



Summer Special Math Clinic (S²MC): Bridging the Gap for Low Performing Students in Mathematics

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ABSTRACT

Nowhere is the developmental nature of learning more evident and integral than in Mathematics. Students with deficiencies in the present-level Math, will not be able to smoothly understand the next-level Math given that the concepts discussed there requires knowledge and mastery of the prerequisites. It is in this light that the Mathematics Program of the Ateneo de Iloilo initiated the S²MC. To ascertain the impact of the program on the mathematics performance and on the readiness of the students in the next level math, this research is conducted. The results revealed that mostly students performed well in the S²MC as revealed in their increased post test scores. When the grades in the summer class was compared with the grades in the first grading period of the succeeding school year, significant relationships were found but with low correlation coefficients. The paper ends with recommendations on how to implement the program better in the next year.

Keywords: Summer Special Math Clinic, math performance, learning gap, bridging, remedial

Introduction

Mathematics learning is developmental in nature—topics to be discussed have their foundation and prerequisite skills anchored on already discussed topics. This means that every level of Mathematics learning should be mastered by the students to ensure a smooth learning of a more advanced topic. (Piaget, 1974; Polya, 1945; R.R. Skemp, 1987)

To address the above concern on mathematics learning, the Ateneo de Iloilo developed and conducted the Summer Special Math Clinic (S²MC). The S²MC primarily aims to help students master the basic concepts in Math to make them more prepared for the next grade level Math. This program is exclusively offered for incoming Grade 7, 8, 9 and 10 students of Ateneo de Iloilo who were identified to have a difficulty in some Math topics. The Summer Special Math Clinic (S²MC) is conducted to follow up on the foundational understanding and skills of low-performing students to better prepare them for the next year level Math. In the past, there have been the then called “Summer in Math” classes but is not offered every year and whose focus depends on the group of students taken in. It is only in the introduction of the S²MC that a focused and intentional program is prepared for the students with difficulty.

Specifically, it aims to,

- a. Reinforce the foundational knowledge and skills of students in Mathematics;
- b. Strengthen the computational skills of students through the provision of a good number of practice drills and exercises with a closer supervision of the teacher;
- c. Prepare students for the next level Math by strengthening their understanding of the prerequisite concepts, and;
- d. Inculcate in the students the value of self-confidence, patience, perseverance, and innovativeness which are essential for a good Math performance.

The class lasts for 10 days, 2 hours per day. The topics discussed are chosen by the teacher in coordination with the past year level Math teacher and in consideration with the next year level topics in coordination with and with the approval of the Math coordinator.

The class is mainly focused on the building of concepts and on strengthening the problem-solving skills of students. Each lesson ends with an assessment. Some form of recognition system is done to culminate the classes.

This study is focused on looking into the possible impact of the program on the students it catered and look into possible areas that can be improved in the succeeding years.

Methodology

The program aims at helping students be more prepared for the next year level Math. With this goal, the evaluation of the program can be carried out by, whenever possible, looking into

- a. the possible difference in the performance of the students in terms of the foundational topics in Math as measured by the Pre-Test and their performance after the intervention as measured by the post-Test.
- b. the influence of the students' performance in the S²MC to their performance in the next year level Math as measured, for the meantime, by their Math grades in the First Trimester, SY2016-17.

To answer (a), the Wilcoxon Signed Rank Test is used to test the significance of the differences in the medians of the two dependent set of scores. A non-parametric test is used as there are at most 20 students in each group. The Spearman rho Correlation Coefficient is used to test if there is a significant relationship between the two variables (hence, addresses b). The confidence level is set at 95% ($\alpha=0.05$). The Statistical Package for Social Sciences (SPSS) IBMv.21 was used to aid in the computation.

There were only 3 attendees for the Grade 7 S²MC, hence, analysis will only be limited to checking whether they performed well in the First Trimester of SY2016-17. For the case of the Grade 9 S²MC students, as their post-test scores have been misplaced due to inconveniences in the venue and transportation (the S²MC 2016 was held in the grade school campus), analysis will also be limited to reporting how they fared in the present trimester as it compares with their Final Math Grades in the previous school year.

Results and Discussions

The results are presented per grade level. Each presentation of results starts with the findings of the statistical treatment (descriptive, inferential, and correlational, whenever available) of the data. This is, then, followed by their interpretation and conclusion. A discussion of possible implication of the results is also provided to make the analysis of results more contextualized and authentic.

Grade 10

The class is composed of 18 incoming grade 10 students (Grade 10 now), 11 of which are males and 7 are females. The students got an average of 6.64 ± 3.15 out of 31 points (transmuted score of 68.57) in the pre-test and 18.28 ± 4.75 out of 32 points (transmuted score of 78.44) in the post-test. This indicates a gain of around 12 points (average of gains in raw score is 12.93). To ascertain whether this gain is significant under $\alpha=0.05$, the raw scores were compared using the Wilcoxon Signed Rank Test using the SPSS IBM v.21, with the null hypothesis: there is no significant difference in the medians of the pre-test scores and the post-test scores. The results are as follows.

The inferential statistics reveals that there is a significant difference between the medians of the pre-test scores and post-test scores of the students with $z=-3.303$ and $p=0.001$. Hence, the gain was indeed significant. This implies that the students did well in summer class or that the S²MC was successful in improving the knowledge and skills of the students in the topics covered in the program as measured by the pre- and post-tests.

To further understand about the possible influence of the program in the Math skills of students, the S²MC grades is compared with the First Trimester grade of the students in Math. The students averaged 82.44 with standard deviation of 5.61 in their computed grades in the S²MC, and 77.89 with standard deviation of 2.18 in their First Trimester Grades in SY2016-17. To analyze the relationship between the data samples statistically, the Spearman rho Correlation Coefficient is used at $\alpha=0.05$, with the null hypothesis: there is no significant relationship between the grades of the students in the S²MC and their respective grades in the First Trimester of SY2016-17. This is the non-parametric counterpart of the Pearson r Correlation Coefficient. The results of the test run on SPSS IBM v.21 is summarized below.

Table 1-Correlation of Students' Post-Test Scores in S²MC and their First Trimester Grade in Math 10

	Post-Test - Grades
Correlation Coefficient	.499*
Sig. (2-tailed)	.035
N	18

*. Correlation is significant at the 0.05 level (2-tailed).

The Spearman rho test reveals a significant relationship ($p=0.035$) between the grades of the students in the S²MC and in the First Trimester of SY2016-17. The two grades are moderately correlated ($r=.499$). This means that a good grade in the summer clinic can somehow be associated with the first trimester grade. There are some factors that can influence the performance of the students in the summer clinic and in the regular class. One of these is the psycho-emotional effect of being in a class that is homogeneous group of mathematically challenged students, in contrast to being in a class with heterogeneous grouping of students with skills that can range from those who can get A+ to those who can barely get a D. It can be observed, from the S²MC 2016 and from previous summer classes, that low-performing students tend to do better if they are grouped together than when they are in a regular class that is heterogeneously sectioned. They might tend to feel intimidated to express themselves in the presence of really good students. Also, the summer classes are smaller in class size (less than 20 students) than a regular class (around 40 students). The smaller the class size, the more time teachers can spend in assisting the students in the seat works. Also, students may feel a lot more comfortable and freer on smaller class size.

Grade 9

The class is composed of 20 incoming Grade 9 students (now Grade 9), 14 are males and 6 are females. As data about how the students performed in the S²MC can no longer be retrieved (only the pre-test scores were located and these are not very helpful in the goal of this evaluation without the post-test scores), the final grade in Math last school year (SY2015-16) will be used to compare with the present First Trimester grade.

The students of the S²MC had an average final grade in SY2015-16 of 76.0 with a standard deviation of 1.02. In the First Trimester of SY2016-17, the students had an average grade of 77.0 with a standard deviation of 2.27. The students have a higher grade in the trimester after they took the S²MC. It cannot be claimed that this is because of the clinic as many factors comes into play, e.g. first trimester topics are relatively easy, among others. The greater spread of the grades in the first trimester indicates that while many increased in their grades, there are some who had decreased. 12 of the students increased and 7 decreased.

Grade 8

There are 16 students enrolled in the class, 12 of whom are male and only 4 are female. The final grades of the students in the clinic are intact, but the pre- and post-test are not. The students have a good performance in the S²MC as they got an average grade of 78.63 with a standard deviation of 5.03 and they did fairly okay in the first trimester by getting an average 77.94 with a standard deviation of 2.59. No one from the class failed in the first trimester.

To ascertain whether there is a significant relationship between the grades of the students in the clinic and in the first trimester, the Spearman rho Correlation Coefficient is used with H₀: There is no significant relationship in the performance of the students in the S²MC and in the first trimester as measured by their grades in Math. The table below, summarizing the result of the test, reveals a significant relationship (p=0.007) between the variables with a high correlation coefficient of 64.8%. This indicates that a good performance in the clinic would likely translate to a good performance in the first trimester.

Table 2-Correlation of Students' Post-Test Scores in S²MC and their First Trimester Grade in Math 8

	Post-Test - Grades
Correlation Coefficient	.648**
Sig. (2-tailed)	.007
N	16

** . Correlation is significant at the 0.01 level (2-tailed).

Grade 7

The S²MC for grade 7 is officially called the Bridging Program. It sought to provide for the incoming Grade 7 students not only the venue to improve foundational knowledge and skills but also assist students' psycho-emotionally in their transition from grade school into junior high school.

As there are only 3 students who enrolled in the program, statistical analysis will render weak results. Hence, only the First Trimester grades of the students are investigated. The students got grades of 90, 81 and 77. These grades are mostly high and on safe levels in terms of class standing.

On whether the class was very helpful in achieving these grades is inconclusive. A more conclusive study can only be done if more students into the program and the screening process would be followed more strictly.

Conclusion and Recommendation

The S²MC is conducted with the aim of helping students with some level of difficulty be more prepared for the next level Math. Overall, the students performed well in the summer program. Consequently, they also performed well enough in the first trimester of the next level Math. Preliminary evaluation results provide indications to the positive outcomes of the goals of the program. However, continued implementation and evaluation are needed to provide more concrete evidence of the effectiveness of the program.

In connection with the above results, discussions and conclusions, the following recommendations are put forward:

- Ensure that data on assessments during S²MC be intact, especially the pre- and post-tests
- An annual evaluation of the program. Feedback from the students may also be gathered.
- More aggressive campaign for students who shortlisted to attend the class.
- A similar program maybe done in the duration of the school year.

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