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Continuous Drill in Mathematics: A Spark for Mastery of Fundamental Operations

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Abstract: *This study was conducted to prove that the continuous used of mathematics drill can have an impact on the numeracy skills of the learners in the primary grades. The school-participants of this study were selected in accordance with their reports on the 2018 Project All Numerates findings the schools with the lowest numeracy rates in the conduct of one basic fact a day. There are seven elementary schools that were purposively selected to find out the highest rate of numeracy skills in their school in the primary grades (Grades 1, 2, & 3). Statistical analysis like mean, standard deviation and t-test were used for this study. Results show that significant differences transpired after getting the results of the arithmetic mean and t-test which showed remarkable improvements. This means that learners' interaction with exposure to mathematics drill employed the causal style of discourse and had significantly better numeracy retention and gained the mastery level of the lesson presented at once. Based on the findings of the study, relevant recommendations were provided afterwards.*

Keywords—continuous drill; Mathematics subject; primary grades; fundamental operations

1. INTRODUCTION

Drill practice in mathematics can enhance mastery of the fundamental operations, the deepening of the mastery will enable an individual to apply it in the simplest situations at home and in real life situations. In the teaching learning process, instructional strategies play a vital role. [1] It augments the memory level of the learners and makes the teaching learning process exciting [2]. At present, in the Philippine education system, intervention activitie are highly regarded as tools for remediating poor achievements of the learners and making discussion more interesting. One study concluded that remediation activities affect students' academic performance [3]. More interestingly, the use of drill can make the start of every discussion interesting and motivating. It is important that children master the basic facts during primary years. Once, they have learned these basic number relationships, they are much better prepared to tackle challenging topics in the higher mathematics.

When students enter the secondary school mathematics classroom, many factors contribute to their potential for success. One of them is the students' capacity to recollect basic math facts with slight effort and a great deal of speed and accuracy [4]. This type of seemingly unconscious recall is often referred to as automaticity [5]. Many educators especially in Mathematics and researchers accept the fact that automaticity is indispensable in order to develop approximation and mental computation skills [4]. It is the essence of overall number sense [6][7]. If students are constant with their accuracy and speed in terms of computation, they will devote more attention to the complete purpose of the problem [4]. Students with the ability to solve problems and reach higher-level math reasoning are sometimes negatively affected by their lack of confidence and ability to solve basic computation problems [8]. Jimenez [9] in his study stated that cognitive domains of the students determines the students' problem-solving ability. Legislative acts such as the No Child Left Behind Act (NCLB, 2002) and the present curriculum are supporting education reform and the way mathematics is being taught to students in the classroom. If students could not be able to calculate or recall a simple math fact, they will be more likely to give up before the problem is solved [4]. After conducting a study that measured the impact of computerized drill and practice, a study [10] reported that "the ability to succeed in higher-order skills appears to be directly related to the efficiency at which lower-order processes are executed" (p. 1). A lack of fluency in basic math facts hinders student's ability to perform more rigorous problem. In the schools division of Meycauayan City, for the SY 2018-2019 the implementation of a five minute drill is suggested to prepare the learners for mastery of the fundamental operations and apply this to real life situations.

Mathematics education is a necessity in almost all careers especially in the fields of technology, commerce, science, and economics and other related living and learning aspects of life [11]. If the learners will appreciate mathematics at an early age then they will love mathematics and become successful in the latter years of their life.

The activity drill will follow steps for the learners to master the basic competencies. The drill activity can be in the form of oral drill, written drill and a drill while having a physical exercise, this is timed for 5 minutes and the teachers can have their own style in the conduct of the drill which can be given at the beginning or end of their classes. It is expected that the learners will be more receptive to snappy basic questions on fundamental operations.

1.1. Research Questions

The study sought to find out if the activities in line with drill practice are effective in enhancing the learners' ability in number sense.

Specifically, it sought answers to the following questions:

1. What is the type of drill the primary grade learners find interesting?
   a. Oral drill
   b. Written Drill
   c. Drill with physical exercises
2. Is there a significant difference in the performance of learners in the pre-test and post-test after their exposure to everyday drill?
3. Is the regular mathematics drill a significant factor in mastery of fundamental operations and understanding of mathematics competencies?

2. METHODOLOGY

2.1 Research Design

This study used both quantitative and qualitative approaches. The performance of learners was determined at end of every quarter to find out the effectiveness of everyday drill to their performance. The researcher utilized the used of frequency, percentage, mean and t-test. While, teachers and learners were interviewed based on the drill they have found effective and the result after their exposure to the drill.

The use of structured interviews in data collection was a quantitative approach whereas an unstructured, open-ended interview is qualitative adapted to the study of Creswell [12] [13]. In this study, structured questions were asked followed by unstructured interview time given to the selected teachers to further probe the effectiveness of the drill being used.

2.2 Participants

The respondents of this study are the grade 1 to grade 3 learners of the selected elementary schools in the schools' division of Meycauayan City. The result of the test shall be interpreted in terms of comparison of the result before and after exposure to math drill. The compatibility of the results from each group will be tested using t-test independent.

2.3 Statistical Analysis

In this particular study, mean, standard deviation and t-test were used to determine any underlying differences in the result of the pre-test and post-test activities given during the study.

2.4 Interview Questions

A set of guide questions were administered to randomly selected teachers and learners. This is to have an in-depth interview with them with respect to their math drill presentation and the significant contribution of such drill in the mastery of the mathematics competencies.

2.5 Data Gathering Methods

The study has two phases: Phase I meeting with the mathematics coordinators for the delivery of the information and the Phase II the interview to the purposively selected primary grade teachers and learners of Schools Division of Meycauayan.

The researcher asked permission from the school heads to conduct the study. After their approval, the researcher commenced.

3. RESULTS AND DISCUSSIONS

The following tables showed the results of the data analysis and interpretation after the teacher used the mathematics drill religiously every day.

The Mathematics Drill used in this study were categorized as to the type of drill the primary grade learners find interesting such as the oral drill, written drill, and drill with physical exercises the results were indicated in the table. There are seven (7) schools subjected in this study stated as follows: Pajo Elementary School, Liputan Elementary School, Banga Elementary School, Perez Elementary School, Bahay Pare Elementary School, Libtong Elementary School, and Tugatog Elementary School. For the clarity of the presentation, this section is divided into two parts. Part I the data as to the choice of the primary learners' type of drill they are most interested about and the result of performance after their exposure to everyday drill. Part II presents the interview to the teachers and learners as to the significant contribution of the drill to the mastery of the competencies.

Table 1 shows the type of drill the primary grade learners find interesting in every school. An analysis of the data showed the learners' preference as to the drill the learners wanted to be given to them. Most of the learners answered that they found the use of oral drill as interesting while learners from Pajo ES, Liputan ES and Libtong ES found that oral and written drill as the most suitable drill for their primary learners together the learners preferred that these drills be given to them. While Bahay Pare ES and Banga ES learners' choice for the drill be given to them was oral drill from grade 1 to grade 3. Whereas, Perez ES and Tugatog ES commented that the drill with physical exercises and oral drill were most appropriate for them to develop their numeracy skills.

Table 1. Summary of the Primary Grade Learners Choice as to the Type of Drill Most Interesting

School	N	Grade Level	Type of Drill
Pajo Elementary School	359	Grade 1	Oral drill
		Grade 2	Written Drill
		Grade 3	Written Drill
Liputan Elementary School	86	Grade 1	Oral Drill
		Grade 2	Oral Drill
		Grade 3	Written Drill
Banga Elementary School	206	Grade 1	Oral Drill
		Grade 2	Oral Drill
		Grade 3	Oral Drill
Perez Elementary School	843	Grade 1	Oral Drill
		Grade 2	Oral with Physical Exercises
		Grade 3	Oral with Physical Exercises
Bahay Pare Elementary School	119	Grade 1	Oral Drill
		Grade 2	Oral Drill
		Grade 3	Oral Drill
Libtong Elementary School	312	Grade 1	Oral Drill
		Grade 2	Oral Drill
		Grade 3	Written Drill
Tugatog Elementary School	64	Grade 1	Oral Drill
		Grade 2	Drill with Physical Exercises
		Grade 3	Drill with Physical Exercises

The pre-test data showed that the mean difference of Grade 1, Grade 2 and Grade 3 learners varied as follows .388, .593, and .988 which is not significant. Therefore, it can be said that the practice of any mathematics drill conducted at the beginning or end of every classes will have an effect in the numeracy performance of the learners.

Table 2. Summary of Comparison of the pre-test and post-test after the learners' exposure to mathematics drill

Level	N	X-Pre-Test	X-Post-Test	Mean Diff.	SD	t-value Pre	t-value Post
GR 1	753	1.86	6.59	4.59	2.28	.388	.002*
GR 2	719	2.16	7.26	5.26	2.14	.593	.001*
GR 3	517	2.00	7.69	5.69	1.93	.989	.000*

*$p < .05$

Table 2 showed the analysis of the data wherein it was found that the post-test t value of Grade 1, Grade 2 and Grade 3 learners varied as to .002, .001 and .000 respectively. Therefore, it can be said that there is a significant effect in the learners' numeracy skills after the everyday exposure of learners to mathematics drill which means that the two groups are comparable in their numeracy performance. The Grade 3 result however, can be considered as highly significant for obtaining a result of .000 which means that the numeracy skills of the learners is depended on the amount of time of every learners' exposure to the mathematics drill.

Student Interview Responses in Relation to the conduct of the Mathematics Drill

The learners were interviewed by their teachers themselves directly from their classes. The learner interviewee sat next to the interviewer. The interview began with light general conversation to relax the learner and to introduce the interview question "*Can the everyday mathematics drill improve your performance in numeracy and understanding of mathematics competencies*"? Whereas, the teachers were being interviewed with the question, "*Can the regular mathematics drill plays a significant factor in the mastery of fundamental operations and understanding of mathematics competencies?* From the in-depth learners' interviews and teachers' interview the following patterns were discovered.

Performance in Numeracy Skills

As a result of Pajo Elementary School learners' experiences more than half out of the 3 learners being interviewed in Grade 1 stated that they enjoyed experiences in learning mathematics through their mathematics drill. Likewise, the Grade 2 learners also find enjoyment in the mathematics drill provided by their teachers. Grade 3 learners answered that they enjoyed math drill and they are learning at same time.

The teachers being interviewed as to the question "*Can the regular mathematics drill plays a significant factor in the mastery of fundamental operations and understanding of mathematics competencies?"* According to the two Grade 1 teachers being interviewed they said that it helps in understanding and mastery of the learner's numeracy skills. Whereas, according to the Grade 2 teacher it helps motivate the learners in answering mathematics. The two Grade 3 teachers answered that it helps to retain different fundamental in the mind of the learners and admitted that it helps a lot for the teacher and the learners become participative in class.

As to the result of Perez Elementary School learners' interview, they all stated that they wanted to begin their class with the conduct of the drill, they wanted this to be given to them constantly. The teachers' answer to the question gained three important answers as follows: (1) Yes, it helps the

learner visualizes the numbers by the use of regular mathematics drill (2) Builds the confidence of the learners when it comes to mastery of mathematics drill (3) creates the sense of connection of each fundamental operation that make it easy when mastering it.

For Libtong Elementary School, the result for the learners' interview gained the following answers: (a) *Opo, importante ang pagkakaroon ng drill sa math para mas lalo po naming maintindihan* (b) *Opo, para po mamaster po naming ang multiplication table 1-10* (c) *Opo, para hindi po kami mahirapan sa mga lesson sa higher grades* (d) *Opo, mahalaga po siya para sa amin para madali n lng sa amin yung mga lesson na mahirap kagaya ng fractions*. (e) *Opo, para mas lalo p naming maintindihan ang mga lesson sa Math*. Likewise, the teachers' stated the following responses [(a) Yes, it acquires the knowledge of skill through repetitive practice (b) Yes, it is a significant factor. Because it is where the pupils master the 4 fundamental skills (c) Yes, it is, It helps pupils to master the 4 fundamental operations (d) Yes, it helps a lot in terms of understanding and mastery of the lessons in math (e) Yes, it allows the learner to master the basic facts.]

As to Bahay-Pare Elementary School answers to the questions to both the learners and teachers they find the continuous mathematics drill as enjoyable and sustainable in learning every lesson whereas, the teachers answered that the constant giving of mathematics drill the learners become more participative and interested with the lesson. In a study by Asio & Riego de Dios [14] students were very satisfied on the skills exhibited by an educator. Since the learners participate in the drill activities, this interests them and motivates them further.

Banga Elementary School learners answered that it helps to retain the different fundamental operations. *"Mabilis po kaming nakakapag add, subtract at multiply kahit sa isip lang kailangan lng po na mapractice lagi, masaya po kami pag may drill".* The teachers stated the following observations everytime they conducted the drill (a) Yes, repetition of basic facts develop one's skills. (b) Yes, it helps the pupils master the skills (c) Yes, because they will master the skills in basic facts (d) Yes, making the learners too it again and again the numeracy skills can be developed with mastery and (e) answered Yes, because regular drills are very important so that pupils will not forget and use it whenever necessary.

For Liputan Elementary School and Tugatog Elementary School the learners said that they have positive experiences in mathematics classes during their regular drill they claimed that they can confidently answered the questions of the teacher in a much fast paced they don't need to used their hands in counting. This scenario reflects the contexts of a 21st century attributes and skills of teachers wherein students evaluated their teachers and got a very satisfactory response [15]. Whereas, the teachers said that it is really a must to begin the class with a drill so that the learners can be settled first to the numeracy state of motivation.

4. Conclusion

Based on the results from the data presented, the following conclusions were drawn:

1. The continuous drill of the primary grade learners can improve the performance of learners in terms of their numeracy skills in the four fundamental operations of mathematics.
2. There is a significant difference in the scores of learners in terms of quarterly assessment after exposing them to continuous drill.

5. Recommendations

In the light of the findings and conclusions, the researcher recommends that:

1. Encourage primary grade teachers to conduct everyday mathematics drill to make a difference in the learners' numeracy ability and provide technical assistance to the teachers in sharing the best mathematics drill practices of other schools to provide it on their own school and master the numeracy skills in return to improve students' mathematics performance
2. It is important that teachers should be aware of the mathematics drill to be conducted every day and consciously develop students' confidence in dealing with numbers. A feeling of mathematical self-efficacy must be enhanced at an early grade.
3. Teachers can develop their ingenuity in coming out with the mathematics drill in which their learners find interesting.
4. Further studies as to extending the mathematics drill not only in the primary grades but to the intermediate and secondary grades as well and observed the impact of this practice in the Mathematics ability of the learners.

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