61-73.

Brearley, M., 2001. Emotional intelligence in the classroom: Creative learning strategies for 11 – 18s. Wales: Crown House Publishing.

Curtis, K.M., 2006. Improving student attitudes: A study of a mathematics curriculum innovation. Unpublished PhD Dissertation, Kansas State University.

Gay, L.R. and P. Airasian, 2000. Educational research: Competencies for analysis and application. New Jersey: Prentice Hall.

Goleman, D., 1995. Emotional intelligence. New York: Bantam Books.

Goleman, D., 1998. Working with emotional intelligence. London: Bloomsbury Publishing.

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.

Mertens, D.M., 1998. Research methods in education and psychology: Integrating diversity with quantitative and qualitative approaches. London: Sage Publications.

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.

Myers, A. and C. Hansen, 1997. Experimental psychology. 4th Edn., California: Brooks/Cole Publishing Company.

Olson, V.E., 2002. Gender differences and the effects of cooperative learning in college level mathematics. Unpublished Mathematics Education Doctoral Thesis. Curtin University of Technology.

Pasi, R.J., 2001. Higher expectations: Promoting social emotional learning and academic achievement in your school. New York: Teachers College Press.

Rimm-Kaufman, S.E., 2006. Social and academic learning study on the contribution of the responsive classroom approach. Available from http://www.responsiveclassroom.org/pdf_files/sals_booklet_rc.pdf [Accessed Disember 8, 2006].

Smith, J.E., 2001. The effect of the carnegie algebra tutor on student achievement and attitude in introductory high school algebra. Unpublished Ed.D Dissertation, Virginia Polytechnic Institute and State University.

Tapia, M., 1996. The attitudes toward mathematics instrument. Paper Presented at the Annual Meeting of the Mid-South Educational Research Association.

Tapia, M. and G.E. Marsh, 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.

Wiseman, D.C., 1999. Research strategies for education. London: Wadsworth Publishing Company.