Teaching Science Using Cubing Technique for Selected Elementary Grade Level

Apiag, Mary Grace M.[1]

[1]Department of Secondary and Elementary Education, Undergraduate Student, Mindanao State University at Naawan, Naawan, Misamis Oriental, 9023, Philippines

Alia Leemarc C.[2*]

[2]Department of Secondary and Elementary Education, Faculty of College of Education and Social Sciences, Mindanao State University at Naawan, Naawan, Misamis Oriental, 9023, Philippines

*Corresponding author's e-mail address: leemarc.alia@msunaawan.edu.ph

ABSTRACT

The study dealt on the effectiveness of cubing technique strategy on the performance of elementary pupils. Specifically, it aimed to find out the significant difference between the pretest and posttest scores in science of the pupils when taught to cubing technique. There were ninety (90) pupils of Tuod Integrated School enrolled in SY 2018-2019 involved in the study. The study used experimental research design. The pupils of Grade 4, Grade 5 and Grade 6 were given fifteen (15) questions given before and after the conduct of the study. Data were analyzed using percentage, t-test and paired t-test. T-test result revealed that there was no significant difference on the pretest scores of the pupils when exposed using cubing technique as a learning tool. T-test result signified significant difference on the post-test scores in Science of the pupils when exposed using Cubing Technique as a learning tool. On the other hand, Paired t-test result showed significant difference on the pretest and posttest scores in science of the pupils when exposed using cubing technique as a learning tool. This study concluded that Cubing Technique as a leaning tool can improve the performance in science of the pupils. Similar studies can be conducted to other disciplines too.

Keywords: *Strategy, Performance, Cubing Technique*

1. INTRODUCTION

Cubing was originally created to have students use a variety of thinking skills to consider a single concept. Moreover cubing gives students a chance to look at a concept from a series of different perspectives. It allows the teacher to differentiate for readiness in a very un-obvious way. It also provides a way for all students to explore one important topic or idea but to accomplish task at their readiness levels, in their preferred learning styles, and/or areas of personal interest. All students are working on activities dictated by their cubes; the activities are differentiated for individual students or groups of students. One cubing activity might group gifted learners for more challenging, higher-level activities; another, cubing activity might group non-gifted students according to their interest (Eulouise William, 2002). On the other hand, cube is a six-sided figure that has a different activity on each side of the cube. A student rolls the cube and does the activity that comes up. Additionally, cubing is a versatile, easy-to-use instructional strategy. It is easy to differentiate and works well with both individuals and small groups of students. It is flexible and adaptive way to differentiate instruction. Differentiated instruction is a way of teaching that allows teachers to present content in multiple ways to accommodate the needs and learning styles of individual students. Cubing require students to look at a topic from six different angles such as: Describe, Compare, Associate, Apply, Analyze, and Argue.

In implementing cubing technique, The teacher would write six questions that ask for information in a selected topic that design different levels of questions using Bloom's intelligence levels that prove their unit. On the other hand the teacher will keep clear learning goals in mind when considering the use of cubing for different learners. In addition, the teacher will also provide extended opportunities, materials, and learning situations that are appropriate for a wide range of readiness, interests, and learning styles. And above all, making sure that the students understand the verbs and the direction for the task.

1.1. Statement of the Problem

This study determines the effectiveness of cubing technique teaching strategy for elementary levels which are the Grade 4, Grade 5 and Grade 6.

This paper attempts to answer the following questions:

1. What is the pretest scores in Science of the pupils when grouped to Cubing Technique?
2. What is the posttest scores in Science of the pupils when grouped to Cubing Technique?
3. Is there significant difference on the pretest score in Science of the pupils when group to Cubing Technique?
4. Is there significant difference on the posttest in Science of the pupils when taught to Cubing Technique?
5. Is there significant difference on the pretest and posttest in Science of the pupils when taught to Cubing Technique?

Null Hypotheses:

Ho1: There is no significant difference on the pre-test scores in Science of the pupils when grouped to Cubing Technique.

Ho2: There is no significant difference on the post-test scores in Science of the pupils when taught to Cubing Technique.

Ho3: There is no significant difference on the pre-test and post-test scores in Science of the pupils when taught to Cubing Technique.

1.2 Scope and limitations of the study

The study was conducted at Tuod Elementary School during the SY 2018-2019. The respondents of this study were the Grade 4, Grade 5 and Grade 6 pupils officially enrolled on the said school. There wereseventy five (75) pupils chosen as the respondents of this study. Twenty five (25) pupils for the Grade 4, Twenty five (25) pupils for the Grade 5 and Twenty five (25) pupils for the Grade 6. This Study focused on the results of pretest and posttest scores in Science with the topic of Life Cycle of a Butterfly for Grade 4 level, Water Cycle for the Grade 5 level and Digestive System for the Grade 6 level using Cubing Teachnique.It was conducted during the second grading periodof the school year.

1.2. Definition of terms

The following terms are defined to clarify the terms used in the study;

Collaborative Learning Strategy is small-group learning involves students working together in groups, typically mixed ability, to explore, make sense and apply new information or knowledge.

Cubing Teachnique is a collaborative of learning that will be able student to think and rewrite about a certain topic from a variety of different perspective.

Experimental group is the grouping of pupils'exposed to Cubing Teachnique.

Performance refers to the pretest and postest scores of the pupils in science

pretest refers to the pupils performance before the cubing technique was being applied to the teaching and learning process

Posttest refers to the performance after the Cubing teachnique was implemented in teaching science

2. MATERIALS AND METHODS

2.1. Research design

The study used the sample group with true experimental and the randomized pretest-posttest design. Three elementary levels are used, which are the Grade 4, Grade 5 and Grade 6 levels, all grade levels chosen was exposed to Cubing Technique. Random assignment is used to form the groupings. The performance of students is measured through giving of pretest and posttest before and after implementation of the topics chosen.

2.2. Subject of the study

The respondents of the study were the Grade 4, Grade 5 and Grade 6 pupils of Tuod Elementary School. The School was located at Barangay Tuod, Manticao, Misamis Oriental. All Grade levels chosen are exposed to experimental group which is the Cubing Technique in teaching science.

2.3. Data gathering procedure

The researcher selected the Tuod Elementary School and asked permission from the school principal to conduct the study. Then, asked the Grade 4, Grade 5 and Grade 6 teachers to conduct and gather data. Grade 4 consists of 25 pupils, Grade 5 consists of 25 pupils while in Grade 6 consists of 25 pupils for a total of 75 respondents. All Grade levels chosen were the experimental group which was taught using Cubing Technique. The first step in procedure is the conduct of pretest in Grade 4, Grade 5 and Grade 6 and determining of pretest scores. Followed by the implementation of the topic which is the Life Cycle of a Butterfly for Grade 4, Water Cycle for the Grade 5 and Digestive System for the Grade 6 level are taught using a Cubing Technique. The author used pretest before implementing the study to measure the knowledge of the students. Students are able to make predictions based on prior knowledge, or information they already have. A posttest are given to measure the outcome of the students after the topic is implemented. Descriptive statistical namely mean standard deviation, graphical method and paired T-test are used to analyze the data.

2.4. Instrument used in the study

Pretest and posttest questionnaires were given before the implementation of the study. Both pretest and posttest taken from science grade 4, grade 5 and grade 6 pupils module and science links book were supported by table of specification. Teacher made test, cube consist of six (6) questions written on each phase of the cube and dice and the journal notebook for their answer.

3. RESULTS AND DISCUSSION

3.1Pretest scores in Science of the pupils exposed to Cubing Technique

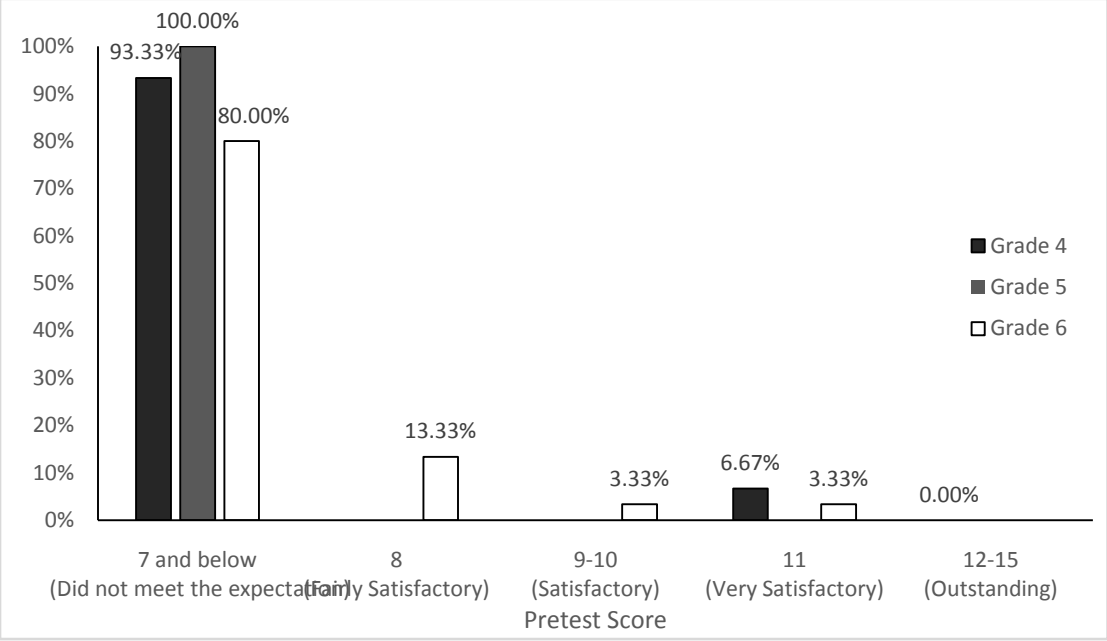

Figure 1. Percentage distribution of the pretest score in Science of the pupils exposed to Cubing Technique

Figure 1 showed the percentage distribution of pretest score in Science among pupils. Using cubing technique as a tool in grade 4 pupils 93.33% got the score that ranges from 0 to 7, none of them got the score that ranges from 8 to 10, 6.67% got the score of 11, and none of them got the score that ranges from 12 to 15. In grade 5 pupils 100% got the score that ranges from 0 to 7, and none of them got the score that ranges from 8 to 15. In grade 6 pupils 80% got the score that ranges from 0 to 7, 13.3% got the score that ranges from 8 to 10, 6.67% got the score of 9 to 10 and 11, and none of them got the score that ranges from 12 to 15.The result of revealed the percentage distribution of pretest score in Science among different grade level. This means that majority of the students in Grade 4, Grade 5 and Grade 6 that have taken the pretest find it difficult for the reason that they have taken the pretest with just small background knowledge. However, there are also pupils that passed the test due to their prior knowledge about the topic. Students who learned and understand correct information have a better chance of success learning new material. Student's prior knowledge can help or hinder learning (Gerberick, 2012).

3.2 Posttest scores in Science of the pupils when grouped to Cubing Technique

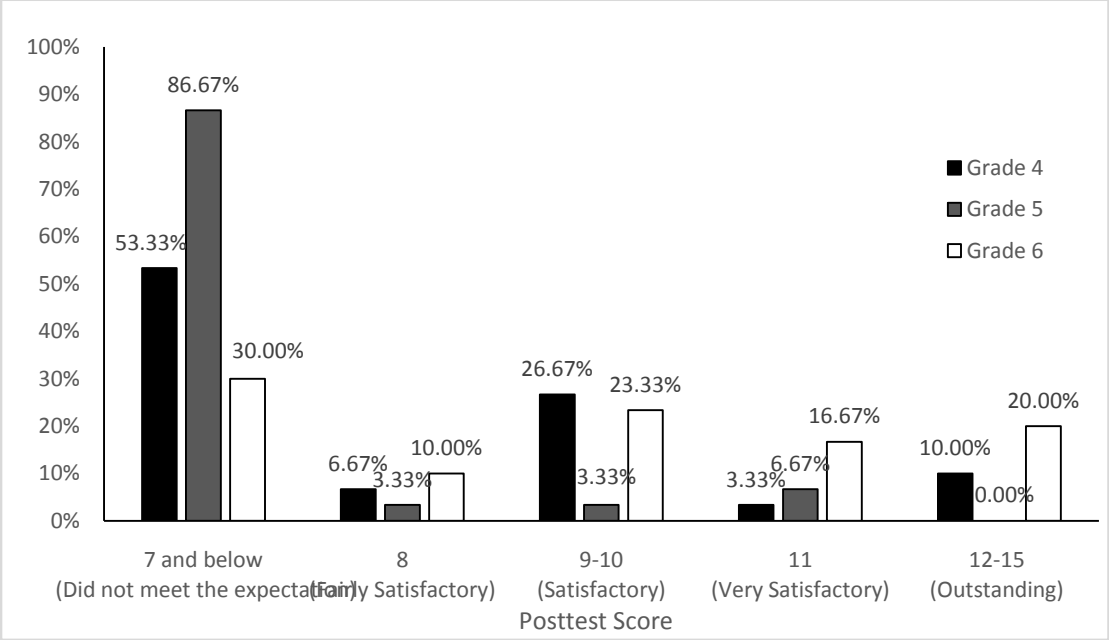

Figure 2. Percentage distribution of the posttest scores in Science of the pupils when grouped to Cubing Technique

Figure 5 showed the percentage distribution of the posttest scores in Science among pupils. Using cubing technique as a tool in grade 4 pupils 53.33% got the score that ranges from 0 to 7, 6.67% got the score of 8, 26.67% got the score ranges from 9 to 10, 3.3% got the score of 11, 10% got the sore ranges from 12 to 15. In grade 5 pupils 86.67% got the score that ranges from 0 to 7, 3.3% got the score of 8 and 9 to 10, 6.67% got the score of 11, and none of them got the score that ranges from 12 to 15. In grade 6 pupils 30% got the score that ranges from 0 to 7, 10% got the score of 8, 23.3% got the score of 9 to 10, 16.67% got the score of 11 and 20% got the score that ranges from 12 to 15.Different grade level showed that there was a significant difference in terms of posttest result. This means that after the intervention using cubing technique as learning strategy in teaching, the number of students who got the score which did not meet the expectation is decreasing. In grade 4 pupils 46.67% got the highest score. In grade 5 only 10% of pupils who got the highest score and in grade 6 pupils 70% got the highest score. This means that cubing technique as a learning tool helps the pupils in improving their performance in Science. In addition, with the use of cubing technique that link the information on the cube that the pupils is learning by doing, the information can be remembered easily. It reminds learners of relevant information that they already have (Cowell, 2015).

3.3 Difference between the pretest performances in Science among different grade level exposed to Cubing Technique

Table 1. Difference between the pretest scores using one way Analysis of Variance (ANOVA) in different grade level exposed to cubing technique.

Source	SS	df	MS	F	p-value	Remarks
Grade level	1.09	2.00	0.54	0.11	0.8951	Not Significant
Pupils	426.87	87.00	4.91			
Total	427.96	89.00				

With 0.05 level of significance

Table 1 revealed the difference in the pretest performance in Science among different Grade level exposed to cubing technique as a tool. The analysis reveals that there is no significant difference in pre-test score using cubing technique

in 3 different grade level since the p-value which is 0.8951 is greater than 0.05 level of significance. Therefore, the null hypothesis is not rejected. Therefore, the pretest scores of the pupils among grade level exposed to cubing technique means that the prior knowledge of the pupils are equal to the topic that included in the pretest.

3.4 Difference between the posttest performances in Science among different grade level exposed to Cubing Technique as a tool

Table 2. Difference between the posttest scores using t-test for two independent samples in different grade level exposed to Cubing Technique as a tool

Source	SS	df	MS	F	p-value	remarks
Grade level	254.6	2	127.3	14.90592	$2.71X10^{-6}$	Significant
Pupils	743	87	8.5402299			
Total	997.6	89				

With 0.05 level of significance

Table 2 showed the difference in the posttest performance in Science among different Grade level exposed to cubing technique as a tool. The analysis reveals that there is significant difference in posttest score using cubing technique in 3 different grade level since the p-value which is $2.71X10^{-6}$ is lesser than 0.05 level of significance. Therefore, the null hypothesis is not rejected. This indicates that cubing technique as a learning tool among Grade level of Science performance has a higher effect. A probable reason is that, students who were trained in using graphic organizer performed better in the post test compared to the students who did not use graphic organizers Simmons (1988).

3.5 Difference between the pretest and posttest scores in Science among pupils using Cubing Technique

Table 3. Difference between the pretest and posttest scores in Science among pupils using Cubing Technique

Pretest-Posttest	mean (Pre-Post)	mean difference	t-value	p-value	remarks
Grade 4	4.6-7.3	-2.7	-3.74	0.0005	Significant
Grade 5	4.43-4.90	-0.46667	-0.87	0.388139	Not Significant
Grade 6	4.7-9	-4.3	-5.87	$2.44X10^{-7}$	Significant

With 0.05 level of significance

Table 3 displayed the difference in pretest and posttest scores using cubing technique. The analysis reveals that there is a significant difference in pretest score and posttest score in favor of posttest in grade 4 and grade 6 since their p-value is lesser than 0.05 level of significance, while there is no significant difference in pretest and posttest scores in grade 5 since the p-value is greater than 0.05 level of significance. It implies that cubing technique is more effective in grade 4 and grade 6 pupils.

4. SUMMARY AND CONCLUSIONS

1. This study determined the effectiveness of cubing technique on elementary levels which are the grade 4, grade 5 and the grade 6. Specifically, it aims to determine the pretest scores in Science of the pupils when grouped to Cubing Technique, determine the posttest scores in Science of the pupils when grouped to Cubing Technique. To find out the significant difference on the pretest score in Science of the pupils when group to Cubing Technique. Find out the significant difference on the posttest in Science of the pupils when taught to Cubing Technique and find out the significant difference on the pretest and posttest in Science of the pupils when taught to Cubing Technique. There were ninety (90) pupils of Tuod Integrated School enrolled in SY. 2018-2019 in valued in the study. The study used experimental research design. The pupils were given fifteen (15) items test given before and after the conduct of the study. Data were analyze using Anova, percentage, t-test and paired t-test.

2. Result shows that the pretest scores in science of pupils when group to cubing technique among different grade level got the score that needs improvements.

3. Result showed that the posttest scores in science of the pupils when exposed to cubing technique among different levels helps pupils in improving their performance in science. It reminds learners of relevant information that they already have.

4. Result revealed that there was no significant difference in pretest scores using cubing technique in three different level, this implies that the pretest scores of the pupils among grade level exposed to cubing technique means that the prior knowledge of the pupils are equal to the topic that included in the pretest.
5. Result showed that there was significant difference in posttest using cubing technique in three different levels. It was revealed that the used cubing technique as a learning tool got the higher score. It implies that the cubing technique as a learning tool is more effective.

6. Therefore the cubing technique was effective in the classroom setting among Grade 4 and Grade 6 compare to Grade 5 level as a support as the pupils build their prior knowledge and skills. The result and findings were clear to testify that the study conducted was successful.

5. IMPLICATIONS AND RECOMMENDATIONS

1. The result implies that cubing technique as a learning tool can improve among Grade 4 and Grade 6 pupils compare to Grade 5 pupils performance when applied in teaching Science.
2. Cubing technique as a learning tool helps to improve the students' performance when it is used daily.
3. For the teachers to find ways on how to improve learning and academic performance of the students since we are now in the 21st century specifically in Science subject.
4. For the students who planned to have similar to this study, it should be conducted with at least 1 topic in Science, see to it that the pupils read and understand the questions properly before answering the test, and there's enough time in conducting the study so that the pupils can really adapt to this approach.
5. Similar study can be explored using Cubing Technique as a learning tool in other subject matter like Math, or even Language subjects like English.

ACKNOWLEDGMENT

Foremost, the author would like to express her utmost gratitude to the Almighty God, for providing everything that made this piece of work into a reality.
The author would also like to extend her sincerest thanks to the following persons who are part in the fulfillment of this study:
Their parents, Mrs. Annabelle M. Apiag and Jessie D. Omentic for their untiring support, financial assistance, never-ending inspiration, and unconditional love;

Sister Ann Charlote M. Apiag of Mary Grace for financial, moral and even the unseen support to the author;
Mr. Leemarc c. Alia, their thesis adviser for the patience and, critical review and editing that formed this study into a more recognizable and acceptable shape; for the words of encouragement, advises and help in conducting this paper;

Mr. Wenceslao Coronado Ph. D, their panel member for the patience, critical review and editing for helping the author to finish their paper;
Mrs. Bella S. Amarga, their panel member for the patience, for the words of encouragement, review and editing to this study;

Mr. GuilbertCabillan, for analyzing the data result of the study;
Tuod Integrated School principal, Mr. Alvin A. Sabayanan for giving the permission to conduct the study;

Science teachers Mrs. Jean Cabresos of Grade 4, Mrs. Naneth H. Ugmad of grade 5 and Mrs. Shelamie D. Bahian of grade 6 in Tuod Integrated School, for sharing with the researcher her book and time in conducting this study;

Grade 4, Grade 5 and Grade 6 pupils in Tuod Integrated School SY 2018-2019, who were the respondents for the active participation during the conduct of the study;
Their classmates, who are also having their thesis paper, for the clarifications and suggestions;

Especially Annalyn Ramos for the emotional support and letting us to use her laptop.

Lastly, to the individuals whom the author failed to mention, for sharing your time, knowledge, wisdom and kindness. The author will forever be grateful to you.

REFERENCES

Anderson, L. W. and Krathwohl, D. R., et al (Eds..) (2001) *A Taxonomy for Learning, Teaching,and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Allyn & Bacon.

Amanda kocher (august 22, 2016) Differentiation of Cubing Scientific Method

Bloom, B.S. and Krathwohl, D. R. (1956) *Taxonomy of Educational Objectives: The Classification of Educational Goals*, by a committee of college and university examiners. Handbook I Cognitive Domain. NY, NY: Longmans, Green

Bruner, J. S. (1960). *The Process of education.* Cambridge, Mass.: Harvard University Press.

Bruner, J. S. (1961). The act of discovery. *Harvard Educational Review*, 31, 21-32.

Bruner, J. S. (1966). *Toward a theory of instruction*, Cambridge, Mass.: Belkapp Press.

Bruner, J. S. (1973). *The relevance of education*. New York: Norton.

Burnett, A. Goldberg and T. Lewis, Ed.; Manning Publications: Greenwich, CT, 1995; pp. 45-66.

Bruner, J. S. (1978). The role of dialogue in language acquisition. In A. Sinclair, R., J.

Cox, P. T., Giles, F. R. and Peitrzykowski, T. Prograph. In Visual Object-Oriented ProgrammingM.

Green, T. R. G. Cognitive Dimensions of Notations. In People and Computers V.; A. Sutcliffe and L.

Green, T. R. G. and Petre, M. Cognitive Dimensions as Discussion Tools for Programming Language Design. Human-Computer Interaction, In Press, 1996.

Jarvelle, and W. J.M. LeSvelt (eds.) *The Child's Concept of Language.* New York: Springer-Verlag.

Jean Piaget, (2018) The University of Sydney School of Education and Social Worker.

Krathwohl, D. R. (2002) A Revision of Bloom's Taxonomy. (PDF) in *Theory into*