IJAMS
INTERNATIONAL JOURNAL OF ADVANCED MULTIDISCIPLINARY STUDIES
Volume V, Issue 3, March 2025, eISSN: 2799-0664

Effectiveness of Collaborative Learning Strategies in Enhancing Elementary Teachers' Competence and Performance of Grade 2 Learners in Math

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Abstract —The study evaluates the effectiveness of collaborative learning strategies in enhancing elementary teachers' competence and performance of grade 2 learners in Math. A quasi-experimental research design utilizing the pre-test and post-test assessments based on the 2nd quarter Most Essential Learning Competencies (MELCs) in Math. Likewise, teachers' competence was measured using the Classroom Observation Tool (COT) and conducted the classroom observation during the delivery of the lesson in the intervention phase. Forty (40) Grade 2 learners and 2 teachers were involved in the study. Based on the data presented, it was revealed a significant difference in the pre-test and post-test performances of grade 2 learners in Math before and after the integration of collaborative learning strategies in teaching and learning. Further, outstanding performance of teachers in classroom observation was attained. The findings highlight the profound influence of collaborative learning strategies and high impact teaching practices on learners' achievement. Schools are advised to continue implementing collaborative learning strategies in teaching Math and ensuring constant professional development to maintain and enhance teaching performance.

Keywords — Effectiveness, Collaborative Learning Strategies, Elementary Teachers' Competence, Performance, Grade 2 Learners, Math

I. INTRODUCTION

In line with the MATATAG agenda of the former secretary of Department of Education that learners must be provided with alternative learning intervention to address the problems on literacy and numeracy among Filipino learners. With the implementation of the Enhanced K to 10 Curriculum of the Department of Education, collaborative teaching and learning has been one of the interventions that teachers implement.

In recent years, there has been a rise in popularity for collaborative learning as a mode of academic instruction. The process of having more than one instructor work collaboratively on the preparation, delivery, and evaluation of lessons is referred to as "collaborative teaching," and the phrase is used to define this approach. The effectiveness of collaborative teaching approaches in terms of improving teachers' competence and learners' academic performance is the primary emphasis of this research.

Collaboration in the classroom is becoming increasingly common as teachers become more aware of the ways in which it can enhance their students' educational experiences. Teachers that work in an environment that encourages collaboration share their knowledge and experiences with one another, which results in students having access to a learning environment that is both more robust and diverse. This strategy also helps to make the classroom a more welcome place for children with a variety of skills and experiences to collaborate, grow, and value one another as they interact

with one another. Although there are many benefits associated with collaborative learning, its implementation might be challenging at times. Limitations on time, ineffective communication and coordination, opposition to change, and an inability to evaluate the effectiveness of collaborative instructional strategies are just a few of the challenges that must be overcome.

Increasing the academic success of one's learners is inextricably linked to the implementation of time-saving strategies in the classroom. The use of collaborative teaching, which is when two or more teachers work together on class planning, delivery, and assessment, is becoming an increasingly popular way for boosting the academic experiences of students so as improving the competence of teachers in teaching. Teachers need to collaborate with one another to successfully communicate with one another, integrate their own areas of knowledge and skill, and share responsibility for the students' educational progress. Collaborative teaching approaches might take the form of co-teaching, team teaching, or peer coaching depending on the goals and requirements of both the teachers and the students. There are several beneficial effects that relate to collaborative teaching, some of which include greater levels of teacher efficiency, increased levels of student involvement, and enhanced levels of learning.

Collaborative instruction has not been generally implemented in schools, despite the obvious benefits it offers, and very little is understood about what makes it effective. The goal of this study is to explore the efficacy of collaborative teaching approaches in terms of increasing the academic performance of students and to identify any challenges that might prevent their implementation. By investigating whether or whether collaborative instruction is more effective in fostering student learning, the purpose of this study is to contribute to the existing body of research on pedagogical approaches and to offer insightful guidance to teachers and educators. The findings of this study underscore the usefulness of team-based instruction in facilitating deeper learning; as a result, the findings have implications for both the policy and practice of education.

Over the past few years, effective methods of instruction have taken on an increasingly critical role as a direct result of the continuously shifting nature of education. When students come from such a broad variety of different backgrounds, learning styles, and ability levels, it can be challenging for teachers to meet all the standards that their pupils have set for them. Considering these challenges, the use of collaborative teaching as a potential solution to address these challenges and improve education has become increasingly prevalent. Collaboration in the classroom can take many different forms, from jointly preparing and designing courses to jointly delivering lessons and assessing student progress. For collaborative teaching to be successful, it is essential that educational objectives and instructional methods be aligned, and that teachers be able to communicate effectively with one another. With these, teachers' competence and learners' improvement is evident. Hence, this study was formulated to evaluate the effectiveness of collaborative learning strategies in enhancing elementary teachers' competence and performance of Grade 2 learners in Math. A proposed improvement plan was formulated based on the findings of the study. Likewise, it is in the rationale that the researcher who is currently a grade 2 teacher in the above mentioned local, would like to delve worthy research undertaking that would benefit herself, the school she is currently teaching and that of her Graduate Program she is enrolled at.

This study evaluates the effectiveness of collaborative learning strategies in enhancing elementary teachers' competence and performance of Grade 2 learners in Math of Balion Elementary School, Ormoc District V, Ormoc City Division for School Year 2024-2025. The findings of the study were the basis for the proposed improvement plan.

Specifically, this study sought to answer the following questions:

1. What is the level of teachers' competence in utilizing collaborative teaching strategies in teaching Math?
2. What is the performance of the grade 2 learners in Math before and after the integration of collaborative learning strategies?
3. Is there a significant difference between in the performance of grade 2 learners in Math before and after the integration of collaborative learning strategies?
4. What improvement plan can be proposed based on the findings of this study?

II. METHODOLOGY

Design. This study employed a quasi-experimental research design utilizing the pre-test and post-test assessments to evaluate the effectiveness of collaborative learning strategies in enhancing elementary teachers' competence and performance of grade 2 learners in Math. The research focused on assessing how this instructional strategy impacted learners learning outcomes and teachers' teaching competence. Balion Elementary School, Ormoc District V, Ormoc City Division is the locale of the study. It is in Barangay Labrador, Ormoc City, Leyte and very accessible to all modes of land transportation. The school has a land area of 6, 249 sq.m., and has 6 school buildings, and 1 School Canteen. It is composed of nine (9) teachers, (1) master teacher and (1) school principal and with 233 total number of learners (118-Male and 115-Female) at this present School Year 2024-2025. The study targeted forty (40) Grade 2 learners identified as struggling in Math for the school year 2024-2025, employing a complete enumeration method to select participants. Research instruments included a researcher-made Math test aligned with the 2nd quarter Most Essential Learning Competencies (MELCs), administered before and after the implementation of collaborative learning strategies. Moreover, lesson plans were developed which shows collaborative learning strategies in teaching Math. The researcher will formulate activities of which the learners will organize themselves in small groups to answer the problems posed in the lesson. After the group work, the teacher will encourage the members of the group to present their outputs showing the solution on how they arrive at the correct answer. Further, the teacher will encourage the learners to speak and discuss the process of solving the problems. This framework was incorporated in the lesson plans formulated. Parts of the plan where the teacher can input the intervention is highly recommended. To measure the performance of teacher, a classroom observation was conducted utilizing the Classroom Observation Tool (COT) during the implementation of the intervention in Math lessons. This data was used to determine the teachers' teaching competence in Math integrating collaborative teaching strategies. Validation of tests and lesson plans by the District Math Coordinator and School Head ensured alignment with curriculum objectives. The study utilized a matrix to monitor intervention progress, emphasizing the systematic evaluation of educational strategies aimed at improving learner outcomes and that of the teaching competence of teachers. This research focused on evaluating the effectiveness of collaborative learning strategies in enhancing elementary teachers' competence and performance of grade 2 learners in Math through the pre-test and post-test and its significant difference. A Proposed Improvement Plan based on the findings of the study is the output.

Sampling. The respondents of this study were forty (40) Grade 2 learners who were struggling in Math enrolled in the above-mentioned locale for School Year 2024-2025 and 2 teachers. Complete enumeration was employed in choosing the respondents for the study.

Research Procedure. After the research approval, data gathering commenced with submission of letter requests for study approval to appropriate authorities. Initially, a letter was sent to the Schools Division Superintendent seeking approval to proceed with data collection from identified respondents. Following SDS approval, permission letters were also submitted to the Public Schools District Supervisor and School Principal. Once approvals were obtained, the researcher proceeded with data gathering activities. An orientation session was conducted for the respondents, and parental consent was obtained for their children's participation in the study. The pre-test was administered during Math period. Subsequently, a four-week intervention was implemented, focusing on teaching Math using collaborative learning strategies. In the duration of the four-week intervention, school head conducted classroom observation utilizing the Classroom Observation Tool (COT) to determine the competence of teachers in the implementation of collaborative teaching strategies. Post-intervention, a post-test was conducted, and responses were collected, tabulated, and prepared for statistical analysis. A Matrix of Activities was maintained to monitor data gathering progress throughout the study.

Ethical Issues. The researcher properly secured the permission to conduct the study from the authorities through written communication. In the formulation of the intervention materials that was used in the study, the use of offensive, discriminatory, or other unacceptable language was avoided. The respondents' names and other personal data were not included in this study to protect their privacy. Participation of the respondents was also voluntary. Orientation was conducted for the respondents with their parents. In the orientation, issues and concerns were addressed and consent to be included in the study were signed. The researcher-maintained objectivity in analyzing and discussing the results. All authors whose works were mentioned in this study were properly quoted and were acknowledged in the reference.

Treatment of Data. The performance of grade 2 learners in Math before and after the utilization of collaborative learning strategies was evaluated using Simple Percentage and weighted was employed to determine the performance of

teachers. Additionally, the t-Test of Mean Difference was employed to assess significant differences in their performances before and after the intervention.

III. RESULTS AND DISCUSSION

Table 1
Performance of Teachers in Classroom Observation Based on COT

A.	Performance Indicators	Weighted Mean	Interpretation
1	Applied knowledge and content within and across curriculum learning areas.	5.0	Outstanding
2	Used a range of teaching strategies that enhance learner achievement in literacy and numeracy.	5.0	Outstanding
3	Used a range of teaching strategies to develop critical and creative thinking, as well as other higher-order thinking skills.	4.5	Outstanding
4	Displayed proficient use of Mother Tongue, Filipino and English to facilitate teaching and learning.	5.0	Outstanding
5	Established safe and secure learning environments to enhance learning through the consistent implementation of policies, guidelines and procedure.	5.0	Outstanding
6	Maintained learning environments that promotes fairness, respect and care to encourage learning.	4.5	Outstanding
7	Established a learner-centered culture by using teaching strategies that respond to their linguistic, cultural, socio-economic and religious background.	5.0	Outstanding
8	Adapted and used culturally appropriate teaching strategies to address the needs of learners from indigenous people.	4.5	Outstanding
9	Used strategies for providing timely, accurate and constructive feedback to improved learner performance.	4.5	Outstanding
	AVERAGE	**4.78**	**Outstanding**

Legend:

Range	Interpretation
4.500- 5.00	Outstanding
3.500- 4.499	Very Satisfactory
2.500-3.499	Satisfactory
1.500- 2.499	Unsatisfactory
Below 1.499	Poor

Table 1 indicates teacher performance in classroom observation in the intervention, i.e., integrating collaborative teaching and learning in Math using the Classroom Observation Tool (COT). The data indicate that the teachers' performance in classroom observation had a mean weighted score of 4.78, which is outstanding. The

indicators scored perfectly by the observer were "Applied knowledge and content within and across curriculum learning areas," "Used a range of teaching strategies that enhance learner achievement in literacy and numeracy," "Displayed proficient use of Mother Tongue, Filipino, and English to facilitate teaching and learning," "Established safe and secure learning environments to enhance learning through the consistent implementation of policies, guidelines and procedure," and Established a learner-centered culture by using teaching strategies that respond to their linguistic, cultural, socio-economic and religious background." Besides, the indicators that were rated 4.5 were " Employed a range of teaching strategies to promote critical and creative thinking, and other higher-order thinking skills," " Maintained learning environments that promote fairness, respect, and care to promote learning," " Modified and implemented culturally responsive teaching strategies to address the needs of learners from Indigenous people," and " Used strategies for providing timely, accurate and constructive feedback to improve learner performance." This means that the ability to employ various teaching strategies of teachers, especially the implementation of collaborative teaching strategies, encourages the learners to analyze, evaluate, and create possible solutions to the problems posted as part of the activities in collaborative learning. Aside from this, the outstanding rating of teachers shows that teachers are effective in fostering a classroom conducive to learning because it enhances learners' engagement in the lesson while ensuring inclusive and responsive education.

Table 2
Pre-Test Performance of Grade 2 Learners in Math

Score Range	Description	PRETEST	
		Frequency	%
17-20	Excellent	0	0
13-16	Very Good	0	0
9-12	Good	24	60
5-8	Fair	15	38
1-4	Poor	1	2
Total		40	100
Weighted Mean		**8.58**	**Good**

Table 1 shows the pre-test performance of Grade 2 learners in Math, with their scores by level of proficiency. Prominent is the fact that no learners had scores in the Excellent (17-20) or Very Good (13-16) ranges, reflecting a widespread lack of high-level achievement. In contrast, the most significant number of learners-24 in total, or 60% were in the good range (9-12), reflecting a lack of achievement of an acceptable level of proficiency. Also, 15 learners, or 38% of the sample, scored in the Fair range (5-8). This reflects a minimum level of proficiency in Math concepts; however, there is much room for improvement. Alarming is that a low percentage—2%—of the students scored in the Poor range (1-4), reflecting serious difficulty in learning basic math skills. Overall, their performance is good, with 40 Grade 2 students tested and a weighted mean score of 8.58. The fact that none of the students scored in the Excellent or Very Good ranges reflects a lack of advanced mastery of math concepts. As a result, there is a strong need for enhanced instructional strategies and targeted interventions. In addition, teachers must reinforce prerequisite or foundation skills in Math since reinforcing teaching strategies and approaches and additional support will be critical in ensuring enhanced learning and attaining the student's educational goals.

Table 3
Post-Test Performance of Grade 2 Learners in Math

Score Range	Description	POST TEST	
		Frequency	%
17-20	Excellent	34	85
13-16	Very Good	6	15
9-12	Good	0	0
5-8	Fair	0	0
0-4	Poor	0	0
Total		40	100
Weighted Mean		**18.28**	**Excellent**

Table 3 reflects the post-test performance of Grade 2 learners in Math, revealing that 85% attained scores in the Excellent range (17-20), reflecting an excellent understanding of Math concepts. Additionally, 15% attained scores in the Very Good range (13-16), reflecting a good understanding of the subject. Notably, there were no learners fell in the Good (9-12), Fair (5-8), or Poor (0-4) categories, reflecting a complete absence of underachievers. With 40 learners tested and a weighted mean score of 18.28, the general achievement is classified as Excellent. The findings reflect the success of the collaborative learning strategies after the intervention, significantly boosting Math capability. The post-test findings reflect an improved performance of learners' achievement contributed by these collaborative learning strategies. The high percentage in the Excellent and Very Good categories reflects that such methods effectively facilitated peer interaction and resulted in increased engagement with the subject. The absence of lower performance categories reflects that all learners excelled in this supportive environment and through the learning materials utilize. These findings recommend that teachers continue integrating collaborative learning into their teaching practices, thus creating an inclusive environment leading to peer learning. Additionally, it is advisable to sustain and build on this achievement by reinforcing mathematical thinking, problem-solving capability, and the application of knowledge into real-world contexts.

Table 3
Test of Difference Between the Scores in the Pre-test and Post-test Scores of Grades 2 Learners in Math

Test Scores		Standard Deviation	Computed T	Critical T	Decision	Interpretation
Pre Post	8.58 18.28	4.32	12.73	4.32	Reject H_o	Significant

Table 3 discloses test results comparing the pre-test and post-test performances of Grade 2 learners in Math, emphasizing the statistical significance of the differences observed. The mean score in the pre-test was 8.58, indicative of a basic understanding among the learners. Conversely, the post-test scores reflected a dramatic rise to 18.28. This significant shift was analyzed using a t-Test, where the critical t-value was set at 4.32. The computed t-value of 12.73 unequivocally rejects the null hypothesis (Ho), indicating a statistically significant improvement in the performance of Grade 2 learners following the introduction of interventions, namely collaborative learning strategies. The data indicates a profound enhancement in the learners' mathematical proficiency due to the implemented interventions. The dramatic increase in average scores signifies not only a mastery of concepts but also the effectiveness of collaborative learning as a pedagogical approach. This method appears to have facilitated deeper engagement, peer support, and a better understanding of mathematical principles, ultimately leading to higher academic performance. The statistical significance of the t-Test reinforces the reliability of these findings, suggesting that the educational strategies employed had a substantial and measurable impact. These findings underscore the importance of adopting innovative teaching strategies such as collaborative learning in the classroom. Educators should consider integrating similar methods into their

instructional practices, as they can lead to significant improvements in student outcomes. School administrators should promote professional development training programs based on collaborative teaching methodologies to effectively equip teachers to use such strategies. The results indicate a continuing requirement for monitoring through evaluations to track student progress and evaluate the effectiveness of teaching strategies over time so that interventions continue to be responsive to student needs. By establishing collaborative learning environments, schools can enhance academic achievement in Math and other subjects and ultimately establish a more participative and successful student body.

IV. CONCLUSION

The research revealed an impressive improvement in the mathematics achievement of Grade 2 students after using collaborative learning methods, as grossly apparent from the vast difference in their pre-test and post-test scores. This indicates that collaborative learning strategies is essential in enabling learners' understanding, interest, and proficiency in math topics. Besides, the teachers' quality of teaching practices, as revealed by the Classroom Observation Tool (COT) during class observations, also points towards the fact that teachers were responsible for the intervention's success. Teachers could facilitate learning by adopting learner-centered, interactive, and inclusive pedagogical practices that encourage critical thinking, problem-solving, and active participation. The findings highlight the profound influence of collaborative learning strategies and high impact teaching practices on learners' achievement. Schools are advised to continue implementing collaborative learning strategies in teaching Math and ensuring constant professional development to maintain and enhance teaching performance.

V. RECOMMENDATIONS

1. Apply the suggested improvement plan developed concerning the intervention under study.
2. Schools must implement collaborative learning practices as fundamental teaching method in Math and other subjects.
3. Teachers must use group-oriented learning activities, including peer discussion, problem-solving exercises, and group exercises, to maintain interest and improve understanding.
4. Conduct periodic workshops and training programs to provide teachers with competencies to promote collabo rative learning.
5. Facilitate peer mentoring and learning communities where best practices are shared and strategies refined by teachers.
6. Implement instructional supervision and coaching to provide continuous, high-quality instruction.
7. Continue with the Classroom Observation Tool (COT) to measure and enhance teaching processes.
8. Offer constructive feedback and coaching to teachers grounded in classroom observations to enhance their instructional strategies further.
9. Promote a culture of ongoing professional development through self-assessment and peer observation.
10. Future researchers are encouraged to develop further research on the strategies, techniques, and approaches used by problem-based learning school administrators and teachers in responding effectively to the learning needs of the students in mathematics.

ACKNOWLEDGMENT

The researcher would like to express her heartfelt gratitude to all those who have supported and guided me throughout the journey of completing this thesis. First and foremost, praises and thanks be to God, for His showers of blessings, guidance, and provision all throughout. This would not have been possible without him. To Dr. Jasmine B. Misa, thesis adviser, she deeply thankful for those whose unwavering support, invaluable insights, and mentorship have been instrumental in shaping this research. Your dedication to excellence and your patience in guiding her through the complexities of this project have been truly remarkable. To the members of her Thesis Committee and Panel Examiners headed by Dr. Bryant C. Acar, Chairman and Scribe of the Pre and Oral Examination panel, together with Dr. Annabelle A. Wenceslao and Dr. Elvin H. Wenceslao for the smooth sailing of things behind frails in the arduous toil of this study. To the Dean of the Graduate Department of Western Leyte College, Dr. Sabina B. Con-ui, for being considerate in all requests. To Balion Elementary School family, headed by the School Principal, Mrs. Estrella E. Andrin, for allowing her to conduct the research, thank you so much for the full participation of this study. To her colleagues, parents and pupils for having been instrumental in the realization of this study. To the unwavering support of her husband, her inspiration, and number 1 fan who truly support both financially and emotional and for always believing in her that she is bound for greater things. To her loving family, for their unconditional love, prayers and support extended which always inspire to do her very best in achieving this professional goal. To her mother, Lydia P. Roble and father, Nicanor B. Roble who died last 2020, thank you so much for the advises and motivation that you gave before because without him, she will not be reach her dreams now. Finally, thanks to all the people who have supported her to complete the research work directly or indirectly. All the highest Glory to you Lord.

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