 ISSN: 1656-0264

The Effects of Eclectic Teaching Approach in Mathematics for Grade IX Students

June Venelee A. Delgado[1] and Victor D. Villaganas[2]
[1]Mandaue City Comprehensive National High School
[2]Cebu Technological University-Main Campus

ABSTRACT

The study assessed the performance level of Grade IX students in Mathematics after being exposed to conventional teaching approach (CTA) and the eclectic teaching approach (ETA) at Mandaue City Comprehensive National High School during the School Year 2014–2015. This study aimed to compare the effectiveness of CTA and ETA based on the students' performance level before and after they were exposed to these strategies in the fourth grading period, using their Pre test-Post test scores. Results of the study showed that the performance of students (Section A) exposed to the Conventional Teaching Approach and those students (Section B) exposed to the Modular Teaching Approach were both low in the pre-test, but showed minimal improvement in the post-test. There was a significant pre-post mean increase of the students' performance in Mathematics IX using both CTA and ETA. Moreover, there was no significant difference on the mean increase between the students' performance using these aforementioned approaches of teaching, which proved that the effectiveness of these approaches were comparable. The findings indicate that ETA can be an alternative way to CTA.

Keywords: performance level, pre-test, post-test, learning exercise, modular teaching approach

INTRODUCTION

Mathematics, like any other subject in the curriculum, supports and contributes the fundamental skills for learners in basic education. However, Mathematics is a difficult subject, both to learn and to teach (Abalajon, 1993; Paspasan, 2015). Being an exact science and the foundation of science and technology, the curricula at all levels of the educational system feature mathematics among the major subjects. But, because of its abstract nature, mathematics is wrestled with or endured, at its best, rather than enjoyed by most young learners who are not mathematically inclined (Acelajado, 2006). On the other hand, developed nations can be distinguished from the developing and underdeveloped ones in the field of mathematics. However in the global setting, a country's development in mathematics may not be equated with a high achievement or even attitude of the students towards the field. Progressive countries like the United States of America, for example, outperforms in Mathematics, Science and Reading by students from East Asian countries like Singapore and South Korea (TIMSS and PIRLS International Study Center, 2011).Hence, through this, a number of countries are impelled in working hard to improve their educational achievement, by redeveloping curricula, for example, raising standards for teacher certification, or increasing the number of years of schooling. The Philippines, as an example, has recently adopted the K to 12 Basic Education Curriculum with the hope of

 ISSN: 1656-0264

developing scientifically literate individuals equipped with globally competitive ideas and skills.

The shift to a new curriculum has been a product of the analysis of the performance of the Philippine education in the past years. It has been observed that the Republic of the Philippines is far from the ranking of Mathematics with other countries. Results from international surveys and achievement tests placed the Philippines at the bottom rank in science and mathematics. The Executive Opinion Survey in 2011–2012 of the World Economic Forum revealed that the Philippines ranks 48thoutof 62countries worldwide in the quality of math and science education. In addition, a trend in the National Achievement Test in the Philippines for the past ten years shows a depressing result that out of the subjects administered, Mathematics has a depreciating Mean Percentage Score (MPS). The MPS in Mathematics in S.Y. 2004 -2005, S.Y. 2005-2006 and S.Y. 2011-2012 are 50.70, 47.82 and 46.37, respectively. Records of Mandaue City Comprehensive National High School's MPS in Mathematics during the National Achievement Test show a little progress every year. In S.Y. 2009–2010, S.Y. 2010–2011 and S.Y. 2011–2012, the MPS in Mathematics were 37.34, 43.83, and 44.39 consecutively. Despite of its results, the garnered MPS still do not meet the75% division passing percentage. This evident low achievement in Mathematics creates a challenge to the Mathematics educators. In this connection, a teacher may generate new instructional materials and strategies to address this problem. Based on this reality of students' low performance in mathematics, the study on the effects of ETA in mathematics was conducted. Thus, the study assessed the performance level of Grade IX students in Mathematics after being exposed to conventional teaching approach (CTA) and the eclectic teaching approach (ETA) at Mandaue City Comprehensive National High School during the School Year 2014–2015.

The results of the study are beneficial to the following stakeholders: (1) curriculum planners' awareness in the efficiency of using modular instruction as a teaching-learning strategy in eclectic approach of teaching to students with large differences in age, economic status, intelligence, and to provide the ground for upgrading the quality of modular education services in policy making, planning, implementing, and evaluation; (2) administrators introduce ETA to the teachers, to promote good intervention to students' academic performance; (3) Mathematics Supervisors consider the use of ETA to teachers under his or her to increase performance of supervision of Mathematics at all levels;(4) Mathematics coordinator would include the use of ETA among all Mathematics teachers in the school under his or her supervision; (5) Mathematics teachers can adopt modular instruction as one of ETA's teaching and learning strategies with flexibility, and (6) students are given orientation on the use of ETA's modules, which allow them to study on their own pace and environment with minimal disruption to personal normal routines.

MATERIALS AND METHODS

This study uses a quasi- experimental method to compare the effectiveness of CTA and ETA based on the students' performance level before and after they were exposed to these strategies in the fourth grading period, using the Pre-test and Post-test Design. The respondents of the study were the two sections of heterogeneous group of students as 'Section A and Section

 ISSN: 1656-0264

B'. Section A composed of 50 students were exposed to Conventional Teaching Approach, as the non-experimental group; while section B composed of 50 students were exposed to Modular Teaching Approach, as the experimental group.

The Research Instrument

This study used 2 sets of 20-item test in Grade IX Mathematics which focused on the topics about Quadrilaterals and its Properties. This was used for the pre and post tests in both sections. The first set of test item which was used as the pre test was taken from the Department of Education Learning Manual for Grade IX Mathematics. The second set of test item used as post test was made by the researcher parallel to the item given in the pre test. For the validity of the instruments, Mathematics experts were consulted as regards to their suggestions, corrections and for refinement of the research instrument. The modules used were suggested by the Department of Education EASE (Effective Alternative Secondary Education) Project, which were administered to the experimental groups for 4 weeks. A pre test was administered in the two groups before the start of the investigation and a parallel-question post test was administered in the two groups after subjecting the students into the two teaching approaches. The difference in the mean of both groups was calculated and performance of the students in the two groups was compared.

Statistical Treatment

The data were treated using simple percentages to determine the profile of the student-respondents, Z-test for single and large sample to determine the pre test and post test performance of the students in terms of their achievement in Math IX when exposed to the two strategies, T-test of dependent or correlated means to determine the improvement from the pre test to the post test of the students in Math IX when exposed to Conventional Teaching Approach and Modular Teaching Approach, and T-test of mean difference to determine if there is a significant difference in the mean increase in scores between these two approaches, which all tests treated at 5 % level of significance.

RESULTS AND DISCUSSION

Profile of the Respondents

Table 1 depicts the presentation of the respondents' ages and gender of the selected two sample sections with 50students in each section. The respondents' ages range from 14 to 16 implies that they belong to the age adolescent age category of Piaget who is characterized with high level of abstraction of information. These are the respondents who were enrolled in Mathematics IX in Conventional Teaching Approach, which served as the control group.

 ISSN: 1656-0264

Table 1 Profile of the Students in Section A as to Age and Gender

Age	Gender				Total	
	Male		Female			
	f	%	f	%	f	%
16	4	22.22	1	3.12	5	10.00
15	10	55.56	23	71.88	33	66.00
14	4	22.22	8	25.00	12	24.00
Total	18	100.00	32	100.00	50	100.00
Mean Age	**15**		**15**		**15**	

Table 2 shows the equal number of students from Sections B that served as the experimental group, with a negligible percentage of older respondents compared with the control group. Both groups have represented more females than males. Tables 3 and 4 reflect the frequency and percentage distribution of the respondent's average academic grade in Mathematics VIII in each section. The grades were used as the average of the four grading periods of the students in Mathematics in the previous school year of 2013–2014.

Table 2.Profile of the Students in Section B as to Age and Gender

Age	Gender				Total	
	Male		Female			
	f	%	f	%	f	%
17	2	9.09	0	0.00	2	4.00
16	6	27.27	1	3.57	7	14.00
15	12	54.55	19	67.86	31	62.00
14	2	9.09	8	28.57	10	20.00
Total	22	100.00	28	100.00	50	100.00
Mean Age	**15**		**15**		**15**	

Table 3 shows that out of 50 respondents three (3) or 6.00 percent obtained a grade of 90 percent and above, which is classified as Advanced; 16 or 32.00 percent, Proficient; 15 or 30.00 percent, Approaching Proficient; 16 or 32.00 percent, Developing; and 0 or 0.00 percent, Beginning, respectively. It can be drawn from the data that section A respondents achieved Developing, Approaching Proficiency, and Developing in their Mathematics VIII performance, indicative that they belong to the average group

Table 3. Average Academic Grade in Mathematics VIII of the Respondents in Section A

Rating	Category	f	%
90 – Above	A (Advanced)	3	6.00
85 – 89	P (Proficient)	16	32.00
80 – 84	AP (Approaching Proficient)	15	30.00
75 – 79	D (Developing)	16	32.00
74 – below	B (Beginning)	0	0.00
	Total	50	100.00

 ISSN: 1656-0264

Table 4. Average Academic Grade in Mathematics VIII of the Respondents in Section B

Rating	Category	f	%
90 – Above	A (Advanced)	2	4.00
85 – 89	P(Proficient)	19	38.00
80 – 84	AP (Approaching Proficient)	11	22.00
75 – 79	D (Developing)	19	38.00
74 – below	B (Beginning)	0	0.00
	Total	50	100.00

Table 4 shows that (2) or 4.00 percent obtains a grade of 90 percent and above, which is classified as Advanced; 19 or 38.00 percent, Proficient; 11 or 22.00 percent, Approaching Proficient; 19 or 38.00 percent, Developing; and 0 or 0.00 percent for Beginning. It can be drawn from the data that section B of the respondents achieved Proficient and Developing in their works in Mathematics VIII. Both sections showed a relatively average academic standing in Mathematics when they were in Grade VIII. These profiles satisfy the basic requirement of an ideal population.

Pre-test Performance Level of Grade IX Students in Mathematics before Subjected to CTA and ETA

Table 5 shows the pre-test performance level of the respondents in Section A and B before subjecting to the conventional teaching and the eclectic approaches. The test focuses on the following learning competencies: (1) the learners identify quadrilaterals that are parallelogram; (2) the learners determine the conditions that guarantee a quadrilateral a parallelogram; (3) the learners use properties to find measures of angles, sides and other quantities involving parallelograms; (4) the learners prove theorems on the different kinds of parallelogram; (5) the learners prove the Midline Theorem; (6) the learners prove theorems on trapezoid; and 7.) the learners solve problems involving parallelograms and trapezoids. Result of the pre-test scores revealed that there is significant difference between the hypothetical mean and the actual mean of the students in Mathematics IX. As reflected in Table 5, it shows the actual mean, the hypothetical mean (H.M.), the difference between the mean and the standard deviation (SD) of the two groups in Mathematics IX are significantly comparable.

Table 5. Performance Level in the Pretest in Grade IX Mathematics

Section	n	H. M.*	Actual Mean	Difference between Means	SD	Test Statistics Computed z	Tabled Valued	Decision
A	50	15	8.54	6.46	2.44	18.72	1.96	Significant
B	50	15	8.60	6.40	2.36	19.18	1.96	Significant

For significance at $\alpha = 0.05$, $z \geq 1.96$
*Hypothetical Mean was based on the 75% passing percentage of the DepEd

 ISSN: 1656-0264

From Table 5, it is noted that the pre-test of section A obtains an actual mean of 8.54 which is 6.46 lower than the hypothetical mean of 15. On the other hand, section B has an actual mean of 8.60 which is 6.40 lower than the aforementioned hypothetical mean value. At a level of significance α = 0.05, both computed z-test values of 18.72 and 19.18 are greater than the tabled value of 1.96. These are significant, hence, hypothesis is rejected. This indicates that there is a significant difference between the hypothetical mean and the actual mean of the students of the two groups in their pre-test. Their performance in Mathematics IX is Below Average. This means further that the students' performance before they are exposed to CTA and ETA does not reach the standard performance of 75%. This Below Average performance reveals that the students do not have any idea on the aforementioned competencies. In addition, the students may have not encountered such concepts yet in any discussion or reference material during their previous grade level.

Performance Level of Grade IX Students in Mathematics after Subjected to the Eclectic Teaching Approach

Table 6shows the respondents' post-test level of performance in Section A and B after the utilization of the modular and conventional teaching approaches. Section A was exposed to Conventional Teaching Approach, a type of a teacher-centered class, where the teacher discusses the concept in a lecture way. All the source of information about the lesson is controlled by the teacher. The learners were given time to answer activities regarding the lesson, after the teachers lecture. Section B was exposed to the Eclectic Teaching Approach, where students were facilitated by the teacher. The learners were divided into groups of 5 members. Each group was given modules about the learning competencies on quadrilaterals and its parts. The groups were instructed to study together the given module and perform the exercises and other learning tasks. Every meeting, the teacher follows up each group's activities to determine their progress in every lesson.

Table 6.Grade IX Students' Post-test Performance in Mathematics

Section	n	H. M.*	Actual Mean	Difference between Means	SD	Test Statistics		Decision
						Computed z	Tabled Valued	
A	50	15	9.92	5.08	2.33	15.42	1.96	Significant
B	50	15	10.54	4.46	3.98	7.92	1.96	Significant

For significance at α = 0.05, z $\geq$ 1.96

As reflected in Table 6, Section A's CTA had an actual mean of 9.92; while Section B's ETA had an actual mean of 10.54. Section A receives a computed z –test value of 15.42 while section B's computed z-test value is 7.92. Both values are greater than the tabled value of 1.96 at a level of significance α = 0.05. These are significant, thus, the null hypothesis is rejected. This denotes that there is a significant difference between the hypothetical mean and the actual mean of the students after they were exposed to CTA and ETA. It can be observed that the students' performance of their exposure to CTA and ETA still do not reach the standard performance of 75%. This Below Average performance is attributed to the different students' abilities in grasping mathematical concepts, even when presented in a more simplified manner. This shows the non-mastery of the basic mathematics concepts. Their hesitation to ask questions and get clarified with their confusion on the lesson is one of the factors that affects their below average performance in the post-test. In the CTA, they feel hesitant in asking questions since it is the teacher who directs the whole discussion. However, according to Carl Roger's Facilitation Theory (1982), the educator is a facilitator of learning rather than a sole source of knowledge .While learners were expected to learn independently in the ETA, they were hesitant to ask questions since they were expected to draw out their own ideas based on the insights they got in the module, which took time for them to generate among their team members. As expected, the use of module is a technique of self-instruction that involves the presentation of instructional materials to demonstrate their skills and comprehension (Goldschmid, 2005). As described by Samson (2014), modular instruction is an individualized instruction that provides basis for close interaction between the learners and subject matter.

Mean Increase in the Pre-test and Post-test obtained by the Two Sections in Mathematics IX

As shown in Table 7, section A's exposure to CTA obtains a mean increase of 1.38 with a standard deviation of 2.84. While, section B's exposure to ETA obtains a mean increase of 1.94 with a standard deviation of 4.75. Computed t-test values of 3.44 and 2.89 in section A and B respectively are obtained. Both values are greater than the tabled value of 2.00 at 5% level of significance with a degree of freedom of (n-1), which rejects the null hypothesis. This means that there is a significant mean increase between the pre-test and post-test scores of the students' exposure to CTA and ETA in Mathematics IX. Just a recall, Table 6 describes the performance of the students qualitatively to be still 'Below Average'. However quantitatively, this was accompanied with an apparent positive increment of their performance from the pre-test to the post-test. This result is an impact on the use of modules as an effective tool in the core processes of teaching-learning. This result is also complemented by a similar finding of Inocian (1999).Thisimproved performance is attributed by the sensory stimulated visuals in the modules used by section B and the freedom of the student to study at their own pace. For section A, the presence of the teacher who actively discusses the lessons gives a great help, hence it shows improvement of their mathematics performance.

Table 7. Mean Increase of Section A and B from the Pretest to the Posttest in Mathematics IX

Section	n	Pretest Mean	Posttest Mean	Difference between Means	SD of the Difference	Test Statistics: Computed t	Test Statistics: Tabled Value at α = 0.05 with (n-1) df	Decision
A	50	8.54	9.92	1.38	2.84	3.44	2.00	Significant
B	50	8.60	10.54	1.94	4.75	2.89	2.00	Significant

Comparison of the Two Sections Exposed to CTA and ETA

 ISSN: 1656-0264

It is evident from Table 8 that section A's exposure to CTA generates a mean increase of 1.38 with a standard deviation of 2.84. On the other hand, section B's exposure to ETA generates a mean increase of 1.94 with a standard deviation of 4.75. The mean increases of both groups have a difference of 0.56. This gives a computed t-test value of 0.72. This computed t-test value is less than the tabled value at 5% significance level. This means that there is no significant difference in the mean increase between section A and B in their performance in Mathematics IX. This result is similar to the study of Carmelotes (2012), when comparing the Modular Teaching Approach and Conventional Teaching Approach in learning Trigonometry, which also shows no significant difference between the improvement of the performance of the students in the two approaches. The students exposed to the Conventional Teaching Approach and Eclectic Teaching Approach had the same performance, which means that it doesn't matter what teaching approach is given to the students that affects their academic performance. Hence, it is the prerogative of the teacher to which approach does he or she use in the teaching of Mathematics. The construction of the modules and its corresponding learning activities in the ETA has no difference with that of the teacher controlled strategies in the CTA.As to the convenience of the teacher, the learning exercises found in the modules in the ETA are important since these give the same performance level to students taking the learning exercises in the CTA. In the ETA, the teacher has more time to guide students on their own pace since the learning activities cater to the different needs of the learners, through reading inventive diagrams, texts and problem solving.; unlike the CTA, the learners depend on how well the teacher delivers the lesson.

Table 8. Comparison between Sections A and B in terms of their Mean Increase in Mathematics IX

Section	Mean Increase	SD of the Mean Increase	Difference between Mean Increases	Difference between Means	Test Statistics		Decision
					Computed t	Tabled Valued at	
A	1.38	2.84	0.56	0.72*	2.00	Not Significant	A
B	1.94	4.75	0.56	0.72*	2.00	Not Significant	B

CONCLUSION

The performance of students in Section A (exposed to the Conventional Teaching Approach) and Section B (exposed to the Modular Teaching Approach) was low in the pre-test, with a minimal improvement in the post-test. There is a significant pre-post mean increase of the students' performance in Mathematics IX using both the CTA and the ETA. Moreover, it was determined that there is no significant difference on the mean increase between the students' performance using these aforementioned approaches of teaching, which proved that the effectiveness of these approaches were comparable.

 ISSN: 1656-0264

RECOMMENDATIONS

Mathematics, as the most abstract subject in the curriculum, needs the unfolding expertise of the teacher both in content and pedagogical knowledge. The following will be taken into considerations, as vital recommendations for further study: (1) teaching modules in Mathematics 9 will be reviewed based on the content and performance standards, learning competencies are realigned with the teacher's lesson objectives; (2) teachers' biases on the student-centered learning activities that sacrifice the expected Mathematics competencies and the actual nature of the conventional strategies intended for math teaching; (3); designing learning modules in accordance with what the children need, not what the teacher wants.

LITERATURE CITED

Abalajon, T. (1993).Development and validation of modules on selected topics in SEDP Math II at the Manila High School, 1992-1993.Unpublished Master's Thesis, De La Salle University, Manila.

Acelajado, M.J. (2006). The Modular Teaching Approach in College Algebra: An Alternative to Improving the Learner's Achievement, Persistence, and Confidence in Mathematics, De La Salle University, Philippines.

Alferez, M. (2009).MSA Statistics and Probability.MSA Publishing.Cainta, Philippines.

Ali R., et al, (2010). "Effectiveness of Modular Teaching in Biology at Secondary Level", Asian Social Science, Vol 6, No 9

Cabacang, M., et al, (2006).Workbook in Mathematics. Emerald Publishing House. Parañaque City.

Carmelotes, J. "Modular Approach in Teaching Trigonometry."2012.

Executive Opinion Survey of 2011–2012 of the World Economic Forumhttp://reports.weforum.org/global-competitiveness-2011-2012/

Gloeckner, G., Adamson, G. (1996). "Modular technology education." The Technology Teacher, 56 (1), 16-21.

Goldschmid, B. & Goldschmid, M.L. (2005). Centre for Learning and Development, Montreal, Q., Canada.

Inocian, Reynaldo B & Laliene T. Inocian (2016), "Outcomes-based Teaching for Brain-based Learning Vis-à-vis Pedagogical Content Knowledge", Vol. 4, No. 2, pp. 65-75.

 ISSN: 1656-0264

Inocian, Reynaldo B. (1999). The Effects of Self-learning Activities in World History Instruction: A Quasi-Experimental Study. Unpublished Thesis, Graduate Studies, Cebu Normal University.

Loveland, Tom. (1999). “Adapting Modular Curriculum in the Classroom.” The Technology Teacher.

Paspasan, Rodin M. (2015), “Structured Approach vs. Self-Paced Modular Approach in Teaching Trigonometry”, Asia Pacific Journal of Multidisciplinary Research Vol 3, No. 5, pp. 51-58.

Organization of American States, (2006).“Assessment in Competency-Based Education”. Hemispheric Project. Unpublished Thesis.

Samson, R., Jr. “Modular Teaching Approach in Science VIII.”2014.

TIMSS & PIRLS International Study Center, 2011http://timssandpirls.bc.edu/timss2011/downloads T11_IR_Mathematics_FullBook.df