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Salazar's Grouping Method: Effects on Students' Achievement in Integral Calculus

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Abstract
This study aimed to raise the achievement level of students in Integral Calculus using Direct Instruction with Salazar's Method of Grouping. Using the quasi-experimental method of research, the study employed qualitative and quantitative analysis, relative to data generated by the Achievement Test and Math journal, with follow-up interview. Within the framework of the limitations of the study, the Salazar's Method of Grouping revealed a significant increase on the gain scores between the two groups but no significant difference was obtained within and between groups (control and experimental). Further, qualitative assessments showed that the Salazar's Method of grouping develops self-confidence, encourages effective communication and facilitates exchange of ideas towards a common goal. The students from both groups were in favor to the presentation of the lesson, especially with the incentives given.
Keywords: Salazar's Grouping Method, Direct Method of Instruction, Achievement Level in Integral Calculus

1. Introduction

Calculus is the most important subject for science and engineering students because of its widespread use in the field of science and engineering. Knowledge of calculus is necessary in engineering subjects such as mechanics, fluids, thermodynamics and advance mathematics (Mokhtar, et.al, 2010). However, many students cannot achieve a deep understanding; they find calculus very hard and abstract (Zhang, 2003 as cited by Mokhtar, et.al, 2010). The students frequently question what to do with calculus; they even claim that it is not an important subject.

The researcher in his 27 years in teaching mathematics courses at the university level, finds Integral Calculus as the most difficult subject for science and engineering students. He agrees with Ainsworth (1994 as cited by Miller 2005) that student who comes to college without an adequate background in math will likely withdraw when he encounters difficult math problems. One of the problems that the researcher has observed through the years of teaching Integral Calculus is that many students have a weak algebra and differential calculus background. That is the main reason that most students in Math 04 (Integral Calculus) failed (66% failure) and most of them are repeaters (4^{th} time in a row).Further, moderation step 2 done by the Integral Calculus coordinator showed a very low (below 50%) performance among University students for the school year 2010-2011.

Integral Calculus (Math 04) is a 4 unit subject (48 hours) required for Bachelor of Science in Mechatronics Engineering, Bachelor of Science in Engineering Informatics and Bachelor of Computer Science students in the university. They are only required to take a 3 unit (36 hours) College Algebra subject with the same course content and combined with non-science and non-engineering students of the University.

A great deal is being written and said about new ways of improving mathematics teaching and learning. One of the greatest challenges that educators face is determining the most effective teaching strategies for their students. Most of the suggestions in improving students' performance in mathematics is concerned with the development of some forms of initialized instructions; making a wider and more effective use of applications and devising new ways of increasing appeal to student intuition in the development of concepts (Salazar, 2003).

The researcher practically uses Direct Instruction in teaching mathematics subjects. Direct instruction is a teacher-centered instructional approach that is more effective for teaching basic or isolated skills. It is generally fast-paced instruction and often used with a small group of students (www.k8accesscenter.org). Grouping students involves cooperative learning. *Cooperative learning* according to Slavin (1988, as cited by De la Cruz, 2001) is a classroom technique in which students work on a learning activity in small groups and receive rewards or recognition based on their group's performance. According to Slavin (1987 as cited by Abu & Flowers, 1997), there are two major theoretical perspectives related to cooperative learning: motivational and cognitive. The motivational theories of cooperative learning emphasize the students' incentives to do academic work, while the cognitive theories emphasize the effects of working together. Neil Davidson developed at the University of Washington a teaching method called *Small Group Discovery Method***.** He started with the idea established by R. L. Moore that bright students can develop mathematics. Under the small group discovery method, the class is divided into small groups with three to four members per group (Dancis and Davidson, 1967).

In an effort to improve the teaching and learning Calculus and in turn to improve students' achievement, the researcher used direct instruction with grouping in the seatwork stage. However, the researcher adapted the

Salazar's creative way of grouping known as Enhanced Group Moore Method (Salazar, 2007). Moreover, to enhance the competitive atmosphere, additional five (5) points were awarded as incentive to students/groups that successfully defended their solutions. Hence, in this study, the method is named as Salazar's Method of Grouping.

Salazar's Method of Grouping was used in the final term of the course which concentrated on the applications of Integral Calculus specifically on finding the areas and volume of solid of revolutions. These are the most important topics of the subject (Integral Calculus).

1.1 **Statement of the Problem**

This study used Direct Instruction with Salazar's' Method of Grouping versus Individual Learning to determine the effects on students' achievement level in Integral Calculus.

Specifically, this study answered the following questions:

1. What is the students' achievement level in Integral Calculus?
2. Is there a difference in the scores in the achievement test of the students' after exposing them to the Salazar's Method of Grouping and Individual Learning?
3. What are the gain scores of the students' achievement level in Integral Calculus?
4. Is there a difference in the gain scores in the achievement test of students' after exposing them to Salazar's Method of Grouping and Individual Learning?
5. What insights are drawn from students' journal?

1.2 **Research Hypothesis**

The study put forward the following hypothesis:

1. There is a significant difference in the scores in the achievement test of students exposed to Individual Learning and Salazar's Method of Grouping.
2. There is a significant difference in the gain scores in the achievement test of students exposed to Individual Learning and Salazar's Method of Grouping.

2 .Methodology

The research design employed was quasi-experimental method. In particular, the pretest-posttest equivalent control groups design. This study utilized two (2) existing classes (section EF – MW and CF-TH, both 9:45-11:15 pm, Ramadan Timing) in Math 04 (Integral Calculus) which is the researchers' teaching load for the 3rd Trimester SY 2011-2012. Only nineteen (19) students per section (21 students – section EF and 26 students-section CF) were included in the study. The female students were not included due to cultural orientation and students who were not around during the pretest.

The overall groups mean was computed to ensure the comparability of the control and experimental groups at the start of the experiment.

Table 1: Distribution of Students by Group and Mathematical Ability

Group	Grade		n	Overall Group Mean	Interpretation
	Average Prelim Grade	Average Midterm Grade			
Control	41.51	40.18	19	40.84	Failed
Experimental	43.88	41.25	19	42.56	Failed

Table 1 show the average grade for the prelims and midterm for the 3rd Term, SY 2011-2012 which the students are currently enrolled. Further, the table shows that the overall group mean ratings of both the experimental and control groups is 40.84 and 42.56 respectively, which implies that the groups are not different in terms of mathematical ability. This observation is supported by the students' scores in the pretest where both groups obtain roughly 0%. This implies that the students in this study have no background in finding the areas and volume of solid revolutions using Integral Calculus.

Qualitative and quantitative data were gathered using the following instruments:

Achievement Test in Integral Calculus. A validated Achievement Test (teacher-made test) lifted from The Calculus 7 (Liethold, 1996) was used in this study. An item in the test represented each topic covered in this study. The test is problem solving where the students are required to solve the area under a curve, area between curves and volume of solid of revolution- disk and ring method. The test consisted of four (4) problems, five (5) marks each with twenty (20) as the highest possible score.

The test was validated by two (2) math professors, one teaching Integral Calculus and the other teaching Advanced Engineering Mathematics in the University. The same test was pilot tested to insure validity to seventeen (17) students enrolled in Math 06 (Advanced Engineering Mathematics) section EG..

The researcher made a scoring rubric written on the Achievement Test and answer key with corresponding

marks were prepared by the researcher before marking. The test was checked and graded by the researcher using the University Grading System.

Table 2 Achievement Test Scores Descriptions

University Grading System*			
Score	**Grade Ratings**	**Grade Range**	**Achievement Level Interpretations**
20	96-100	1.00	Excellent
18- 19	86-95	1.25-1.50	Very Good
14- 17	69-85	1.75-2.25	Good
10- 13	50-68	2.50 -3.00	Fair
Below 10		5.0	Failed

*University Student Handbook SY 20-11-2012

With respect to the working description of the gain scores on the achievement test scores, the following correspondence was used.

Table 3 *Gain Scores Descriptions*

Gain Scores	Achievement Level Increase Descriptions
17-20	Very High Increase
13- 16	High Increase
9 - 12	Average Increase
5 - 8	Low Increase
1 - 4	Very Low Increase

Math Journals – this instrument was the source of qualitative data to determine insights in regards to the method of teaching used by the researcher. Prompts focused on the method of teaching specifically on the grouping method used and the incentives given. The students were encouraged to answer the questions in paragraph or outline form in English. This was used to validate the results of the quantitative assessments.

Interview. The interview was used to validate the results of the quantitative assessment of the students. This also served as a source of qualitative data on the students. The interview was conducted informally by groups to increase the rapport in the discussion and to minimize shyness among the interviewees. The interview questions focused on the method of teaching, grouping method and incentives given and follow-up questions. The Math journal served as the guide questions to confirm their answers and some follow-up questions.

Two (2) existing classes in Math 04 (Integral Calculus), as regular load of the researcher where the source of data to be collected. However, matching was done to ensure comparability in terms of the mathematical ability of the students based on their prelims and midterm grades and the result of the pretest. By lottery, the Monday-Wednesday (MW) class became the control group while the Tuesday-Thursday (TH) class became the experimental group.

As soon as the treatments were assigned, the researcher conducted an orientation on the processes of the study. Then, the pretest was conducted after the orientation. The researcher himself handled the two classes

Prior to the conduct of the experiment, a try-out was done to familiarize and as much as possible make the students feel at ease with the new method. The Math journal was given after the posttest. The posttest was considered as Quiz no.2, open notes.

To control other factors that might influence the outcomes of the study, the amount of time for conducting the two classes was both one hour and thirty minutes (1 hr. 30 minutes) Ramadan Timing for two (2) weeks. The experimental group met from 9:45-11:15 P.M every Monday and Wednesday while the control group met 9:450-11:15 every Tuesday and Thursday for a total of 7 hours for each group. One topic was covered every meeting. Four (4) topics were covered in the experiment. Both groups were provided with course specifications and instructional material. PowerPoint presentations were prepared on volumes of solid of revolutions. The teaching method used differs only on the seatwork stage.

Direct Method of Instruction was used to both groups .On the other hand, the seatwork stage Salazar's Method of Grouping was used in the experimental group and individual learning on the control group.

The sequence of activities for both groups is outlined below:

I. *Introduction/Review* –setting the stage for learning.
II. *Development* – explaining/deriving the formula and giving illustrative examples
III. *Guided* Practice- solving a problem with the student on the board, the teacher just acted as a secretary.
IV. *Closure*- making a summary on the lesson emphasizing the important points.
V. *Seatwork* –a set of problems were given to the board where the students solve the problems (one problem at a time) using the following method of grouping.

Individual Learning: Students did the seatwork individually, the teacher from time to time, moved around to

assist or give hints and suggestions on how to solve a particular problem. Sometimes the students approached the teacher and showed their work and asked for hints. The first student who presented a correct solution and answer to the teacher, defended his solution on the board and earned additional five (5) points,. However, a grace period of five (5) to ten (10) minutes were given to give chances to others who were still solving the problem before the solution was discussed on the board. The same earned 5 additional points. The accumulated points were ranked and were given additional points on their final examination based on the ranking. The highest additional points is ten (10) and the lowest is one (1) point. Then the teacher moved on to the next problem..

Salazar's Method of Grouping. The first stage was the same as in the Individual Learning. As soon as the student successfully defended his solution in class and earned additional 5 points, he was told to select a group member of his choice and proceed to the next problem. Whenever, the same group (with two members) was able to defend their solution in class successfully, each group member earned additional 5 points. Then they must select another group member of their choice and move to the next problem. Solving the problem was a group effort .If again, the group with three (3) members successfully defended their solution, and each group member earned additional 5 points, and then returned to stage one. This cycle continue until the end of the semester. However, membership of groups must not be the same on the next groupings. When all the students had been in a group of two or three, the said group would return to stage one.

The posttest was administered after the experiment. The math journal was given a day before the posttest. Follow-questions were asked (interview) to the subjects of the study, as soon as the students submitted their Math journal

Both quantitative and qualitative analyses were done to determine the achievement level of the respondents who were exposed to Salazar's Method of Grouping and Individual learning. The quantitative data were derived from the math journals and follow-up interview results.

The mean of the prelim and midterm grades of the two groups was used to determine the comparability of the subjects Wilcoxon-Mann-Whitney, a non-parametric test was used to test the significance of the difference between groups pretest, post test ,gain scores and within groups' pretest and posttest results.

The Vassar Stats: Website for Statistical Computations (http://faculty.vassar.edu) was used in the statistical computations. Hypothesis was tested using a level of significance of 0.05.

3. Results and Discussion

The following discussion presents the results of the analysis of the student scores in the in the achievement test in Integral Calculus. It describes the effects of the Salazar's Method of Grouping on the students' achievement level. This result is supported by the qualitative gathered from the math journal and follow-up interview.

Achievement Level

Table 4 in the next page presents the results of the pretest and posttest of the two groups.

Table 4 **Comparison of Raw Scores in the Achievement Test**

Raw Scores	PRETEST						POSTTEST					
	Control Group			Experimental Group			Control Group			Experimental Group		
	f	%	ITP	f	%	ITP	f	%	ITP	f	%	ITP
20												
18-19												
14-17										2	11	G
10-13							4	21	F	4	21	F
Below 10	19	100	FL	19	100	FL	15	79	FL	13	68	FL
Total(Mean)	**19**	**100**	**FL (0.1)**	**19**	**100**	**FL (0.11)**	**19**	**100**	**FL (5.1)**	**19**	**100**	**FL (5.8)**
Grade			**5.0**			**5.0**			**5.0**			**5.0**

Legend: **ITP** – Interpretation: **E**- Excellent: **VG-** Very Good; **G** – Good; **F**-Fair**: FL**- Failed

It can be gleaned from the table above that both groups (control and experimental) has a mean score in the pretest is 0.1 and 0.11respectively with a grade equivalent of 5.0, a failure grade. 100% of the students in the control group failed; in fact only one (1) student got a score of one out of twenty, the rest zero. While in the experimental group, only one student also got a score of 2 and the rest zero, a 100% failure. Therefore, the two groups are comparable at the very start of the study.

Further, the posttest in both groups (control and experimental) revealed a failure grade in spite of its mean increase of scores from 0.1 to 5.1 and 0.11 to 5.8 which is negligible and still not passing.

The poor performance in the achievement is attributed to poor background in algebra and analytic geometry which was confirmed Ainsworth (1994 as cited by Miller, 2005) findings. Also, reasons on the Internal

Moderation step 2 in Math 04 SY 2010-2011 supports the results.

Student's math journal revealed some reasons on this very low performance, followed by their answers during the interview.

A student in the control group commented*: "Is very hard for the student because it need more than three months"*. This was seconded by a student in the experimental group*: "The subject is very hard and we need more time to study and everything in this subject"*When asked, why? *We have to review our algebra, analytic geometry and differential calculus. We don't have time doctor, we are working.*

One student even suggested, *"1. Cancle any section in Ramadan. 2. But the sections for math in the begging of duty ex: 4:00 pm or 05:00 pm."*

Difference in Scores in the Achievement Test

Table 5 below presents the results on the test of significant difference of the scores in the achievement test of the students before and after exposing them to Salazar's Method of Grouping and Individual learning.

Table 5 **Difference of the Scores in the Achievement Test**

Group and Test Compared		n	Sum of Ranks	Test Used	Z–critical value	z-observed value	Decision
Within Groups	Pretest vs Posttest (control group)	19	W=-190	Wilcoxon Sign Rank Test	1.645	-3.81	Not significant
	Pretest vs Posttest (experimental)	19	W=-190		1.645	-3.81	Not Significant
Between Groups	Posttest(control) vs Posttest (experimental)	19	U^{A} =227.5	Mann-Whitney Test	Upper limit=238 Lower Limit=123	-1.36	Not significant

** Significant at 0.05 level of significance*

Table 5 revealed that there is no significant difference on the student scores in the achievement test before and after exposing them to Salazar's Method of Grouping and Individual Learning. Although an increase of score was seen but still its negligible because it is still a failure mark. Salazar's Method of grouping is not effective in raising the achievement level of the subjects of this study. This results was also found by Ali (2011), that there is no significant difference in learning as a consequence of different teaching method (lecture vs cooperative)

Gain Scores within Groups

Table 6 below exhibits an increase of scores in the Achievement test in both group after exposing them to Salazar's Method of grouping and Individual Learning.

Table 6: **Gain Scores within Groups**

Gain Scores Range	Control Group			Experimental Group		
	f	%	ITP	f	%	ITP
17-20	0	0		0		
13-16	0	0		2	10.52	H
9-12	5	26.32	A	5	26.32	A
5-8	1	5.26	L	5	26.32	L
1-4	13	68.42	VL	7	36.84	VL
Total (Mean)	**19**	**100**	**VL (4)**	**19**	**100**	**L (7)**

Legend: ITP – Interpretation; VH – very high increase; H – high increase : A - average increase ; L – low increase;

As seen from table 6 above, the control group obtained a very low mean increase (4) while the experimental group performed a low mean increase (7) in the Achievement test after exposing the groups(control and experimental) to Individual learning and Salazar's Method of Grouping , respectively. Only 26.32 % (5 out of 19) obtained an increase within the range of 9-12 in the control group, while in the experimental 10.52% (2 out of 19) got a high increase (score range 13-16), which is worth to be considered. This result indicates that involvement in cooperative learning is a strong predictor of student's academic performance (Tsay & Brady, 2010).

Comparison of Gain Scores

Table 7 in the below reveals a significant difference of the gain scores of the students between the control group and the experimental group.

Table 7: **Comparison of Gain Scores**

Group and Test Compared	n	Sum of Ranks	Test Used	z-critical value	z-observed value	Decision
Control Group Gain Scores Vs Experimental Group Gain Scores	19 19	U^{A} =242	Mann-Whitney Test	Lower Limit=123 Upper Limit=138	Z=-1.79	Significant

** significant at 0.05 level of significance*.

Results of the Mann-Whitney Test revealed that the Salazar's Method of Grouping at least raised the students' scores in the achievement test in terms of their gain scores as evidenced by accepting the alternative hypothesis, that there is a significant difference in the gain scores in the achievement test of students exposed to Individual learning and Salazar's Method of Grouping. This findings was also disclosed by Salazar (2007) on using Enhanced-Group Moore Method of Instruction in raising student's van Hiele Levels of Geometric \understanding and Proof-construction Performance.

Insights Drawn from Students Math Journal and Interview

The following are insights drawn from students Math Journal and interview in terms of the researcher method of teaching, method of grouping and incentives given.

Method of Teaching Used

The students from the two groups (control and experimental) had written the following impressions and comments.

"The first impressions I witnessed from the method of teaching used by Dr. Douglas was that it had a lot of motivating and challenging questions that makes the students interact with each other to solve mathematical problems." Another student commented*: "Recently he become very helpful and cooperative guy and he try to give us many examples to get the idea and many activities to improve our self."*

Accordingly, the activities motivated the students. This is verified with the comment of the student.*"The more illustrative examples were given and the seatwork stage changed. You give us a problem for us to solve individually and helped us to how to solve the problem by giving hints and whenever we got the correct answer you give us bonus points".*

Further, some of the comments are: *'His teaching is good and cler. Sometimes he ask any student to teach them understand more."* Also another student wrote:"*He is good, he would repeat for anyone if they didn't understand, his language is clear and good."*

Actually, the researcher required the student who got the correct solution to explain his solution in class in Arabic which motivated them to listen.

However, one student commented that:" *Actually, there is none from Dr. Salazar side, the disadvantage is that the time is not enough for the material of the subject in the term."*

On Salazar's Method of Grouping

The following are the impression/ comments of the students from the experimental group:

*"The grouping method is very helpful among students, the work or project is divided among students, and each one performs his/her duty very honestly and also helps students to finish their work or project on time. "*Another student said*:" Student come to a more complete understanding by comparing with others. Students with better skills serve as model. It is more motivating*."

The students like the grouping method because they can discuss in group the problem in Arabic.

However, some students wrote the following disadvantages of the grouping method.

" if the group is not properly monitored, some student in the group could be left out there by not benefithing from this method." To substantiate this comment; others said**,** "*Some student are dishonest regarding the membership of the group. When somebody got a correct answer/solutions, they claim that they are members of that particular group and they are persistent. "Some of the student not like to partesbate with the group* "and *" when the student copy from each other's will not help them."*

Consequently, that student said, "*Doctor we want to pass , we are working, we are tired, we don't have time to study".*

On Individual Learning

The students in the control group yielded the following impressions/comments.

"Good for student to understand the lecture and solve the problem by self and ask the teacher, if the student have problem from solving and decase the problem."And " It is very motivating process, as all the students would try to finish the exercise to get the bonus points."Also " This shows which students tried to really solve .

Therefore it encourage us students to honestly try to solve and it also helps us passing." And lastly " Individual helps the low level students in studying hard and working more."

Individual learning motivated them to work hard in solving the given problem because of the bonus points given. A student was asked how individual learning motivated him to solve the assigned problem. He said,

"The bonus points. I have to do it because it's a competition".

Incentives Given

On the incentives given, students from both groups gave the following impressions and comments.

"Comptition in the classis very good and we need more." And *" It give as more the courage to solve more problems and the more bonus we have the more courage we have"* Also, *" I love this method for it gives students confidence in exams and encourages them to study and take initiatives.* Another students wrote*: It is invcouraging, feeling success, happiness, it also incoragfes the student to attend, participate and work hard in learning the subject.* And lastly, *" Bonus points helps us in surviving."*

However, three (3) students wrote*:" only one student is solve and the rest coping.*"When they were asked to explain what they mean on this statement.

In a group of two or three, only one student is solving the rest are just copying. Usually, the first student to solve the problem correctly is the same student who solves the problem on the next stage of grouping.

The researcher asked the student to whom they were copying. "*Everybody wants me to be a group member, I do not know who to choose. But I prefer, Ahmed (codename- the student who repeated the subject for the 4th time). I want to help him".*

It is inspiring to note that one student wrote:" *Teaching is not something easy, there are students of different thoughts/minds, to make each and every student understand, I think is not an easy job. But Dr. Douglas does his best, applies all his energy to make the students understand and tries to make notes easy for students. He makes us all work and also give lectures which increase our will power to study and attain a position/job in the future."*

The student's responses to the Math Journal and Interview disclosed that they tried their best to at least earn the bonus points. They have developed the value of sharing and helping others. In addition, the method of grouping encouraged them to start on their own. It promoted effective communication and exchange of ideas towards a common goal. The incentives made the seatwork enjoyable.

4. Conclusions and Recommendations

The findings of this study are presented below following the sequence of the research questions in the statement of the problem.

1. The pretest results of the two groups in the Achievement test showed only almost equal mean scores (0.1 and 0.11 for the control group and experimental groups, respectively). Both scores fall in the category of FAILURE. That is, the students do not have any idea of what to do, even on graphing a line and a parabola which are topics in their pre-requisite subject- Analytic Geometry,

However, the Achievement Test mean score in the control group improved from 0.1 to 5.1. An increase of 5 in the mean score was achieved. In the experimental group, the achievement test mean score improved from clueless 0.1 to 5.8, but still a failure mark. An increase of 5.7 in the mean score was achieved.

2. Comparing the test scores within groups (experimental and control groups) revealed that there is no significant difference between pretest scores and posttest scores in both groups. Also, the same findings was obtained in comparing the posttest scores between the control and experimental groups.

3. In the gain scores obtained within groups, the control group obtained a mean gain score of 4 interpreted as very low increase while the experimental group revealed a 7 mean gain score which is interpreted as a low increase.

4. A significant difference of the gain scores between the two groups was revealed by the Mann-Whitney Test.

5. The following insights were drawn from the students' math journal and follow-up interview.

They felt that Integral Calculus is difficult even before the prelims and midterm period .They had poor background in the prerequisite subjects (algebra, trigonometry, analytic geometry and differential calculus) which are needed in integration. Both groups were in favor of the sequence of presentation of the lesson used in this study especially on the incentives given.

The Salazar's Method grouping encouraged them to solve problems by themselves and later on to share and help others in the next stages. The incentive (additional five points) served as a driving force to solve the problems on the seatwork stage as seen from the rank of the accumulated additional points; three of the students from the experimental group obtained the highest accumulated points. However, low ability group members just depend on high ability students so that they can earn additional points without much effort .And sometimes claim to be a member of the group who answered and defended their solutions in class even if they are not members of that group in order to earn additional points.

While in the control group, competitive atmosphere was felt. They have to solve the problem by themselves as fast as they can to earn more additional points.

It is therefore possible to increase the gain scores of the students using the Salazar's Method of grouping.
Although, the results revealed a failure mark on the achievement level in Integral Calculus, still this study deserves attention. A significant increase of the gain scores was achieved. Although obtained a low increase, yet something has been done credited to the Salazar's Method of Grouping. Insights drawn from the students' journal that may have contributed to this low increase deserves an attention, which is, no classes on Ramadan
On Poor Preparation in Integral Calculus. It is recommended that there must be a strong foundations on students pre-requisite skills, specifically on algebra, analytic geometry and differential calculus. College Algebra must be a five (5) units subjects same as Analytic Geometry and Differential Calculus. And Integral Calculus must also be a five (5) units subject. Strict implementation on the policy of accepting new students.
On Future Researches. For future researches, the following could be considered;
Use of homogeneous or heterogeneous small grouping according to ability levels, gender type, reverse order of grouping used in this study, or other types of grouping.
Use of large samples (two sections with 40 students for each group).
Implementation of the Salazar's Method of grouping in other basic mathematics courses in the tertiary level like College Algebra, Trigonometry, Analytic Geometry and Calculus.
Replication of the experiment in regular timing not Ramadan.
Research in using Mathematical Software i.e MATLAB
Calculus is viewed by the students as the most difficult mathematics subjects by students. Unless a strong foundation on its pre-requisite skills is achieved, the students performance in Integral Calculus will still be low. Our students are interested to learn, but they are NOT ready to learn.

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