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Collaborative learning in mathematics

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Abstract: This study described and examined the effects of collaborative learning in mathematics as perceived by learners and teachers among the selected Junior High Schools in the Philippines. It employed descriptive correlational research through researcher-made survey-questionnaire. It was participated by 100 mathematics and 100 grade 10 learners who were randomly selected. Results revealed that learners and teachers perceived that collaborative learning as an instructional strategy in mathematics, was highly effective specifically in the aspects of social development skills and enhanced understanding in teaching and learning mathematics. Also, learners and teachers both perceived that collaborative learning was highly effective as it enabled them to expose to a more relevant and wide-ranging instructional opportunities through collaboration and cooperation under mathematics instruction. Hence, the study recommends that teachers should create an actual and comprehensive instructional plan that apply and expand the positive implications of collaborative learning to mathematics instruction.

Keywords: collaborative, learning, mathematics, instructional, strategy, social development, enhanced understanding, teachers, learners

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INTRODUCTION

Teaching and learning mathematics in the basic education program is regarded as one of the most feared conditions in the actual educational settings because of the complex formula, theorems and higher order thinking skills needed. It is most feared by learners because of the number anxiety they commonly encounter. In addition to this, learners perceived that subject is inherently difficult due to calculations and application of acquired formula or concepts in solving problems. On the other hand, teachers also find difficulty in teaching the subject because of low level of engagement and class interactions they observed during mathematics instruction. The gravity of teaching and learning mathematics has been considered as one of the primary burdens in the Philippine educational system as the result of PISA 2022, shows that Filipino learners are strongly needing consistent, relevant and deeper learning in the subject. Also, according to the international metrics,

Filipino learners are less capable in utilizing their analytical, critical and problem-solving skills which lead to the continued deterioration in the quality of instruction in mathematics.

Consequently, part of the modern challenges of mathematics teachers is how they can put mathematic into more creative and highly engaging experience among the learners. In this line, mathematics teachers are expected to create more engaging interactions during the teaching and learning process. While it is viewed that teachers' primary duty is to bring instruction more meaningful and retentive, teachers in this regard are facing difficulty because of the participation and preoccupied behavior of learners in learning mathematics. As shown in the study of Abeygunawardena and Vithanapathirana (2019) shows that mathematics teachers are mainly aware on the difficulty in the application of the different teaching methods because of students' behavior towards learning mathematics. Further, according to the study of Basaraba (2019) which concludes that there is a significant association on learners' poor performance in mathematics and the instructional teaching strategies employed by teachers. Moreover, in the words of Mazana et al. (2019) which conclude that factors influencing students' liking or disliking of mathematics constituted students' aptitude attribute, instructional and social psychological and environmental factors. In addition, as shown in the study of Hallifax et al. (2020) which reveals that tailoring to initial motivation to learn mathematics can improve intrinsic motivation.

The researcher consistently observed that her learners find it difficult to learn mathematics. In this regard, she also extended her observations as to her fellow teachers instructional approach in providing effective and efficient teaching and learning mathematics. In accord to her observations, collaborative learning is commonly used where learners are deeply involved in the process. Learners in this mathematics teaching strategy are engaged to formulate their own ways of understanding mathematics concepts by means of working together. Common type of collaborative learning in mathematics is the promotion of teamwork and peer tutoring where mathematics teachers grouped their learners randomly and assigned particular topics to solve or complete under a specified time frame. Given these observations, the researcher ignited her interests in describing the effects of collaborative learning in learning mathematics.

Problem Statement

This study described and examined the effects of collaborative learning in mathematics as perceived by learners and teachers among the selected Junior High Schools in the Philippines. The study specifically aimed to:

1. describe learners' perceptions on the effects of collaborative learning in mathematics in terms of enhanced understanding, development of critical thinking skills and social skills development;
2. describe teachers' perceptions on the effects of collaborative learning in mathematics in terms of enhanced understanding, development of critical thinking skills and social skills development and;
3. examine if there would be a significant difference on the assessment of the respondents on the effects of collaborative learning in mathematics

Theoretical Framework

This study is anchored on Cooperative Learning Theory. The theory suggests that structured group work enhances learning outcomes through positive interdependence and individual responsibility in accomplishing the given learning tasks. In addition, the theory asserts that learners can work together towards the total completion and successful attainment of learning

task, emphasizing their acquired learning from the cooperation and collaboration made. So, it is practically relevant in this current work, as the same described and examined collaborative learning process in mathematics.

METHODOLOGY

Research design

This study utilized descriptive research. As defined by Siedlecki (2020), descriptive research is a quantitative method that is described as the collection of numerical data for the statistical analysis of a sample data set in a population. Here, it described and examined the effects of collaborative learning in mathematics as perceived by learners and teachers among the selected Junior High Schools in the Philippines.

Respondents and Locale of the Study

The subject respondents of the study were the 100 randomly selected mathematics teachers and 100 randomly selected grade 100 learners among selected public schools in the Philippines. The selection of the respondents was based on their willingness to participate in the study. Formal invitation links were sent to the respondents. Random sampling technique was utilized in selecting the respondents of the study.

Data Gathering Instruments

The study use two different versions of researcher-made survey questionnaire. The developed survey-questionnaire used a 4-Likert Scale such as: 4-Highly Effective, 3-Effective, 2-Not Effective and 1-Highly Not Effective. The researcher-made survey questionnaires underwent reliability testing through pilot testing among non-included respondents. The developed survey-questionnaire for learners has obtained .889 Cronbach Alpha result which was signified that the items were "Acceptable." In addition, the formulated survey-questionnaire for teachers obtained a Cronbach Alpha result of .871 which was signified that the items were "Acceptable."

Data Gathering Procedure and Data Analysis

The researchers sent a formal letter of request to the respondents' immediate head and informed consents to the subject respondents. In this line, the researchers established active and consistent line of communication through their social media account. Google form was used in order to administer the survey-questionnaire. Link was shared through the respondents' social media account. When all the data have been collected and encoded on a digital facility created by the researchers through MS Excel, appropriate statistical tools were applied.

Apparently, relevant statistical tools were used such as mean, standard deviation and general weighted mean and ANOVA. These statistical tools used so as to quantify or measure each specific research objective. These relevant statistical tools enabled the researcher to describe and examine the effects of collaborative learning in mathematics as perceived by teachers and learners

DISCUSSION OF FINDINGS

Perceived Effects of Collaborative Learning According to Student-Respondents

Collaborative learning in mathematics is a progressive learning acquisition approach instituted by teachers in order to rectify the ballooning instructional problems faced in teaching and learning mathematics. Based from the results of the study, learners perceived collaborative learning in terms of social skills development as highly effective. This means that learners experienced that collaborative learning enabled them to establish stronger ties and interactions with their classmates. The result also shows that collaborative learning in mathematics enabled learners to feel positive interactions through their classmates' mentoring and coaching. In other words, with the social development aspect of collaborative effects, learners are given strong opportunities to communicate and engage with their classmates while trying to understand the basic and fundamental concepts in mathematics. On the other hand, learners' perceived collaborative learning in terms of development of critical thinking skills and enhanced understanding as not effective because of the potential distractions they encountered brought about by too much interdependence and interactions during the teaching and learning process in mathematics.

Practically, the results evidenced Cooperative Learning Theory as the results show that learners perceived that collaborative learning in terms of social development skills as highly effective, indicating that they value more that social and interactive effects of collaborative learning approach which at the onset, is its primary intent. Apparently, the results practically implicates learners and mathematics teachers to establish parameters on the institution of collaborative learning by means of creating instructional framework in order to meet the holistic development of learners under the mathematics instruction. Hence, the results are supported by the study of Salleh (2021) which reveals that collaborative learning shows significant effect on students' social interaction skills. Thus, similar study noted that students believed that collaborative learning encouraged to work best with others.

Perceived Effects of Collaborative Learning According to Student-Respondents

Teachers as the main implementers of mathematics instruction based on the competencies engraved on curriculum, they are at their capacities, expected to create and formulate effective and efficient teaching strategies to institute retentive learning. In this line, teachers perceived that enhanced understanding and social skills development aspects of collaborative learning in mathematics as highly effective. Based from this, the result implies that teachers perceived that learners are able to develop their basic and complex understanding to mathematical concepts and principles as they work together. In addition, teachers also perceived that social skills development through active interactions of learners to one another, is also one significant factor that made them strongly engaged in the teaching and learning process. Apparently, teaches also perceived that collaborative learning in terms of enhanced understanding is obtained as learners can be able to ask for actual coaching and mentoring opportunities for their classmates who are highly advanced and competent under mathematics instruction. In other words, learners when they are taught using collaborative learning, they can be able to exchange ideas and raise questions among themselves that eventually resolved through their fellow classmates' competence.

Practically, the result evidenced Cooperative Learning Theory as the teachers perceived that collaborative learning is highly effective specifically in the aspects of enhanced understanding and social skills development. The theory asserts that learners learn when they are actively interacting with one another. Notably, the result practically implicates teachers and learners to create more

fundamental framework as to the extent of collaboration and cooperative that are to be established during the teaching and learning process. Hence, the results supported the study of Sukmawati et al. (2019) which asserts that interaction is the most obvious effects of collaborative learning where learners learn by working together. Similar study shows that collaborative learning has no significant difference in line with its instructional effects to other strategies used in mathematics.

Difference on the Assessment of the Respondents on the Effects of Collaborative Learning in Mathematics

Based from the results of the study, there was no significant difference between the assessments of the two groups of respondents regarding the perceived effects of collaborative learning. This indicates that both groups generally perceived the effects of collaborative learning in mathematics as highly effective in the delivery of effective, efficient and retentive teaching and learning process.

CONCLUSION

Collaborative learning in mathematics is a current instructional strategy under the 21st Century teaching and learning process. It found out that learners and teachers perceived that this instructional strategy was highly effective specifically in the aspects of social development skills and enhanced understanding in teaching and learning mathematics. Also, learners and teachers both perceived that collaborative learning was highly effective as it enabled them to expose to a more relevant and wide-ranging instructional opportunities through collaboration and cooperation under mathematics instruction.

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