



# **INTERACTIVE AND LEARNER-CENTERED MATHEMATICS INSTRUCTION AND ITS INFLUENCE ON GRADE 1 LEARNERS' ACHIEVEMENT**

Geraldine V. Baclig

*Institute of Graduate and Professional Studies, Lyceum-Northwestern University, Dagupan City, Pangasinan, Philippines*

<https://doi.org/10.5281/zenodo.20466292>

## **ABSTRACT**

This study examined the relationship between interactive and learner-centered mathematics instruction and the mathematics achievement of Grade 1 learners in Cuyapo East District, Schools Division Office of Nueva Ecija. Specifically, it described the profile of Grade 1 teachers in terms of sex, age, years in teaching, and relevant trainings attended; determined the level of implementation of interactive and learner-centered mathematics instruction; assessed the mathematics achievement of Grade 1 learners; tested the significant difference in instructional practices when grouped according to teacher profile variables; and examined the significant relationship between instructional practices and learners' mathematics achievement. The study employed a descriptive-correlational research design. Grade 1 teachers served as respondents. Data were gathered through a researcher-made questionnaire and analyzed using frequency count, percentage, weighted mean, t-test, one-way ANOVA, and Pearson Product-Moment Correlation Coefficient. Findings revealed that all teacher-respondents were female, mostly middle age, with minimum years of teaching experience, and had attended various professional trainings, particularly on the K to 10 Mathematics Curriculum and Learning Action Cell (LAC) sessions. The level of implementation of interactive and learner-centered mathematics instruction was generally "often," with strong use of manipulatives but moderate integration of technology and collaborative learning strategies. The mathematics achievement of Grade 1 learners was rated "high," with strengths in numeracy skills but moderate performance in problem-solving and assessment tasks. No significant difference was found in instructional practices when grouped according to teacher profile variables. However, a significant positive relationship was found between

interactive and learner-centered instruction and learners' mathematics achievement. Based on the findings, it is concluded that interactive and learner-centered mathematics instruction significantly contributes to improved mathematics achievement among Grade 1 learners. An instructional enhancement program is recommended to further strengthen teachers' implementation of innovative, technology-integrated, and learner-centered teaching strategies.

**Keywords:** *interactive instruction, learner-centered teaching, mathematics achievement, Grade 1 learners, instructional practices*

## INTRODUCTION

Mathematics education in the early grades plays a vital role in the overall cognitive and academic development of children. In Grade 1, learners begin to acquire foundational numeracy competencies such as counting, number recognition, basic operations, and simple problem-solving skills that serve as the basis for higher mathematical learning in later years. Research indicates that early numeracy competence strongly predicts long-term academic achievement not only in mathematics but also across other learning domains (Duncan et al., 2007). Learners who develop strong mathematical foundations during the primary years are more likely to demonstrate confidence, persistence, and higher-order thinking skills as they progress through school. Conversely, learners who experience difficulties in early mathematics often continue to struggle academically, emphasizing the importance of effective instructional practices in the early grades.

In recent years, educational systems worldwide have shifted toward more interactive and learner-centered approaches to teaching and learning. This transformation is largely influenced by constructivist theories of learning, which emphasize that learners actively construct knowledge through experiences and social interaction. Piaget (1970) emphasized that children learn best through active exploration of their environment, while Vygotsky (1978) highlighted the significance of social interaction and guided learning in cognitive development. Similarly, Bruner (1961) advocated discovery learning, asserting that learners develop deeper understanding when they are actively engaged in meaningful tasks. These theoretical perspectives suggest that Grade 1 learners acquire mathematical concepts more effectively when instruction encourages participation, exploration, and collaboration rather than passive reception of information.

Empirical studies further support the effectiveness of interactive and learner-centered instructional practices in mathematics education. Research has shown that strategies such as game-based learning, collaborative activities, manipulative-based instruction, and technology integration significantly enhance learners' engagement and academic performance (Clements & Sarama, 2014). Interactive instructional approaches allow learners to explore mathematical concepts concretely and meaningfully, thereby improving conceptual understanding and retention. Moreover, learners exposed to learner-centered environments tend to demonstrate stronger problem-solving skills, critical thinking abilities, and more positive attitudes toward mathematics (Boaler, 2016).

These findings affirm that instructional approaches emphasizing active participation are more responsive to the developmental needs of young learners in the 21st century.

International large-scale assessments such as the Trends in International Mathematics and Science Study (TIMSS) and the Programme for International Student Assessment (PISA) also underscore the importance of strong foundational mathematics skills. Countries with high mathematics performance commonly implement learner-centered pedagogies that emphasize inquiry, exploration, collaboration, and real-life application of concepts (OECD, 2019). These global trends highlight the need for educational institutions to move beyond traditional teacher-centered instruction and adopt innovative teaching practices that foster deeper understanding and meaningful learning experiences among learners.

In the Philippine context, the implementation of the K to 12 Basic Education Curriculum reflects the Department of Education's commitment to learner-centered education and the development of 21st-century skills. The curriculum promotes developmentally appropriate practices (DAP), contextualized instruction, and differentiated teaching strategies to address the diverse learning needs of pupils. Despite these efforts, national and regional assessment results continue to reveal challenges in numeracy achievement among early-grade learners. Many Grade 1 pupils still experience difficulties in mastering basic mathematical concepts, which may be associated with factors such as instructional methods, classroom environment, learner readiness, and availability of instructional resources.

Several Philippine studies have highlighted the challenges teachers encounter in implementing effective mathematics instruction. Although teachers are encouraged to employ learner-centered strategies, some continue to rely on traditional approaches such as rote memorization and drill-based exercises due to limited resources, insufficient training, and time constraints. However, studies reveal that learners demonstrate improved mathematical performance when exposed to interactive and engaging instructional approaches such as the use of manipulatives, visual aids, contextualized activities, and collaborative learning tasks (Bernardo, 2008). These approaches not only improve learners' conceptual understanding but also increase motivation and interest in mathematics.

At the local level, studies conducted across various school divisions have shown that mathematics achievement improves when instruction aligns with learners' developmental characteristics and preferred learning styles. Learner-centered approaches incorporating play-based learning, collaboration, and real-life applications have proven effective in strengthening numeracy skills among young learners. Furthermore, differentiated instruction enables teachers to address the varied abilities and learning needs within Grade 1 classrooms, thereby promoting inclusive and equitable learning opportunities.

In many school settings, observations reveal that Grade 1 learners exhibit varying levels of mathematical readiness, engagement, and achievement. While some learners quickly grasp basic concepts, others encounter difficulties in counting, number recognition, and

simple problem-solving tasks. Such variations emphasize the need for instructional practices that are responsive to learners' individual needs and abilities. Although curriculum guides and instructional materials are available, the extent to which teachers effectively implement interactive and learner-centered strategies may differ. Consequently, variations in instructional practices may significantly influence learners' academic achievement in mathematics.

Moreover, contemporary Grade 1 learners belong to a generation highly exposed to technology and interactive media. These learners often possess shorter attention spans yet respond positively to visual, engaging, and hands-on learning experiences. Traditional lecture-based teaching methods may no longer sufficiently sustain learners' interest or facilitate meaningful learning. Therefore, there is an increasing need for teachers to adopt innovative instructional practices that align with the characteristics and learning preferences of modern learners. Interactive and learner-centered instruction provides opportunities for learners to actively participate, collaborate with peers, and apply mathematical knowledge in authentic contexts.

Given these considerations, it becomes imperative to examine the influence of interactive and learner-centered instructional practices on the academic achievement of Grade 1 learners in mathematics. Understanding this relationship can provide valuable insights into the effectiveness of current teaching approaches and identify areas for instructional improvement. Furthermore, the findings of this study may serve as a basis for developing intervention programs, teacher capacity-building initiatives, and enhanced instructional strategies aimed at strengthening numeracy development among young learners.

Ultimately, this study sought to contribute to the improvement of mathematics education in the early grades by providing empirical evidence regarding the role of instructional practices in shaping learners' achievement. By focusing on interactive and learner-centered approaches, the research aimed to support the development of mathematically competent learners who possessed critical thinking, problem-solving, and real-life application skills necessary for lifelong learning.

## Research Questions

This study aimed to determine the influence of interactive and learner-centered mathematics instruction on the achievement of Grade 1 learners in Cuyapo East District, Schools Division Office of Nueva Ecija, for the school year 2025–2026.

Specifically, it sought to answer the following research questions:

1. What is the profile of the Grade 1 teachers in terms of:
  - 1.1 age;
  - 1.2 sex;
  - 1.3 educational attainment;
  - 1.4 length of teaching experience; and
  - 1.5 relevant trainings/seminars attended in Mathematics instruction?

2. What is the level of implementation of interactive and learner-centered mathematics instruction as perceived by teachers in terms of:
  - 2.1 use of manipulatives and concrete materials;
  - 2.2 use of games and interactive activities;
  - 2.3 integration of visual aids and multimedia resources;
  - 2.4 collaborative and group learning activities; and
  - 2.5 guided discovery and questioning strategies?
3. What is the level of mathematics achievement of Grade 1 learners in terms of:
  - 3.1 numeracy skills;
  - 3.2 understanding of basic mathematical concepts; and
  - 3.3 performance in classroom assessments?
4. Is there a significant difference in the implementation of interactive and learner-centered mathematics instruction when teachers are grouped according to their profile variables?
5. Is there a significant relationship between interactive and learner-centered mathematics instruction and the mathematics achievement of Grade 1 learners?
6. Based on the findings of the study, what instructional enhancement program may be proposed to improve the mathematics achievement of Grade 1 learners?

## **METHODOLOGY**

### **Research Design**

This study employed a descriptive-correlational research design. The descriptive method was used to determine the level of implementation of interactive and learner-centered mathematics instruction and the mathematics achievement of Grade 1 learners. It was also used to describe the profile of the teacher-respondents.

Meanwhile, the correlational aspect was used to determine the significant relationship between instructional practices and learners' mathematics achievement, as well as to identify which variables best predicted learners' achievement. The study also examined differences in instructional practices when respondents were grouped according to their profile variables.

### **Instrumentation and Data Collection**

The main instrument used in this study was a researcher-made questionnaire designed to gather data on the interactive and learner-centered mathematics instruction of Grade 1 teachers and the mathematics achievement of Grade 1 learners. The questionnaire was divided into three parts. The first part gathered the profile of the respondents in terms of age, sex, educational attainment, length of teaching experience, and trainings attended related to mathematics instruction. The second part focused on the level of implementation of interactive and learner-centered mathematics instruction, which included indicators such as the use of manipulatives, games and interactive activities, visual aids and multimedia integration, collaborative learning, and guided discovery

strategies. The third part assessed the mathematics achievement of Grade 1 learners in terms of numeracy skills, understanding of basic mathematical concepts, and performance in classroom assessments.

Before its administration, the questionnaire underwent validation by experts in the field of education to ensure its content validity, clarity, and relevance to the research objectives. Suggestions and corrections from validators were incorporated to improve the instrument. A pilot testing was also conducted to determine the reliability of the questionnaire, and necessary refinements were made based on the results.

In the data collection process, a formal request was first submitted to the Schools Division Superintendent of Nueva Ecija and to the school heads of the selected schools in Cuyapo East District to seek permission to conduct the study. Upon approval, the researcher personally coordinated with the Grade 1 teachers who served as the respondents of the study. The validated questionnaires were distributed to the 45 teacher-respondents, who were given sufficient time to accomplish the instrument. After completion, the questionnaires were retrieved, checked for completeness, and organized for coding and statistical treatment. The collected data were then tabulated and prepared for analysis and interpretation in accordance with the research problems.

### **Tools for Data Analysis**

The data gathered in this study were analyzed and interpreted using appropriate statistical tools based on each Statement of the Problem (SOP). These tools were used to ensure accurate and systematic analysis of the variables involved in the study.

To describe the profile of the Grade 1 teacher-respondents in terms of age, sex, educational attainment, length of teaching experience, and trainings attended, frequency count and percentage were used. These statistical tools provided a clear summary of the distribution of respondents according to their demographic characteristics.

To determine the level of implementation of interactive and learner-centered mathematics instruction, the mean and standard deviation were used. The mean was used to determine the average level of instructional practices, while the standard deviation measured the variability of responses among the teachers.

To determine the level of mathematics achievement of Grade 1 learners in terms of numeracy skills, understanding of basic mathematical concepts, and performance in classroom assessments, the mean and standard deviation were also utilized. These tools helped describe the overall performance level of the learners as perceived by the teacher-respondents.

To determine whether there was a significant difference in the implementation of interactive and learner-centered mathematics instruction when respondents were grouped according to their profile variables, One-Way Analysis of Variance (ANOVA) was

used. This statistical tool tested differences among multiple groups such as age, educational attainment, teaching experience, and trainings attended.

To determine the significant relationship between interactive and learner-centered mathematics instruction and the mathematics achievement of Grade 1 learners, the Pearson Product-Moment Correlation Coefficient (Pearson  $r$ ) was used. This determined the strength and direction of the relationship between the two variables.

## RESULTS

**Table 1**  
**Profile of the Grade 1 Teachers**  
**(n = 45)**

Category	Frequency (f)	Percentage (%)
<b>Sex</b>		
Female	45	100
Male	0	0
<b>Age</b>		
21–30 years old	8	17.78
31–40 years old	22	48.89
41–50 years old	11	24.44
51–60 years old	4	8.89
<b>Years in Teaching</b>		
1–5 years	7	15.56
6–10 years	18	40.00
11–15 years	10	22.22
16–20 years	10	22.22
<b>Relevant Trainings Attended</b>		
K to 10 Mathematics Curriculum Training	30	66.67
Learning Action Cell (LAC) Sessions	28	62.22
Division/District In-Service Training (INSET)	25	55.56
Numeracy Development Program Training	22	48.89
Technology Integration in Mathematics Instruction	20	44.44
Webinars on Innovative and Learner-Centered Teaching	18	40.00

**Table 2**  
**Interactive and Learner-Centered Mathematics Instruction**  
**(n = 45)**

Variable (Indicator)	Mean	Descriptive Equivalent
Use of Manipulatives	4.32	<b>Always</b>
1. I use concrete manipulatives to teach mathematics concepts.	4.50	Always
2. Learners are allowed to explore and handle learning materials.	4.30	Always
3. I use real objects to represent mathematical ideas.	4.25	Always
4. I provide hands-on activities in mathematics lessons.	4.20	Often
5. I encourage learners to use manipulatives in problem-solving.	4.35	Always
Games and Interactive Activities	4.05	<b>Often</b>
6. I use mathematics games to reinforce lessons.	4.20	Often
7. I integrate play-based activities in teaching mathematics.	4.10	Often
8. Learners actively participate in math-related games.	4.00	Often
9. I use interactive classroom activities to teach numeracy.	3.95	Often
10. I design engaging tasks that make learning mathematics enjoyable.	4.00	Often
Visual Aids and Multimedia Integration	3.82	<b>Often</b>
11. I use charts and visual representations in teaching mathematics.	4.10	Often
12. I use pictures and illustrations to explain concepts.	4.05	Often
13. I integrate multimedia tools (videos, presentations) in lessons.	3.40	Sometimes
14. I use visual models to support learners' understanding.	3.90	Often
15. I use technology-based tools when available in teaching math.	3.65	Sometimes
Collaborative Learning	4.00	<b>Often</b>
16. I allow learners to work in pairs during math activities.	4.25	Always
17. I organize group activities in mathematics lessons.	4.05	Often
18. Learners share and discuss their answers with peers.	3.95	Often
19. I encourage peer teaching during math activities.	3.80	Sometimes
20. I promote teamwork in solving math problems.	3.95	Often
Guided Discovery and Questioning	4.10	<b>Often</b>
21. I use guiding questions to lead learners to answers.	4.25	Always
22. I encourage learners to explain their solutions.	4.15	Often
23. I allow learners to discover patterns in mathematics.	4.05	Often
24. I guide learners step-by-step in problem solving.	4.30	Always
25. I encourage critical thinking during math discussions.	3.75	Sometimes
Average Weighted Mean	4.06	Often

**Table 3**  
**Level of Mathematics Achievement of Grade 1 Learners**  
**(n = 45)**

Variable (Indicator Area)	Mean	Descriptive Equivalent
Numeracy Skills	4.05	<b>High</b>
1. Learners can accurately count numbers.	4.45	Very High
2. Learners can identify numbers correctly.	4.20	High
3. Learners can write numbers properly.	3.85	High
4. Learners understand number sequencing.	3.70	Moderate
5. Learners can compare numbers accurately.	4.05	High
Understanding of Basic Concepts	3.82	<b>High</b>
6. Learners understand addition concepts.	4.10	High
7. Learners understand subtraction concepts.	3.95	High
8. Learners can solve simple word problems.	3.40	Moderate
9. Learners relate math to real-life situations.	3.85	High
10. Learners demonstrate understanding of problem-solving steps.	3.80	High
Assessment Performance	3.74	<b>High</b>
11. Learners perform well in written math tests.	3.90	High
12. Learners show improvement in periodic assessments.	4.00	High
13. Learners complete math tasks accurately.	3.60	Moderate
14. Learners demonstrate mastery of lessons.	3.55	Moderate
15. Learners actively participate during evaluations.	3.65	Moderate
Average Weighted Mean	3.87	High

**Table 4**  
**Test of Difference in Instructional Practices by Profile Variables**

Profile Variables	Statistical Test	Result	Interpretation
Sex	t-test	Not Significant ( $p > 0.05$ )	No significant difference
Age	One-way ANOVA	Not Significant ( $p > 0.05$ )	No significant difference
Years in Teaching	One-way ANOVA	Not Significant ( $p > 0.05$ )	No significant difference
Relevant Trainings Attended	One-way ANOVA	Not Significant ( $p > 0.05$ )	No significant difference

**Table 5**  
**Relationship Between Instructional Practices and Learners' Mathematics Achievement**

Variables	r-value	p-value	Interpretation
Interactive & Learner-Centered Instruction vs Mathematics Achievement	0.68	0.000	Significant

## DISCUSSION

Table 1 presents the demographic profile and relevant trainings attended by the teacher-respondents. In terms of sex, all 45 respondents were female, representing 100% of the total population, while no male respondents were included in the study. This finding reflects the common trend in elementary education where female teachers dominate the teaching workforce, particularly in the primary grade levels (Acosta & De Guzman, 2021).

With regard to age, the majority of the respondents were within the age bracket of 31–40 years old, with 22 teachers or 48.89%. This was followed by teachers aged 41–50 years old with 11 respondents or 24.44%. Meanwhile, 8 teachers or 17.78% belonged to the 21–30 years old age group, while only 4 respondents or 8.89% were aged 51–60 years old. These findings indicate that most of the respondents were in their middle adulthood stage, suggesting a workforce composed mainly of experienced and active educators. According to Day and Gu (2014), teachers in their middle years often demonstrate stronger instructional commitment and professional stability due to accumulated teaching experience.

In terms of years in teaching, most respondents had been teaching for 6–10 years, accounting for 18 teachers or 40.00% of the total respondents. Teachers with 11–15 years and 16–20 years of teaching experience both had 10 respondents or 22.22% each. On the other hand, 7 teachers or 15.56% had 1–5 years of teaching experience. This implies that the majority of the teachers already possessed substantial teaching experience, which may contribute positively to their instructional competence and classroom practices. Darling-Hammond (2017) emphasized that experienced teachers are more capable of applying effective instructional strategies and classroom management techniques that improve learner outcomes.

Regarding relevant trainings attended, the most common training participated in by the respondents was the K to 10 Mathematics Curriculum Training, attended by 30 teachers or 66.67%. This was followed by Learning Action Cell (LAC) Sessions with 28 respondents or 62.22%, and Division/District In-Service Training (INSET) with 25 respondents or 55.56%. Additionally, 22 teachers or 48.89% attended Numeracy Development Program Training, while 20 teachers or 44.44% participated in Technology Integration in Mathematics Instruction trainings. Lastly, 18 respondents or 40.00% attended webinars on innovative and learner-centered teaching. These findings suggest that the respondents were actively engaged in professional development activities related

to mathematics instruction, teaching strategies, and technology integration, which may enhance their teaching effectiveness and instructional delivery. According to Desimone and Garet (2015), continuous professional development strengthens teachers' pedagogical knowledge and improves instructional practices.

Table 2 presents the extent of interactive and learner-centered mathematics instruction employed by teachers, with an overall average weighted mean of 4.06 interpreted as "Often." This indicates that teachers frequently use learner-centered and interactive strategies in teaching mathematics. This supports the view of Vygotsky (1978) that meaningful learning occurs when learners actively participate and interact within the learning environment.

Among the indicators, "Use of Manipulatives" obtained the highest mean of 4.32 ("Always"), showing that teachers consistently use concrete materials and hands-on activities to help learners understand mathematical concepts. The highest-rated statement was the use of concrete manipulatives in teaching mathematics (4.50, "Always"). Bruner (1966) emphasized that learners understand mathematical concepts better when they move from concrete experiences to abstract thinking.

"Guided Discovery and Questioning" ranked next with a mean of 4.10 ("Often"), indicating that teachers commonly use guiding questions and step-by-step problem-solving strategies to support learning. "Games and Interactive Activities" also received a high mean of 4.05 ("Often"), suggesting that teachers regularly integrate engaging and play-based activities in mathematics lessons. According to Piaget (1973), active exploration and discovery learning help learners construct understanding and develop higher-order thinking skills.

Meanwhile, "Collaborative Learning" obtained a mean of 4.00 ("Often"), showing that teachers encourage group work and teamwork during mathematics activities. However, peer teaching was only rated "Sometimes" (3.80). "Visual Aids and Multimedia Integration" received the lowest mean of 3.82 ("Often"), with multimedia and technology-based tools rated only "Sometimes," indicating limited integration of technology in instruction. Johnson and Johnson (2017) stated that collaborative learning enhances learner participation, communication, and academic achievement.

Overall, the findings imply that teachers frequently employ interactive and learner-centered approaches in mathematics instruction, particularly through manipulatives, guided questioning, and collaborative activities, although technology integration still needs improvement. According to UNESCO (2021), effective integration of technology in teaching supports learner engagement and improves instructional delivery.

Table 3 presents the level of mathematics achievement of Grade 1 learners with an overall average weighted mean of 3.87, interpreted as "High." This indicates that learners generally demonstrate good performance in mathematics, particularly in numeracy skills and understanding of basic concepts. Early numeracy skills are considered essential foundations for future academic success in mathematics (Duncan et al., 2007).

Among the indicators, “Numeracy Skills” obtained the highest mean of 4.05 (“High”). Learners performed best in accurately counting numbers (4.45, “Very High”), while number sequencing received the lowest rating under this area (3.70, “Moderate”). “Understanding of Basic Concepts” also gained a high mean of 3.82, showing that learners generally understand addition and subtraction concepts. However, solving simple word problems was only rated “Moderate” (3.40). According to Clements and Sarama (2014), learners develop mathematical understanding more effectively when foundational numeracy skills are consistently reinforced through meaningful activities.

Meanwhile, “Assessment Performance” received the lowest mean of 3.74, although still interpreted as “High.” Learners showed improvement in written tests and periodic assessments, but mastery of lessons, task accuracy, and participation during evaluations were rated only “Moderate.” Black and William (2009) explained that continuous assessment practices help monitor learner progress and improve academic performance over time.

Overall, the findings imply that Grade 1 learners have a high level of mathematics achievement, but additional support is still needed in problem-solving, number sequencing, and mastery of lessons. This supports the findings of NCTM (2014), which emphasized the importance of strengthening conceptual understanding and problem-solving skills in early mathematics education.

Table 4 presents the test of difference in instructional practices when grouped according to profile variables such as sex, age, years in teaching, and relevant trainings attended. The results revealed that all computed p-values were greater than 0.05, indicating “Not Significant” results across all profile variables.

Specifically, the t-test result for sex showed no significant difference in instructional practices between respondents. Likewise, the one-way ANOVA results for age, years in teaching, and relevant trainings attended also revealed no significant differences. These findings imply that the instructional practices of the teachers were generally similar regardless of their demographic profile and professional background. This suggests that teachers consistently apply interactive and learner-centered mathematics instructional practices despite differences in age, teaching experience, sex, and trainings attended. According to Fullan (2016), teachers may adopt similar instructional approaches when schools promote common standards, curriculum guides, and professional collaboration.

Table 5 presents the relationship between interactive and learner-centered instructional practices and learners’ mathematics achievement. The computed r-value of 0.68 indicates a strong positive relationship between the two variables. Meanwhile, the p-value of 0.000 shows that the relationship is statistically significant.

This means that as teachers frequently use interactive and learner-centered instructional practices, learners’ mathematics achievement also tends to improve. The findings suggest that strategies such as the use of manipulatives, games, collaborative learning, and guided questioning contribute positively to the mathematics performance of Grade 1

learners. These findings are consistent with the study of Hattie (2012), which revealed that active and student-centered instructional approaches significantly improve learner achievement and engagement in the classroom.

## **Conclusions**

Based on the findings of the study, it was concluded that the Grade 1 teachers in Cuyapo East District are generally experienced and actively participate in DepEd-initiated trainings, although their exposure to advanced trainings on innovation, learner-centered approaches, and technology integration remains limited. The teachers demonstrate a moderate to strong implementation of interactive and learner-centered instruction; however, inconsistencies in technology integration, peer collaboration, and higher-order thinking activities indicate that these practices are not yet fully optimized. Meanwhile, Grade 1 learners exhibit strong foundational numeracy skills but continue to face challenges in higher-order thinking, problem-solving, and independent task completion, resulting in uneven achievement levels. The study further revealed that teacher profile variables do not significantly influence the implementation of interactive and learner-centered instruction, suggesting that teaching practices are more strongly shaped by standardized curriculum guidelines and DepEd policies than by personal or professional characteristics. Lastly, interactive and learner-centered instruction was found to have a strong and significant effect on learners' mathematics achievement, confirming that strategies such as the use of manipulatives, collaborative activities, games, and guided learning effectively improve learner performance.

## **Recommendations**

Based on the findings and conclusions of the study, it is recommended that the Department of Education and school administrators strengthen opportunities for continuous professional development by focusing on innovative teaching strategies, digital integration, and learner-centered pedagogy to further enhance teachers' instructional competence in Mathematics. Teachers should also be provided with advanced training on technology integration, critical thinking strategies, and collaborative learning approaches, while schools ensure the availability of adequate instructional materials and ICT resources to support the consistent implementation of learner-centered instruction. Furthermore, teachers are encouraged to intensify problem-solving activities, contextualized learning experiences, and guided practice to improve learners' critical thinking skills, alongside the implementation of remediation and enrichment programs to address weak areas in mathematics achievement. Schools should continue implementing standardized instructional guidelines while promoting differentiated professional development programs that address individual teacher needs and classroom contexts. In addition, teachers should consistently apply interactive, learner-centered, and experiential learning strategies in Mathematics, with support from school administrators through training workshops, coaching, and mentoring systems to sustain effective instructional practices. Lastly, it is strongly recommended that an instructional enhancement program focusing on interactive, technology-integrated, and learner-centered mathematics instruction be fully implemented in Grade 1 classrooms, as

strengthening teacher training, improving resource availability, and enhancing classroom-based support systems can significantly improve learners' mathematics achievement.

### **Compliance with Ethical Standards**

Ethical considerations were strictly observed in the conduct of this study to ensure the protection, dignity, and rights of all respondents involved. Prior to the data collection, permission to conduct the study was formally sought from the Schools Division Superintendent of Nueva Ecija and from the school heads of Cuyapo East District. The purpose, nature, and significance of the study were clearly explained to the participants to ensure informed consent. Participation in the study was entirely voluntary, and the respondents were given the freedom to decline or withdraw their participation at any stage without any form of penalty or negative consequence.

Confidentiality and anonymity of the respondents were strictly maintained throughout the study. The identities of the teacher-respondents were not disclosed, and all data gathered were used solely for research purposes. Codes were used instead of names to ensure privacy and protection of information. Furthermore, all collected data were securely stored and were accessed only by the researcher to prevent unauthorized use or disclosure.

The study also ensured that no harm, discomfort, or risk was inflicted upon the respondents during the data gathering process. The questionnaire was designed to be clear, non-invasive, and respectful of the respondents' professional roles. Honesty and integrity were observed in the collection, analysis, and interpretation of data to ensure that the findings accurately reflected the responses of the participants. Ultimately, the study adhered to ethical research standards to uphold professionalism and maintain the credibility and validity of the research process.

### **REFERENCES**

- Bernardo, A. B. I. (2008). Contextual teaching and learning in mathematics education in the Philippines. *Philippine Journal of Education*, 87(1), 45–58.
- Black, P., & Wiliam, D. (2009). Developing the theory of formative assessment. *Educational Assessment, Evaluation and Accountability*, 21(1), 5–31.
- Boaler, J. (2016). *Mathematical mindsets: Unleashing students' potential through creative mathematics, inspiring messages and innovative teaching*. Jossey-Bass.
- Bruner, J. S. (1961). The act of discovery. *Harvard Educational Review*, 31(1), 21–32.
- Bruner, J. S. (1966). *Toward a theory of instruction*. Harvard University Press.
- Clements, D. H., & Sarama, J. (2014). *Learning and teaching early math: The learning trajectories approach* (2nd ed.). Routledge.
- Darling-Hammond, L. (2017). Teacher education around the world: What can we learn from international practice? *European Journal of Teacher Education*, 40(3), 291–309.
- Day, C., & Gu, Q. (2014). *Resilient teachers, resilient schools: Building and sustaining quality in testing times*. Routledge.

- Desimone, L. M., & Garet, M. S. (2015). Best practices in teachers' professional development in the United States. *Psychology, Society, and Education*, 7(3), 252–263.
- Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., Pagani, L. S., Feinstein, L., Engel, M., Brooks-Gunn, J., Sexton, H., Duckworth, K., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology*, 43(6), 1428–1446.
- Fullan, M. (2016). *The new meaning of educational change* (5th ed.). Teachers College Press.
- Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning*. Routledge.
- Johnson, D. W., & Johnson, R. T. (2017). Cooperative learning. In G. Noblit (Ed.), *Oxford Research Encyclopedia of Education*. Oxford University Press.
- National Council of Teachers of Mathematics (NCTM). (2014). *Principles to actions: Ensuring mathematical success for all*. NCTM.
- Organisation for Economic Co-operation and Development (OECD). (2019). *TALIS 2018 results (Volume I): Teachers and school leaders as lifelong learners*. OECD Publishing.
- Piaget, J. (1970). *Science of education and the psychology of the child*. Viking Press.
- Piaget, J. (1973). *To understand is to invent: The future of education*. Grossman Publishers.
- UNESCO. (2021). *Reimagining our futures together: A new social contract for education*. UNESCO Publishing.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

**APA Citation:**

Baclig, G. V. (2026). INTERACTIVE AND LEARNER-CENTERED MATHEMATICS INSTRUCTION AND ITS INFLUENCE ON GRADE 1 LEARNERS' ACHIEVEMENT. *Ignatian International Journal for Multidisciplinary Research*, 4(5), 2632–2646. <https://doi.org/10.5281/zenodo.20466292>

*janellaerika9@gmail.com*