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Performance of Sophomore Secondary Students Exposed in the Kumon Mathematics Program

James Ray C. Mendaje

Abstract— **This study was undertaken to assess the performance of second year high school students exposed in the Kumon Mathematics Program in the 2010 National Achievement Test (Math). It examined various related data of the students which include the results of the students in the aforementioned test, the Kumon materials utilized by the students, and their number of years of exposure in the program. The research was a descriptive correlation utilizing data of 55 sophomore secondary students from the three Kumon centers and the students' NAT result. The outcome of the study showed that the background of the three centers in terms of student's achievement is remarkable. The students got an overall mean percentage score of 70.03 in the National Achievement Test with a corresponding mastery level descriptive equivalent of "Moving Towards Mastery". Moreover, there was no significant difference in the performance of the students in the three centers in the aforementioned test. There was a positive association between the worksheet levels of the students and their raw scores in the test. The same result between the students' number of years of exposure in the program and their raw scores in the test. Based on the outcome of the study, it is recommended to replicate the research and to revise some parts of the Kumon Mathematics program. Furthermore, despite the slight shortcoming of the program, it can still be recommended as a good supplement to regular schooling since it is proven to be effective in increasing math skills of the students.**

Index Terms- **Kumon Mathematics program, performance, student's achievement,
Mathematics, National Achievement Test**

I. INTRODUCTION

To provide an effective mathematics instruction to the students has always been a subject in the world of mathematics education. Reports of the National Commission on Mathematics and Science Teaching for the 21st Century, National Research Council, the RAND Mathematics Study Panel, and the National Mathematics Advisory Panel pointed out that mathematics teaching and learning are complex undertakings. Mathematics is perceived to be a very difficult and challenging subject. The complexity in dealing with the subject is experienced by different kinds of students in different levels across the globe.

As a mathematics educator, this study was made by the researcher with the goal of finding the best ways in resolving the problems that every student and educator encounter in the area of mathematics education. Mathematics is considered to be sequential in manner. Mastery of the necessary skills must be fully acquired by the learners in order to understand thoroughly the topics.

One of the keys to learn mathematics effectively is to deal on the individual ability of the learners. No two learners are alike. The ability to learn mathematics varies from one learner to another learner. Materials to be utilized by the learner should suit to his or her ability. It is essential upon his progression from one topic to another topic. This is what Kumon Mathematics Program is all about.

A. Statement of the Problem

This study analyzed the performance of sophomore secondary students exposed in the Kumon Mathematics Program in the 2010 National Achievement Test (Math). Specifically; this study sought answers to the following questions:

1. What is the profile of the sophomore secondary students exposed in the Kumon Mathematics Program in terms of
   1.1 Worksheet levels?
   1.2 Number of years of exposure in the program?
2. What is the performance of the second year high school students exposed in the Kumon Mathematics Program in the 2010 National Achievement Test (Math)?
3. Is there a significant difference in the performance of students in the National Achievement Test (Math) in the Kumon centers?
4. Is there a positive association between the number of years of exposure of the students in the Kumon Mathematics Program and their scores in the 2010 National Achievement Test (Math)?
5. Is there a positive association between the levels of the students in the Kumon Mathematics Program and their scores in the 2010 National Achievement Test (Math)?

B. Hypothesis

This study aims to test the following null hypotheses at 0.05 significance level:

Ho_1. There is no significant difference in the performance of students in the National Achievement Test in Math in the Kumon centers.

Ho_2. There is no positive association between the levels of the students in the Kumon Mathematics Program and their scores in the Math National Achievement Test.

Ho_3. There is no positive association between the number of years of exposure of the students in the Kumon Mathematics Program and their scores in the Math National Achievement Test.

James Ray Mendaje, Quality Assurance Specialist, Bahrain Training Institute

II. Review of Related Literature and Studies

A. *Related Literature*

a) The Kumon Method of Learning/Kumon Mathematics Program

The teaching method called Kumon is a simple, methodical approach to learning which aims to provide an effective means to develop the untapped potential of each individual child. The Kumon Mathematics program which is designed to teach math is a flexible, individualized, sequential program that provides for acceleration (Russell, 1993).

The Kumon Method is a home-based education system that aims to develop students' academic ability in order for them to become capable members of society. At the same time it also aims to enable students to become independent by fostering in them the mindset and skills for self-learning (Instruction Principles, 2010).

Kumon was founded in 1954 by Toru Kumon, a Japanese high school math teacher who developed study materials for his own struggling son. He believed that kids needed to have a strong foundation in the basics—phonetic awareness and to memorize multiplication tables, for starters—before they could excel at a more advanced level (Miniter, 2010).

The Kumon method uses a sequential curriculum made up of worksheets to move the student through a concept in small linear steps. The curriculum consists of more than 20 defined skill levels for math and reading. Each level contains 20 sets, with each set consisting of 10 worksheets. The earliest levels cover pre-counting skills, while the highest levels move through college level calculus and statistics. The student moves on to the next level as mastery of the previous level is demonstrated by meeting the timing and accuracy requirements. Kumon encourages the student to develop his or her memory, learn and store computational procedures, and be independent learners (Oakley, Lawrence, Burt, Boxley, Kobus, 2003).

The revised Kumon mathematics program is composed of 22 levels. The pre-school materials comprise 6 levels covering counting and reading numbers, line drawing and number writing, and introduction to addition. The contents of the primary school materials include the four basic operations up to order of operations. The topics in the secondary level start from basic algebra to advanced algebra, while the college level comprises pre-calculus, trigonometry, plane geometry, calculus, linear algebra and probability and statistics. Each worksheet level corresponds to a particular school grade level which is called as the Kumon International Standard (KIS). For example, level A is equivalent to Primary 1, level B to primary 2, etc.

New students take a free placement test, get started at a skill level below their current abilities, and move up in small increments. In order for students to advance, they must achieve a perfect score on a test within a set amount of time. The idea is that a child who demonstrates both speed and accuracy shows full mastery of the material. Kumon stresses an old-fashioned aphorism: "Practice makes perfect." Students must practice their lessons every day by completing worksheets at home (Miniter, 2010).

The goal of Kumon is to make learning a student-driven activity, to put the responsibility for learning on the learner, not on the teacher. It aims to provide each child with a course of instruction that best meets his or her individual needs. The Kumon philosophy says that there is a natural sequence in learning many subjects (especially math) and that study should follow this order. Learning should proceed like a single path. The Kumon path is composed of thousands of small steps that guide students forward little by little. This allows children to proceed at their own pace from beginning to end (Russell, 1993).

In the Kumon Method of Education, study takes the shape of individualized self-learning. There is no blackboard in a Kumon Center. The students utilizes the Kumon worksheets which are created in such a way that the students can do all of the necessary reading, thinking and writing by themselves and keep on making progress. It gives opportunity to each and every student to do the just right level of work and make progress at his or her own pace. The problems in the worksheets are arranged throughout in such a way that the degree of difficulty in study contents increases in a small incremental way (Kumon, 2002).

These worksheets introduce new concepts, demonstrate problem-solving techniques and most of all, provide a deep, solid foundation of practice and repetition, for each level of study. The students must attain a required level of competence at each level – both in terms of accuracy and completion time – in order to progress to the next level (Russell, 1993).

The materials used in Kumon are created with the aim of producing the greatest result in the shortest possible amount of time. Also they are created to allow students to progress naturally and without overexerting themselves (Instruction Principles, 2010).

b) National Achievement Test

As mentioned above, the main purpose of this study is to assess the performance of second year high school students exposed in the Kumon mathematics program in the 2010 National Achievement Test (Math). The NAT used to be called the National Elementary Achievement Test (NEAT) for the grade school level and the National Secondary Achievement Test (NSAT) for the high school level. Both NEAT and NSAT were precursors of the National College Entrance Examination (NCEE), an examination administered to gauge the competency of students entering college. The NCEE was abolished in 1994 through Executive Order no. 632 by then education secretary Raul Roco who stated that all high school students should be able to enter college and be given a chance of a better career in the future. It was replaced by NEAT and NSAT.

When the Department of Education Culture and Sports (DECS) was officially converted into the Department of Education (DepEd), NEAT and NSAT were also abolished and replaced by the National Achievement Test. Both the public and private elementary schools take this exam.

The National Achievement Test is conducted by the Department of Education's National Education Testing and Research Center (NETRC) to assess the competency of both public and private school students in mathematics. The results are intended to guide the Department of Education in its efforts towards the improvement of the quality of education in public schools and to provide appropriate intervention for the students.

Since school year 2002-2003, the test has been given to grade 3, grade 6, and 2nd year high school students. From

2004 – 2006, the NAT was also given to high school seniors under the direction of Secretary Edilberto De Jesus as a special measure to further aid in the assessment of school performance.

B. Related Studies

This study is parallel to other studies conducted in the past regarding the effects of the Kumon mathematics program. The Kumon Mathematics program has been proven to have positive effects on the math achievement of the students. Russell (1993) researched some schools that made use of the Kumon Mathematics program over a period of one year. The results of Russell's research are the following:

At the Cleora Public School in Oklahama, the Kumon Method was introduced in January of 1990 for approximately 130 students. A comparison of the Iowa Test of Basic Skills scores from early 1990 to April, 1993 shows a marked improvement in math ability. The average for the entire group, grades 1-8, in total Math (which includes concepts, computation, and problem – solving) rose from the 63rd percentile to 82nd percentile. Average Math Computation scores alone rose even more: 63% to 84%.

In Bowie, Maryland, after 3 years of static scores (1988 – 1990), students at Holy Trinity Episcopal Day School have seen their scores on the MAT 6 (Massachusetts Achievement Test) jump. At Holy Trinity, 210 students, in grades 1 – 6 took Kumon for five months in 1991 and for the entire year in 1992. The students' average Problem – Solving score rose from 80% in 1990 to 86% in 1992. In computation, their scores increased from 72% in 1990, before Kumon, to 88% in 1992.

Another striking example comes from Sanford, Colorado, where the Kumon Method was used with students in grades 3 – 6, but not in 1 – 2. After only one year of Kumon, the results were impressive. On their April, 1991 Iowa Test of Basic Skills, the First Graders 7 showed an average 1% decline and the Second Graders an average of -2%. Of the class studying Kumon, however, the lowest increase was 9%, while two grades showed a 10% improvement each and one grade averaged 11% increase in performance.

Similarly, in the study of Thijsse (2002) conducted in South Africa, the rate of the decrease of the math anxiety level of the learners in the Kumon group is significantly higher as compared to the group of students not exposed in the Kumon math program. Also, with regards to mathematics achievement, the learners who participated in the Kumon program have improved in terms of math speed, accuracy and school test marks. However, the speed, accuracy and school test results of learners from the control group rated have decreased or remained the same.

Moreover, the study of McKenna, Hollingsworth and Barnes (2003) examined the effects of Kumon instruction. Whole classes of Title I elementary school students from grades two through five were divided into two groups, those with Kumon instruction and those without. All students continued with traditional textbook mathematics. Pretests and posttests were administered to all participants to assess progress, compare standardized test results, and examine levels of acceleration. Results showed that Kumon group students improved their mathematics skill levels more than non-Kumon group students, and they scored significantly higher than non-Kumon group students two years after their Kumon instruction ended.

In addition, the study of Oakley, Lawrence, Petway, Jackson, Dessert and Hanna (2005) revealed that supplementation with the Kumon method as a partial replacement for a traditional mathematics program appears to result in significant improvements in state-wide Michigan Educational Assessment Program test scores for mathematics. Daily supplemental practice in mathematics using the Kumon methodology appears to provide for substantial improvement in state-wide assessment tests.

III. METHODOLOGY

A. Research Design

This study applied the descriptive - correlation method utilizing data of sophomore secondary students from the three Kumon centers and the students' NAT result. The descriptive - correlation method is use to determine if two or more variables are associated with each other by explaining their relationship. The researcher correlated the number of years of exposure of the students in the Kumon Mathematics Program, their levels in the Kumon Mathematics Program versus their scores in the Math National Achievement Test to find out if a relationship exists among the variables.

B. Respondents of the Study

The participants of the study were the 55 sophomore secondary students in Davao City of school year 2009 – 2010 enrolled in the Kumon Mathematics Program in three Kumon centers namely Obrero Center, GCL- Quirino Center, and Matina Center. The number students in Obrero, Matina and GCL- Quirino centers were 25, 15 and 12 respectively. These students were studying in different private high schools in the city. The number of years of exposure in the program varies from one student to another. The students reported to the center at least twice a week and they were given worksheets to answer in the center. After they finished their work in the center, they were given homework to do at home since Kumon is a daily study program. Also the students varied in terms of their levels in the worksheets and number of worksheets studied since the materials assigned are based on their individual ability.

C. Sources of Data

The following tools were used by the researcher in this study:

a) Center Management System Report (Report B). This is a monthly report that contains valuable information of the students with regards to their Kumon study. The information that was beneficial to this study included the starting date of each student in the Kumon Mathematics Program and the Kumon math levels achieved by the students every month. The number of years of exposure of the students in the Kumon Mathematics Program and their worksheet levels were assessed by the researcher a month before the National Achievement Test was conducted. The number of years of exposure of each student in the program covers from the commencement date of the student in the program up to the date of the administration of the test. The basis of the

worksheet level of the student was his or her accomplishment for the month of February 2010 since the National Achievement Test was conducted on the first week of March 2010.

b) *National Achievement Test (Math) Certificate of Rating.* The 2010 National Achievement Test was conducted on March 11, 2010. The 2010 National Achievement Test (Math) is composed of 60 multiple choice questions which comprise varied learning competencies.

The student's certificate of rating contains primarily the raw scores, percentage score, standard score and percentile rank of the student obtained in five different subject areas (Filipino, Mathematics, English, Science, and Araling Panlipunan). The percentage of correct responses per learning competency measured by subject area is also reflected in the rating.

D. Data Gathering Procedure

The researcher asked authorization from the chief instructors of the three Kumon Centers to conduct the study using the 55 sophomore secondary students enrolled in the Kumon Mathematics Program of S.Y 2009 – 2010. After the approval, the list of sophomore secondary students was extracted by the researcher from each center to determine the respondents of the study. Then the researcher sent a written communication to the parents of the involved participants to let them know about the study and to ask permission from them to use the result of their child in the National Achievement Test (Math). After the approval of the parents, the test results were collected one by one by the researcher from the students. Then the researcher gathered the other necessary data to be used in the study such as the students' worksheet levels and number of years of exposure in the program from the Center Management System Report (Report B).

E. Data Analysis

The researcher used the arithmetic mean to calculate the average of the raw and percentage scores of the students on the test, students' average worksheet levels, and students' average number of years of exposure in the program. The One way Analysis of Variance (ANOVA) was used to compute the F value to determine if there is a significant difference in the performance of the students in the three centers. In calculating the coefficient of correlation, the researcher used the Pearson product-moment correlation. To calculate the t-value to test the last two hypotheses, the t - test for the significance of the correlation coefficient was used.

IV. RESULTS AND DISCUSSION

Table 1. Profile of the Students Exposed in the Kumon Mathematics Program

Center	Number of Students Below the KIS	%	Number of Students in KIS and Above	%	Average Number of Years of Exposure in the Program
OBRERO	3	10.71	25	89.29	4.35
MATINA	3	20	12	80	1.77
GCL	0	0	12	100	3.38

The Kumon International Standard (KIS) refers to a worksheet level in the Kumon Mathematics program which corresponds to a particular school grade level. For example, level A is equivalent to Primary 1, Level B to Primary 2, etc. For second year high school students, the KIS is level H. Table 1 is a summary of the data which contain information of the students in terms of worksheet accomplishment, number of years of exposure in the program and NAT result. The table shows that in Obrero Center, 10.71 percent of the students (3 out of 28) were doing materials below the Kumon International Standard (KIS) and 89.29 percent (25 out of 28) were at least in the Kumon International Standard. The average number of years of exposure of the students in the program is 4.35 years. The data in Matina Center indicates that out of 15 students enrolled in the program, 20 percent (3 out of 15) were below the Kumon International Standard and 80 percent (12 out 15) were at least in the Kumon International Standard. The average number of years of exposure of the students in the program is 1.77 years. On the other hand, 100 percent of the students (12 out of 12) were at least in the Kumon International Standard in the GCL center and the average number of years of exposure is 3.38 years. The data is based on the Center Management Report last February 2010.

The data of the table signifies that the background of the three centers in terms of student's achievement in the program is remarkable since majority of the students were at least doing materials equivalent to second year high school based in the standard of Kumon. The challenge of the instructors and staffs in the three centers is to work further such that 100 percent of the students will be advanced from their school grade level. This is to fully maximize their mathematical abilities.

Table 2. Percentage of Correct Responses per Learning Competency in Three Centers

	Percentage of Correct Responses Per Learning Competency																	
Center	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
OBRERO	95	85	43	94	43	97	92	64	53	85	92	55	68	53	81	77	88	69	54
Mastery Level Descriptive Equivalent	CAM	MTM	AM	CAM	AM	M	CAM	AM	AM	MTM	CAM	AM	MTM	AM	MTM	MTM	CAM	MTM	AM
MATINA	85	73	43	84	43	89	82	58	49	74	81	54	68	55	79	77	85	65	48
Mastery Level Descriptive Equivalent	MTM	MTM	AM	MTM	AM	CAM	MTM	AM	AM	MTM	MTM	AM	MTM	AM	MTM	MTM	MTM	AM	AM
GCL	83	75	41	83	42	90	85	64	53	75	85	53	70	52	75	74	84	74	53
Mastery Level Descriptive Equivalent	MTM	MTM	AM	MTM	AM	CAM	MTM	AM	AM	MTM	MTM	AM	MTM	AM	MTM	MTM	MTM	MTM	AM

Legend : CAM – Closely Approximating Mastery, MTM – Moving Towards Master, AM – Average Mastery, M – Mastered

Scrutinizing the data in Table 2, the result shows that the students in Obrero center obtained a mastery level descriptive equivalent of "Mastered (M)" in learning competency 6 which covers simplifying rational algebraic expression. They got a mastery level descriptive equivalent of "Closely Approximating Mastery (CAM)" in competencies 1, 4, 7, 11, and 17 which comprise finding solution of systems of two linear equations, finding the solution set of a quadratic equation, performing operations on rational algebraic

expressions, representing relationships as equations, and solving radical equations. Moreover, in competencies 2, 10, 13, 15, 16, and 18 which deal on using systems of linear equations to solve problems, identifying relationships between two quantities in real life, evaluating numerical expressions, performing operations on radical expressions, and finding the common difference and nth term of arithmetic and geometric sequences, the students bagged a mastery descriptive equivalent of "Moving Towards Mastery (MTM)". While in competencies 3, 5, 8, 9, 12, 14, and 19 which cover translating situations in real life to linear inequalities, using quadratic equation to solve problems, solving rational equations, solving problems involving rational algebraic expression, solving problems on variations, and solving arithmetic and geometric problems, the students obtained a mastery descriptive equivalent of "Average Mastery (AM)".

However, the students in Matina and GCL centers almost obtained similar results. They obtained a mastery descriptive equivalent of "Closely Approximating Mastery (CAM)" in competency 6, "Moving Towards Mastery (MTM)" in competencies 1, 2, 4, 7, 10, 11, 13, 15, 16 and 17, and "Average Mastery (AM) in competencies 3, 8, 9, 12, 14, 18 and 19. The students in two centers differ only in competency 18 in which the students in Matina got a mastery level descriptive equivalent of "Average Mastery (AM)" while the students in GCL obtained an equivalent of "Moving Towards Mastery (MTM)".

The table further illustrates that among the learning competencies, the students in three centers got very low percentage scores in competencies 3, 5, 9, 12, 14 and 19. These learning competencies have one thing common. They basically deal on solving word problems. This is an indication that there's a need to work on in terms of enhancing the skills of the students in solving different kinds of world problems. Based on the contents of the Kumon mathematics program, the worksheets contain only minimal problems that correspond to learning competencies 3 and 19 which deal on translating situations in real life to linear inequalities and solving arithmetic and geometric problems. The worksheet do not contain exercises related to learning competencies 5, 9, 12 and 15 which comprise solving word problems involving quadratic equations, rational algebraic expression, variations, and exponents. This is an implication that the Kumon Mathematics program should be amended in such a way that it should not only focus calculation, solving word problems should also be given great emphasis.

The Curriculum Development Center (2003) stressed out that an important objective in teaching mathematics is to develop students' mathematical problem-solving skills. Learning to solve problems is a primary objective in learning mathematics, as problems are inevitable fact of life (Patton, Cronin, Basset, and Koppel, 1997).

Comparison of the Achievement of the Students in three Centers

Table 3. Analysis of Variance of the Raw Scores of Students in Three Centers

SOURCE OF VARIATION	SUM OF SQUARES	df	MEAN SQUARE	Computed F Value	Critical F Value at 0.05	Decision
Treatments	115.27	2	57.64	0.468	3.15	Ho is not rejected
Error	6402.11	52	123.12			

The third problem in this study was: Is there a significant difference between the performance of the students in the National Achievement Test (Math) in the three centers? Table 3 presents the data for comparing the significant difference between the raw scores of the students in the National Achievement Test (Math) in three centers. As presented, the computed *F* value is 0.468 while the critical *F* value is 3.15. The analysis reveals that that the null hypothesis is not rejected since the computed *F* value is less that the critical *F* value. This implies that there is no significant difference in the performance of the students in the National Achievement Test (Math) in three centers. This is an implication that the three centers do not differ in terms of locality, learning environment and teachers' instruction skills. This is also due to the fact that the students were doing the same learning materials. The future enrolees can choose any of these three centers depending on their own convenience.

This is well – supported by the study of Russell (1993) in which the students in three different schools who are exposed in the Kumon mathematics programs showed a marked improvement on their mathematical abilities.

Direct Relationship between the levels of the Students in the Kumon Mathematics Program, the Number of Years of Exposure in the Program and their Raw Scores in the Math National Achievement Test

Table 4. The t-value for Positive Association between the Students' Worksheet Levels and Raw Scores

	Mean	SD	Pearson r	Df	Computed t-value	Critical Value at 0.05(1T)	Decision
Worksheet Levels	17.22	11.1	0.83	53	10.83	1.671	Reject Ho
Raw Scores	42.29	2.41					

The data about the hypothesis stating that there is no positive association between the levels of the students in the Kumon Mathematics Program and their raw scores in the Math National Achievement Test are shown in Table 4.

The mean of the worksheet levels of the students is 17.22 with a standard deviation of 11.1. Considering the raw scores, the students got a mean of 42.29 with a standard deviation of 2.41. Using Pearson product-moment correlation formula, the computed correlation coefficient is 0.83 which indicates that there is a high correlation between the two quantities. Apparently, the computed t-value exceeds the critical value which leads to the rejection of the null hypothesis. This shows that there is a positive association between the levels of the students in the Kumon Mathematics Program and their raw scores in the Math National Achievement Test. This implies that the raw score does increase as the worksheet level increases. The higher the level of the students, the higher the scores they obtain in the test.

This is supported by the study of Oakley, Lawrence, Petway, Jackson, Dessert and Hanna (2005) who revealed that supplementation with the Kumon method as a partial replacement for a traditional mathematics program appears to

result in significant improvements in state-wide Michigan Educational Assessment Program test scores for mathematics. Daily supplemental practice in mathematics using the Kumon methodology appears to provide for substantial improvement in state-wide assessment tests.

The study of Thijsse (2002) also supported this study which states that the learners who participated in the Kumon program have improved in terms of math speed, accuracy and school test marks.

Table 5. The t-value for Positive Association between the Students' Number of Years of Exposure in the Program and Raw Scores

	Mean	SD	Pearson r	Df	Computed t-value	Critical Value at 0.05(1T)	Decision
Number of Years of Exposure	3.43	2.65	0.296	53	2.26	1.671	Reject Ho
Raw Scores	42.29	2.41					

Presented in Table 5 are the data related to the last hypothesis stating that there is a no positive association between the levels of the students in the Kumon Mathematics Program and their raw scores in the Math National Achievement Test. The table shows that the mean number of years of exposure of the students in the program is 3.43 with a standard deviation of 2.65. On the other hand, the students' mean raw score is 42.29 with a standard deviation of 2.41. The computed correlation coefficient is 0.296. Although that there is a low correlation between two quantities, the null hypothesis is still rejected since the computed t-value exceeds the critical value. This means that there is a positive association between the number of years of exposure of the students in the Kumon program and their scores in the said test. This implies that raw score does increase as the number of years of exposure of the students in the program increases. The more that the students are exposed in the program, the higher the score that they obtain in the test.

The study of Russell (1993) supported this study that Kumon Mathematics program has been proven to improve the mathematics skills of the students who are exposed in the program for some period of time.

V. CONCLUSIONS AND RECOMMENDATIONS

a) Conclusions

The following are the conclusions of the study based on the findings:

The background of the three centers in terms of student's achievement is remarkable since majority of the students were doing materials at least in the Kumon International Standard (KIS). But still the instructors and staff in the three centers should work further so that all students will be studying advanced materials. This is to fully maximize their mathematical abilities.

There's a great need to improve the weak areas of students in the aforementioned test particularly those areas that cover solving word problems. This would be collaborative efforts of the students, the parents, the instructors and teaching staffs in the Kumon centers as well as the administrations and teaching staffs of the schools where the students are studying.

Since the students do not differ in terms of their performance in the aforementioned test, this would indicate that the three centers do not differ in terms of locality, learning environment and teachers' instruction skills. This is also due to the fact that the students were doing the same learning materials. The future enrollees can choose any of the three centers depending on their own convenience.

The positive association between the worksheet levels of the students and their raw scores in the test implies that the raw score does increase as the worksheet level increases.

Also, the positive association between the students' number of years of exposure in the program and their raw scores in the test implies that raw score does increase as the number of years of exposure of the students in the program increases.

b) Recommendations

In the light of the outcomes of the study, the following points are recommended:

Replication of the research should be conducted using sample comprising not only Kumon students in Davao City but also in other areas in the country. The research should not only focus on the performance of the students exposed in the program. Sample of non-Kumon students should also be taken into account to make a comparative analysis of the performance of the two groups. Also, the study should also investigate students' performance in different grade level since the National Achievement Test is not only administered to second year high school students. The test is also administered to elementary students particularly grade six pupils. Moreover, the future researchers should also consider other sources of data, not only the aforementioned test, to fully measure the extent of the students' performance in Math. This data includes the College Scholastic Test, College Admission Test, Mathematics Diagnostic Test, etc.

The teacher should make a comprehensive assessment of the abilities of the students particularly in Math to diagnose the areas that a particular student has not yet fully mastered. One of the greatest problem that a teacher faces in teaching higher mathematics, for example the high school and college teachers, is the inadequacy of the basic skills of the students in the lower mathematics program such as ability perform the four arithmetic skills, ability to simplify and evaluate operations on fractions, etc. After finding out the specific learning difficulty of the student, giving review exercises or supplements of that particular topic is highly recommended so that the student can smoothly deal the higher topics. The main key is to deal on the individual ability of the students. No two learners are alike. The bottom line is that if a particular student has not yet acquired full mastery of the subject matter, he or she should not be advanced to the next level. The materials to be utilized by the teacher and students should contain substantial examples and exercises for the students to work on to fully developed the student's mathematical skill.

Examining the revised structure of the Kumon Mathematics program, the topics that level H (Kumon

International Standard for Second Year High School) comprises does not cover all the learning competencies of the Math National Achievement Test). Some of the topics that can be found in the Kumon materials that match to other learning competencies are scattered in the higher levels. There are also learning competencies that are not covered in the program. This would be a challenge to Kumon to work towards improving its math program. Being the world's largest after-school math and reading enrichment program, Kumon should be open to the new changes in the field of mathematics education. It should respond to the needs of the learners at the soonest possible time.

Despite the slight shortcoming of the Kumon mathematics program, it can still be recommended as a good supplement to regular schooling since it is proven to be effective in increasing math skills of the students based on the findings of this study and other studies pertaining to the program.

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James Ray C. Mendaje is currently a quality assurance specialist of Bahrain Training Institute and previously a Math Lecturer in the same institute and Math Lecturer in Mizan – Tepi University, Ethiopia. Prior to working abroad, he worked as a higher Math instructor in Kumon for 6 years and as a Math assistant for 4 years. He graduated with a degree of Master of Arts in Education major in Mathematics.