



Effectiveness of Collaborative and Individualized Learning on the Learners' Achievement in Science Among Pupils

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ABSTRACT

Purpose of the study: As the Philippine educational system transitions back to face-to-face classes post-pandemic, there are significant challenges, particularly in primary education. This study examines the effectiveness of collaborative versus individualized learning in students' achievement in science. The research focuses on fifty (50) grade 5 pupils from a public elementary school in Gingoog City during the SY 2022-2023.

Methodology: The study utilized an experimental research design. Two groups of students were given both pretests and posttests. Data analysis was performed using percentages and t-tests to determine the effectiveness of each learning approach.

Main Findings: The results revealed a notable difference in pretest scores between pupils engaged in Collaborative Learning and those in Individualized Learning. Posttest scores also showed a significant improvement in pupils exposed to Collaborative Learning compared to Individualized Learning. The t-test results confirmed significant differences in both pretest and post-test scores within each group, emphasizing the superior impact of Collaborative Learning on student performance.

Novelty/Originality of this study: This study highlights the transformative potential of Collaborative Learning in the context of post-pandemic education. Collaborative Learning significantly enhances students' academic performance in Science by fostering interaction and cooperative problem-solving. The research suggests that the daily implementation of Collaborative Learning can be a powerful tool for improving educational outcomes. Furthermore, the study opens avenues for applying Collaborative Learning strategies across other subjects such as Filipino, English, Araling Panlipunan, and Mathematics, potentially revolutionizing pedagogical approaches in primary education in the Philippines.

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1. INTRODUCTION

Adopting back to face-to-face classes, where learners are the product of New-normal Education, posed a significant challenge to the Philippine educational system, particularly in primary education. The lack of learning due to the previous learning modalities, Modular Distance Learning (MDL), affected most public-school pupils. The Department of Education's back-to-back classes challenges teachers to integrate various teaching-learning strategies and styles that will help learners be more capable of learning. Our DepEd Teachers were exposed to a variety of teaching-learning styles, one of which is collaborative and individualized learning.

Teaching elementary learner is difficult, Which is why collaborative and individualized learning methods are preferred. The resume of classes tests the teachers in various parts of the teaching world that tend them to be resourceful, versatile, and reflective of the needs of the learners, believing that this would help formulate a suitable teaching-learning for primary learners. In the situation where learners are challenged to do less effective learning styles. Collaborative and individualized learning helps the learner overcome their learning needs through individual activities, group sharing and participation.

The essence of primary education as it relates to collaborative and individualized learning piqued my interest because it is a fascinating topic that a teacher will be able to explore creatively. If a school is supposed to prepare pupils for the purposes of the principles of lifelong learning and lifelong education, teachers must use approaches that develop pupils' intellectual and memory components, as well as their emotional components [1]-[3]. This is aided by the use of appropriate teaching methods designed to pique a student's interest in the subject matter and motivate them to continue their education. Teaching methods and styles will always be necessary especially when teachers will look word for the welfare and the betterment of the Learners. Young minds must be taught in a creative and meaningful manner using these collaborative and individualized learning styles.

Many people's insights and perceptions prompted the researcher to conduct a study on the Effectiveness of Collaborative and Individualized Learning on Pupils' Achievement in Science among Grade 5 pupils. It aims to assist learners in using the appropriate learning style, as well as teachers in adjusting to and making interventions regarding face-to-face of learning. This is to improve the academic performance of learners despite learning challenges. One of the primary goals of this research is to achieve high academic performance among grade 5 pupils in science and to compare the effectiveness of collaborative and individualized learning despite the learning challenges.

According to new research Collaborative learning is a common educational strategy is collaborative learning, in which pupils work together in small groups to learn how to tackle academic difficulties [4]-[5]. Collaboration is expected to foster activities such as elaboration, justification, and argumentation, all of which. A teaching strategy called collaborative learning was created to raise pupils' academic accomplishment through the development of their social and interpersonal abilities. It is widely acknowledged as a pedagogical strategy that encourages student socialization and academic growth [6]-[7].

Working in groups can help pupils learn a lot, but the learning potential of collaboration is underutilized in practice [8], particularly in science education [9]. Learning that is collaborative, cooperative, and team-based although they are sometimes considered to represent the same concept differing definitions, we consider these concepts comparable and employ them. Throughout the paper, the term "collaboration" is used. Pupils in collaborative learning engage in small-group activities in which they share their knowledge and expertise. In The teacher usually serves as a facilitator in these student-led activities [9]-[12].

Working in groups teaches pupils how to relate to their peers and other pupils. This is especially useful for pupils who struggle with social skills. Structured interactions with others that actively involve pupils in learning can benefit them. In small groups, each member has an opportunity to contribute. When pupils work as a team, they are more likely to take ownership of their material and think critically about related issues. Getting together is the first step; staying together is progress. Collaboration leads to success—Henry Ford. Collaborative learning (CL) is more than a classroom technique; it is a personal philosophy. In all circumstances, when people gather in groups, it suggests a method of dealing with people in order to highlight abilities and contributions of individual group members There is authority sharing and acceptance. Every group action is held accountable by all members The active, social, contextual, engaging, and student-led educational experiences result in deeper learning. The following are some of the advantages of collaborative learning: Higher-level thinking, oral communication, self-management, and leadership skills development. Encourage student-faculty interaction. Student retention, self-esteem, and responsibility improve. Collaborative Learning for Academic Success. Exposure to and improvement in understanding of various points of view. Preparation for real-life social and occupational situations [13]. Working together to achieve a common objective is necessary for collaborative learning. This partnership goes beyond cooperation. Collaboration encompasses the entire learning process. This could involve the teacher teaching the pupils as well as the pupils teaching one other and the teacher. Achieving the objective suggests that pupils have assisted one another in understanding and learning, which is more significant because it shows that pupils are accountable for one another's learning in addition to their own. Collaborative learning is a method that teachers use to facilitate learning and improve learner performance [14], [15].

This study will seek to find out the effectiveness of collaborative and individualized learning on the student's achievement in science. The study will look at the impact of Collaborative and Individualized Learning on learners' performance in Science. This research was carried out at one of the mainland central schools in Gingoog City during the second quarter of the school year. This school year, 50 pupils from the Grade 5 sections 1 and 2 enrolled. Participants will be in the years 2022-2023. The study will concentrate on the results of learners' Science pretest and posttest scores.

2. RESEARCH METHOD

The study used experimental design to compare the level of difference in the performance level of pre- and post-tests between pupils who are exposed to collaborative learning (the intervention group 1) and those who are exposed to individualized learning (the intervention group). Both groups have the same eight (8) learning competencies taught. Below is the diagram used in the study.

Table 1. Experimental Design

Intervention group 1	R	O1	X	O2
Intervention group 2	R	O3	C	O4

Where:

R is the randomized assignment

O1 is the observation in the pre-test scores of the intervention 1 group

O2 is the observation in the post-test scores of the intervention 1 group

O3 is the observation in the pre-test scores of the intervention 2 group

O4 is the observation in the post-test scores of the intervention 2 group

X is the variable use in intervention 1 group

C is the variable use in intervention 2 group

This study was conducted in one of Gingoog City's mainland schools. It is one of Gingoog City's best and most productive central schools. The school is located in one of the barangays of Gingoog City, Misamis Oriental, and has a clean and green, peaceful, and friendly environment. It has also received several awards and recognitions. It's 10.5 kilometers away from the city. The subject of the study were the sixty (50) pupils, who were enrolled for the school year 2022-2023. Section 1 consist of 25 pupils while grade 5 section 2 consist of 25 pupils in one of the public elementary schools in Gingoog City, Misamis Oriental.

The principal of the chosen school was approached and granted permission to conduct the study. The respondents were randomly assigned, to one of the two groups: the intervention 1 for collaborative learning and the intervention 2 for individualized learning. Then, the pre-test was administered. By following the determination of the pre-test scores, the study's implementation was carried out. The administration of post-tests and the determination of post-test scores were carried out. The data were tabulated using percentages, means, and the T-test.

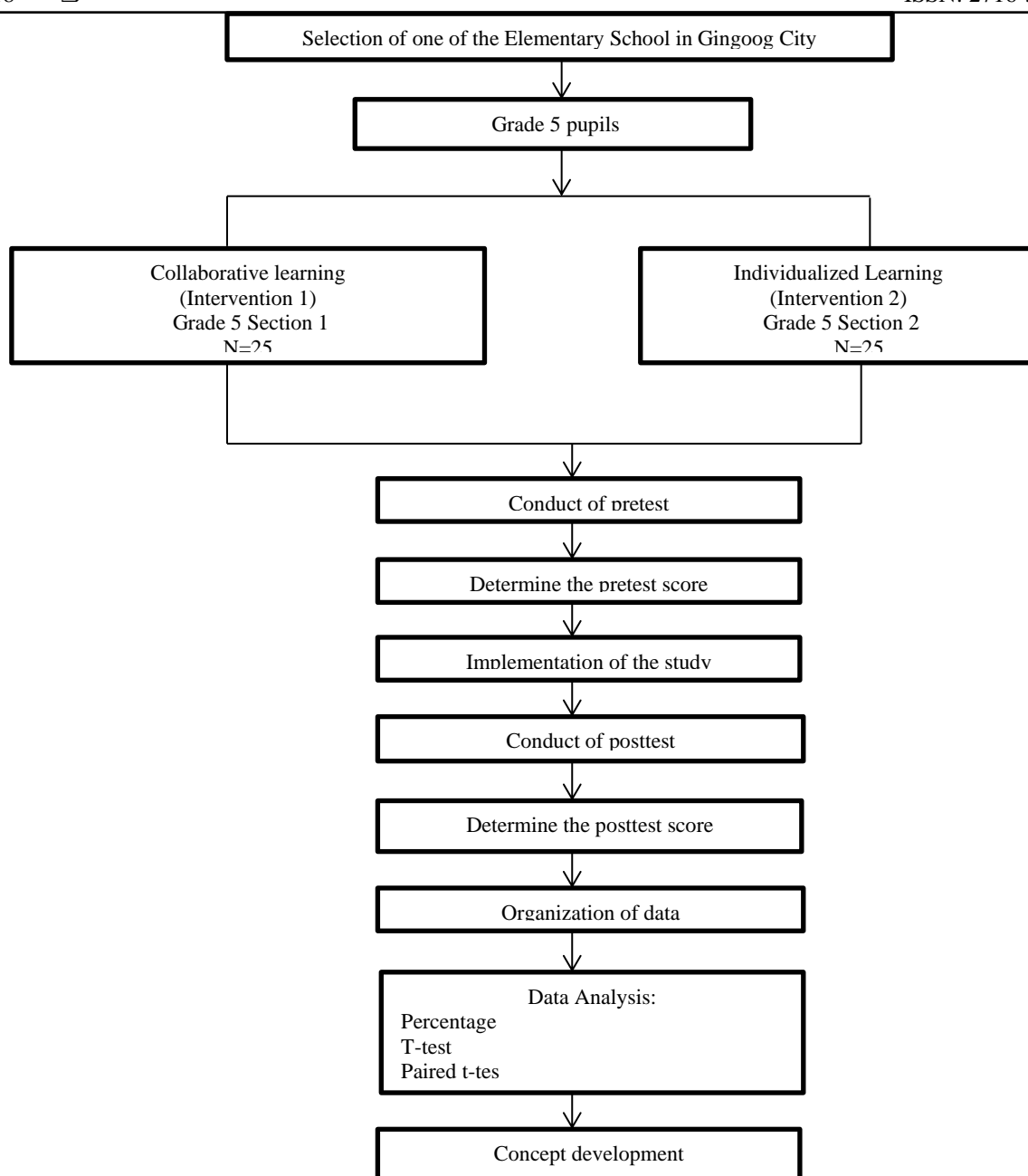


Figure 1. Flow chart of the methods used in the study

The instrument used were visual aids, especially pictures. The topic is Science subjects and the table of specification (TOS) for the formulation of the pretest and posttest in Science for the grade 5 pupils. There are 2 lesson plans which it has different topics for the intervention group 1 and also for the intervention group 2.

Table 1. Score, and Descriptors (Designed by DepEd 2015)

Score	Descriptors
16-20	Outstanding
14-15	Very Satisfactory
12-13	Satisfactory
10-11	Fairly Satisfactory
Below 9	Did not Meet Expectation

The table shows that the performance level of pupils who can answer 0-9 below the expectation did not meet. The performance level of pupils who can answer 10-11 correctly is considered satisfactory. The performance level of pupils who can correctly answer 12-13 questions is satisfactory. The performance level of

pupils who can correctly answer 14-15 questions is very satisfactory. The performance level of pupils who can correctly answer 16-20 questions is outstanding.

The following statistical tools are used to interpret the data in the study. Percentage, Percentage will be used to determine the percentage distribution of the pretest and the posttest score of the grade 5 pupils. T-test, T-test will be used to find out the significant differences between the pretest score of the two groups and significant differences of the posttest score of the two groups.

3. RESULTS AND DISCUSSION

This chapter discusses data presentation, analysis, and interpretation. It was discussed and interpreted in light of the data treatment. As a result, the data obtained was divided into five parts: the first discussed the pretest score in Science of the Learners when grouped according to Collaborative Learning and Individualized learning. The second discussed Post-test score in Science of the Learners using Collaborative Learning and Individualized Learning. The third discussed the difference between the pre-test performance in Science among grade 5 Learners in Collaborative Learning and Individualized Learning. The fourth discussed the difference between the post-test scores in Science among grade 5 Learners in Collaborative Learning and Individualized Learning in teaching. And lastly, the part 5 discussed the difference between the pre-test and post-test scores in Science among grade 5 Learners in Collaborative Learning and Individualized Learning.

What is the pretest score in Science of the pupils when grouped using

The pretest score in Science of the Learners when grouped according to Collaborative Learning and Individualized Learning

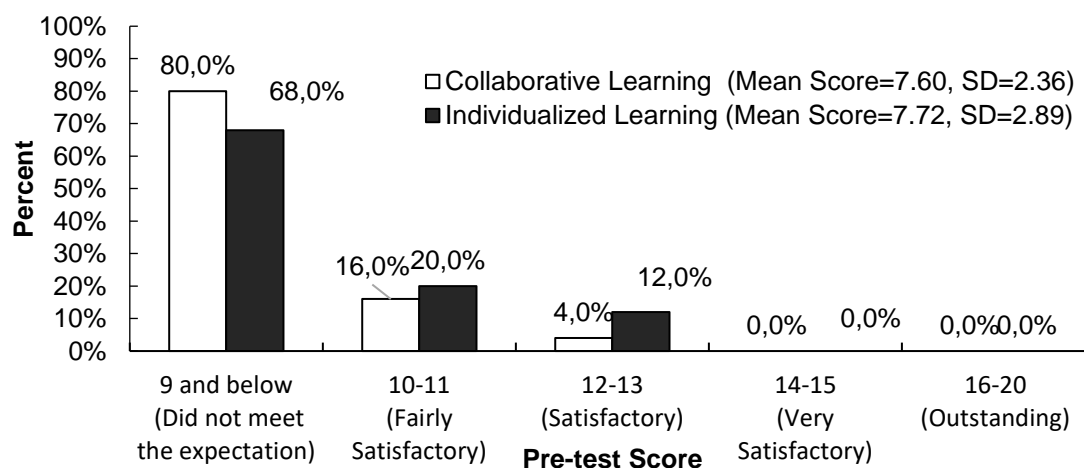


Figure 2. Percentage distribution of the pre-test score in Science of the Learners when grouped according to Collaborative Learning and Individualized Learning

In Collaborative Learning results show that 80% or 20 of the Learners received a score of 9 or lower, which did not meet the expectation about the topic that had not yet been introduced, 16% or 4 of them received a score of 10 to 11, which is fairly satisfactory, and 4.0% or 1 of them received a score of 12 to 13, which was fairly satisfactory, while none received a score of 14 to 20, which is very satisfactory and outstanding. Further result also shows that the average score of the respondents were 7.60(SD=2.36) which did not meet the expectation. Eighty percent (80%) of the pupils assigned to collaborative learning received a score of 9 or less, indicating that they did not meet the expectation. This means that all of the pupils who took the pretest struggled because they did not have any prior knowledge of the topic covered in the test. In classrooms where teachers value understanding what knowledge pupils have, engaging pupils in prior knowledge experiences becomes a form. We all know that prior knowledge is a critical component of the learning process. It plays a significant role in comprehension, or making sense of our learning experiences (Christen & Murphy, 1991).

Individualized Learning reveals that 68% or 17 of Learners received a score of 9 or lower, indicating that they did not meet the expectations for the topic that had not yet been introduced, 20% or 5 of the Learners received a score of 10 to 11, which is fairly satisfactory, and 12.0% or 3 of them received a score of 12 to 13, which is fairly satisfactory, while none received a score of 14 to 20, which is very satisfactory and outstanding. Furthermore, the average score of the respondents was 7.72 (SD=2.89), which did not meet the expectation. Sixty-eight percent (68%) of pupils grouped to Individualized learning received a score of 9 or lower, which did not meet the expectation. This also implies that, for the same reason as the experimental group, the majority of pupils who took the pretest found it difficult because they took the test with less background knowledge and

pupils made educated guesses on the questions because they did not know the answers. The results of the pretest for both groups are not surprising because it is a pre-assessment for the research topic as well as a test for the pupils' equal learning capacity.

What is the posttest score in Science of the pupils when exposed using:

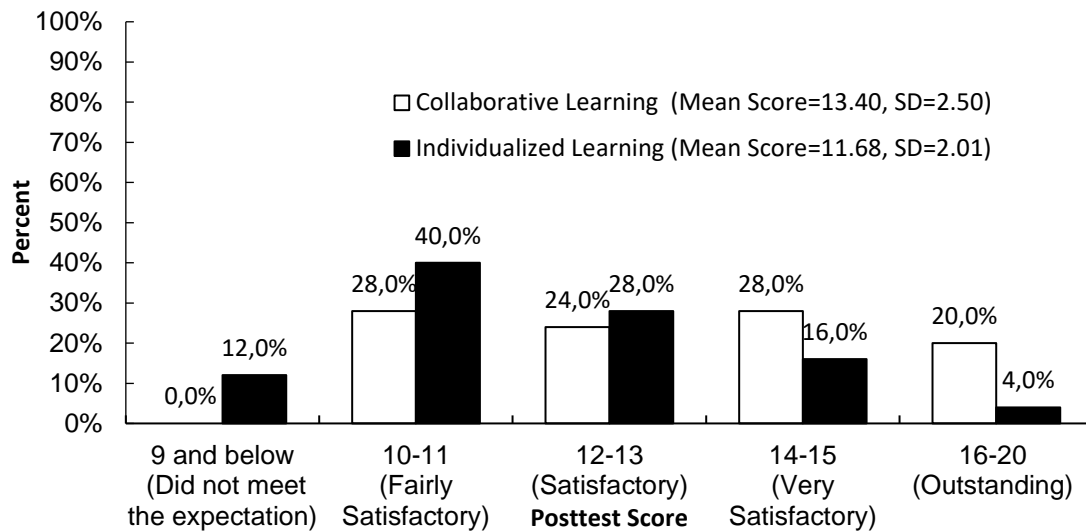


Figure 3. Percentage distribution of the post-test score in Science of the Learner using Collaborative Learning and Individualized Learning

In Collaborative Learning the result reveals that none of them got the score of 9 and below which did not meet the expectation about the topic that have already introduced, 28% or 7 of them got the score ranges from 10 to 11 which is fairly satisfactory and 24% or 6 of them got the score of 12 to 13 of them were fairly satisfactory, 28% or 7 of them got the score ranges from 14 to 15 which is very satisfactory, and 20% or 5 which belongs to outstanding. Further result also shows that the average score of the respondents were 13.40 (SD=2.50) which is very satisfactory. When exposed to collaborative learning, 100% of the pupils received desirable or passing grades. This simply means that the pupils learned more about the discussed topic and are no longer guessing because they understand it. Participation of pupils in the teaching-learning process is an important method of teaching. It allows pupils to receive feedback from their peers, apply their knowledge, and improve their public speaking skills. Collaborative fosters higher level thinking abilities [16], [17]. Pupils are enthusiastic about their studies process. Collaboration among pupils is the most effective form of interaction. When pupils collaborate in groups, one partner is listening while the other is discussing the topic under investigation. Both are evolving valuable problem-solving abilities by developing ideas, discussing them, receiving immediate feedback, and answering questions and comments. CL helps pupils improve their oral communication skills [18], [19]. Pupils who tutor each other must have a clear understanding of the concept they are presenting and be able to communicate it orally to their peers' partners. Members of a collaborative group who share working memory resources can process learning materials together to improve understanding and knowledge acquisition of the activities that need to be learned. The advantages of providing prior knowledge for complex tasks had a significant impact on performance outcomes [20].

In Individualized Learning the result shows that 12% or 3 of them got the score of 9 and below which did not meet the expectation about the topic that have already introduced, 40% or 10 of them got the score ranges from 10 to 11 which is fairly satisfactory and 28.0% or 7 of them got the score of 12 to 13 of them were fairly satisfactory, 16% or 4 of them got the score ranges from 14 to 15 which is very satisfactory, and 4% or 1 which belongs to outstanding. Further result also shows that the average score of the respondents were 11.68(SD=2.01) which is very satisfactory. Overall, eighty two percent (82%) of the pupils exposed to Individualized learning got a passing rate. This indicates that following the lecture, the pupils learned about the subject. As a result, pupils won't hazard a guess at an answer because they already understand the subject.

Is there a significant difference in the pretest scores in Science of the pupils when grouped using Collaborative learning and Individualized learning?

Table 2. Difference between the pre-test scores using t-test for paired observation in Science of the Learners in Collaborative Learning and Individualized Learning

Pre-test	Mean	MD	t-value	p-value	remarks
Collaborative Learning	7.6				
Individualized Learning	7.72	-0.12	-0.161	0.873	Not Significant

Table 2 shows the difference between the pre-test scores in Science of the Learners in Collaborative Learning and Individualized Learning. The analysis shows that such difference is not significant since the t-value is -0.161 that correspond to the p-value of 0.873 is greater than 0.05 level of significance. Thus, the null hypothesis (H_{01}) is not rejected and concludes that the learning capability of the learners about the certain topic in science before the intervention applied were the same, implying that there no groups who are more knowledgeable than the other group.

The T-test results revealed no significant difference in the pretest scores of the pupils when they were divided into collaborative learning and individualized learning groups. This means that the pretest scores of pupils in both the experimental and control groups are the same. This also implies that the experimental and control groups have nearly identical background knowledge of the topics. A probable reason is that, when material is applied, discussed, or explained to others, active learners are more likely to remember and comprehend it. Reflective pupils like to consider it silently at first [22], [23]. When pupils explain and receive explanations from one another in a group setting, the new concepts are retained in their memory for much longer. They have a better understanding of what they have learned and thus perform better. Learning is an active process that allows pupils the opportunity to construct understanding through empirical investigation and group interaction [24]. It is expected that increasing our creativity and critical thinking will help us, our organization and our clients become happier through improvements in our quality and quantity of output [25], [26].

Is there a significant difference in the posttest scores in Science of the pupils when exposed using Collaborative learning and Individualized?

Table 3. Difference between the post-test scores using t-test for paired observation in Science among grade 5 Learners in Collaborative Learning and Individualized Learning

Posttest	Mean	MD	t-value	p-value	Remarks
Collaborative Learning	13.40				
Individualized Learning	11.68	1.72	2.678	0.010	Significant

Table 3 shows the difference of post-test scores in Science of the Learners in Collaborative Learning and Individualized Learning. The analysis shows that such difference is significant since the t-value is 2.68 that correspond to the p-value of 0.010 which is less than 0.05 level of significance. Thus, null hypothesis (H_{02}) is rejected and conclude that Collaborative learning (mean=13.40) is more effective than Individualized learning (mean=11.68). When pupils were exposed to Collaborative Learning and Individualized Learning, the T-test results revealed a significant difference in their posttest scores. This demonstrated that the posttest scores of the group exposed to Collaborative learning were higher than the scores of the group exposed to Individualized learning.

In research from Karlsen [27] Collaborative learning entails pupils being responsible for one another's learning as well as their own, and achieving the goal entails pupils assisting one another to understand and learn. This strategy can also help learners gain a better understanding of the text's main ideas. Learning is more than just an intellectual activity; it involves the entire person. In terms of learning outcomes, knowledgeable individuals and knowledgeable collaborative groups outperformed novice individuals and novice collaborative groups, as expected. In terms of learning outcomes, less knowledgeable, collaborative learners outperformed less knowledgeable, individual learners. While more knowledgeable collaborating and individual learners performed equally well in the learning phase and the delayed test, collaborative groups performed better on the retention test. Collaboration aided learning in complex tasks more than individual learning, but performance was dependent on the learner's task-specific prior knowledge [28]

Is there a significant difference in the pretest and posttest scores in Science of the pupils when exposed using Collaborative learning and Individualized learning?

Table 4. Difference between the pre-test and posttest scores in Science of the Learners in Collaborative Learning and Individualized Learning

Difference	Mean	MD	t-value	p-value	Remarks
Collaborative Learning (Pretest-Posttest)	7.60-13.40	-5.80	-12.36	<0.0001	Significant
Individualized Learning (Pretest-Posttest)	7.72-11.68	-3.96	-10.52	<0.0001	Significant

Table 4 shows the difference between pre-test and post-test scores in Science of the Learners in Collaborative Learning and Individualized Learning. In difference between pretest and posttest score using Collaborative Learning analysis reveals that such difference is significant since the t-value is -12.36 that correspond to the p-value of <0.0001 which is less than 0.05 level of significance. In difference between pretest and posttest score using Individualized Learning analysis reveals that such difference is not significant since the t-value is -10.52 that corresponds to the p-value of <0.0001 which is less than 0.05 level of significance. Thus, the null hypothesis (H_{01}) is rejected and conclude that both Collaborative learning and Individualized learning had significant difference in pretest and posttest, implying that the two methods were effective in teaching but it is the collaborative learning found to be more effective than individualized learning as shown in table 8.

Paired t-test result showed a significant difference on the pretest and posttest score of the pupils when exposed to collaborative learning and Individualized learning. This demonstrated that pupils understood the topic and were able to comprehend the concept by utilizing their full thinking potential in groups, which required each individual to consider all sides of an issue/topic. Pupils with low knowledge benefit more from structures than pupils with higher knowledge or intelligence. Collaborative pedagogies have a positive impact. Pupils in collaborative classrooms develop certain skills and learn certain content “more effectively and efficiently” than pupils in other classrooms [29], [30]. Also, it reveals that there is no significant difference in pretest and posttest scores in Science exposed to Individualized learning because the t-value is -10.52, which corresponds to a p-value of 0.0001, which is less than the 0.05 level of significance. This implies that both methods were effective in teaching, but collaborative learning was found to be more effective than individualized learning. CL fosters higher level thinking abilities. Pupils are enthusiastic about their studies process. Collaboration among pupils is the most effective form of interaction. When pupils collaborate in groups one partner is listening while the other is discussing the topic under investigation. Both are evolving valuable problem-solving abilities by developing ideas, discussing them, receiving immediate feedback, and answering questions and comments. The benefits of collaborative learning over individual learning are not always consistent. On the one hand, evidence suggests that a collaborative approach may be more effective than individual learning when problems are extremely complex and information is widely disseminated among different working memories [28]. In general, the findings suggest that the collaborative intervention provided pupils with the opportunity to promote more appropriate learning strategies, knowledge appropriation, academic success experience, and, as a result, a better perception of academic effectiveness.

4. CONCLUSION

Based on the study's findings, the researcher concluded that there is a significant relationship between collaborative and individualized learning and academic performance. Collaborative learning fosters critical thinking abilities, socialization, self-esteem, a sense of responsibility, and academic achievement in pupils. Where learning strategies and interventions are needed, collaborative learning plays a vital role in achieving academic success. These can be accomplished by putting this learning strategy into action. Consistent application of this teaching-learning technique can yield more desirable results. This learning technique opens the door to a more innovative, creative, vivacious, and sophisticated type of learner, whose capabilities were improved and developed. However, to fully achieve the level of success of this study, these learning techniques require more strategic planning and a consistent timeframe to avoid misconceptions and conflicts.

In view of the findings, the following recommendations were made: To equip and suit your teaching style. 1) To the given findings, parents are regarded as the child's first teacher. Parents must be well-versed in considering collaborative learning with any family members, knowing that this process of learning can help boost the learner's capacity to learn more, be creative, and develop higher-order thinking skills.; 2) Teachers need to understand their pupils' specific strengths and characteristics as well as how to cultivate their proactive thinking. To experiment with this method in an effort to discover strategies to enhance pupils' academic performance in the twenty-second century.; 3) The administrators ought to design an adaptable program that will improve and lighten the teachers' instructional techniques. One of the most important figures in a child's life,

particularly in terms of their growth and development, is their teacher. The greatest strategy to significantly alter the teaching-learning environment should be to introduce the teacher to and provide them with the tools they need to deal with the various types of learners.; 4) Numerous factors could have an impact on a student's academic success. Similar research can be conducted employing collaborative learning in various subject areas, such as Math, Araling Panlipunan, Edukasyong pagpapakatao, and even Filipino.

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