



DEPARTMENT OF EDUCATION REGION VIII - EASTERN VISAYAS

RESEARCH BULLETIN

April—June 2026 Volume 8(1)

Math VLOG (Mastering Arithmetic Through Hands-On Video Learning to Optimize Growth) Program Aid in Improving Numeracy Proficiency of Grade 1 Pupils of Basey I Central Elementary School

Arlene Ocop
Schools Division of Samar

Introduction

Numeracy is the competence to understand and manage numbers, a fundamental skill that influences diverse areas of human activity. Beyond mere arithmetic, numeracy encompasses a spectrum of competencies, including mathematical reasoning, problem-solving, and the ability to interpret and critically evaluate numerical information (Bransford, 2016).

In practical terms, numeracy is an indispensable skill in personal finance, enabling individuals to manage budgets, interpret financial statements, and make informed decisions about investments and loans. Moreover, it is a cornerstone in a technologically advancing world, with proficiency in numeracy becoming increasingly vital for success in STEM (science, technology, engineering, and mathematics) fields (Duncan, 2022).

The Department of Education

(DepEd) in the Philippines has actively pursued initiatives to address the challenge of low numeracy levels among learners. DepEd advocates for a shift in pedagogy, emphasizing understanding and application of mathematical concepts rather than rote memorization, with the goal of making numeracy more relevant and practical for learners.

Recognizing the crucial role of educators, DepEd has invested in teacher training and development programs. These initiatives aim to enhance teachers' capacity to employ innovative teaching methodologies, incorporate technology, and address the diverse learning needs of students. The integration of technology into numeracy education is another key strategy employed by DepEd, utilizing online resources, interactive modules, and digital tools to make learning more engaging and accessible.

DepEd has also implemented assessment and monitoring mechanisms

CONTENT HIGHLIGHTS

1

Math VLOG (Mastering Arithmetic Through Hands-On Video Learning to Optimize Growth) Program Aid in Improving Numeracy Proficiency of Grade 1 Pupils of Basey I Central Elementary School

3

Problem-Solving Routines to Outstand and Build Learning Engagement in Mathematics (PROBLEM): Working Towards Developing Learners' Problem-Solving Skills

4

Pagtuturong Resiprokal: Pag-unlad sa Kasanayang Pag-unawa ng mga Mag-aaral sa Filipino 10

10

The Effect of Concrete-Pictorial-Abstract (CPA) Approach on Grade 8 Students' Mathematical Conceptual Understanding and Representation on

to track students' numeracy levels, including standardized tests and assessments at various grade levels. This data-driven approach allows for evidence-based decision-making, enabling targeted

interventions and improvements in the curriculum.

The purpose of introducing the MATH VLOG solution is twofold. Firstly, it seeks to improve the immediate learning experience of Grade 1 pupils by catering to diverse learning styles and preferences, thereby making mathematics more accessible and enjoyable. Secondly, the solution aligns educational practices with the broader global and national shift towards technology-driven learning. This ensures that learners not only master arithmetic but also develop essential skills needed in the digital age.

Ultimately, MATH VLOG aspired to contribute valuable insights into the benefits of innovative and technology-driven approaches in mathematics education. By addressing the immediate challenges faced by Grade 1 pupils at Basey I Central Elementary School, the solution aimed to serve as a model for broader educational institutions seeking to optimize their teaching methodologies in the ever-evolving landscape of education.

Methodology

This study employed a mixed methods approach, combining quantitative and qualitative methodologies to thoroughly explore the research questions. The goal was to gain a comprehensive understanding of the effectiveness of MATH VLOG (Mastering Arithmetic Through Hands-on Video Learning to Optimize Growth) Program and its influence on instructional practices for improving numerical proficiency among Grade 1 pupils.

Discussion of Results And Reflection

This section presents a detailed analysis of the study's results, accompanied by the researcher's insights and reflections. The data were thoroughly evaluated and interpreted, providing a systematic and organized response to the research questions.

Research Question 1. What is the numeracy proficiency level of Grade 1 pupils of Basey I Central Elementary School before and after the

implementation of MATH VLOG" (Mastering Arithmetic Through Hands-on Video Learning to Optimize Growth) Program?

Table 2 presents the learners' numeracy proficiency levels in the

Table 2
Level of Learners' Numeracy Proficiency in the ERUNT Pre-Assessment and Post-Assessment

PRE-ASSESSMENT	POST-ASSESSMENT					
		Non-Proficient	Low Proficient	Nearly Proficient	Proficient	Highly Proficient
Non-Proficient	8	0	1	5	2	0
Low Proficient	13		0	5	7	0
Nearly Proficient	4			0	3	1
Proficient	2				1	1
Total	27	0	1	10	13	2

ERUNT pre-assessment and post-assessment. In the pre-assessment, the largest group of learners was classified as Low Proficient (13 learners), followed by Non-Proficient (8 learners), Nearly Proficient (4 learners), and Proficient (2 learners).

A closer examination of the post-assessment reveals notable upward mobility across all groups. Among the 8 learners initially classified as Non-Proficient, 1 advanced to Low Proficient, 5 improved to Nearly Proficient, and 2 progressed to Proficient. Similarly, of the 13 learners who were Low Proficient in the pre-assessment, 5 moved up to Nearly Proficient while 7 reached the Proficient level. In the Nearly Proficient category, 3 learners advanced to Proficient and 1 attained the Highly Proficient level. Lastly, of the 2 learners who began as Proficient, 1 remained at the same level while the other progressed to Highly Proficient.

References

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., ...& Japel, C. (2022). School readiness and later achievement. *Developmental Psychology*, 43(6), 1428-1446.

Dowker, A., Sarkar, A., & Looi, C. Y. (2016). Mathematics anxiety: What have we learned in 60

years? *Frontiers in Psychology*, 7, 508.

Garcia, M., & Wang, S. (2022). Personalized Learning in Elementary Mathematics: An Examination of Adaptive Learning Platforms. *Journal of Educational Psychology*, 37(2), 145-162.

Gersten, R., Jordan, N. C., & Flojo, J. R. (2014). Early identification and interventions for

students with mathematics difficulties. *Journal of Learning Disabilities*, 38(4), 293-304.

Johnson, A., Brown, K., & Martinez, C. (2021). Enhancing Numeracy Proficiency in Primary School: A Study on the Implementation of Adaptive Learning Strategies. *Journal of*

Educational Research, 48(4), 367-382.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2016). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, 41(2), 75-86.

Levine, S. C., Suriyakham, L. W., Rowe, M. L., Huttenlocher, J., & Gunderson, E. A. (2020). What counts in the development of young children's number knowledge? *Developmental Psychology*, 46(5), 1309-1319.

Smith, J., & White, L. (2017). The Impact of Adaptive Learning Interventions on Mathematics Education: A Meta-Analysis. *Journal of Educational Technology*, 40(3), 215-230.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Problem-Solving Routines to Outstand and Build Learning Engagement in Mathematics (PROBLEM): Working Towards Developing Learners' Problem-Solving Skills

Mary Jane I. Quemaño, Master Teacher Ii

Elsie A. Tan, Public Schools District Supervisor

Capayas Elementary School, Cabucgayan District 2

Schools Division of Biliran

Introduction

Problem solving is an imperative skill that helps learners understand various circumstances, recognize challenges, and find solutions. It involves analyzing information, thinking critically, and choosing effective plans and approaches to attain objectives and goals (Fissore et al., 2021). As a higher-order thinking skill, it is crucial for learners to develop this ability so they can face real-life problems and become independent, lifelong learners.

However, many students in the Philippines demonstrate poorly in problem-solving, especially in Mathematics. The 2022 PISA results showed that Filipino learners ranked among the lowest-performing countries, particularly in math skills (OECD, 2023). At Capayas Elementary School, most Grade 3 learners also struggled, with 85% showing no mastery in solving word problems based on Rapid Mathematics Assessment (RMA) results.

Because of this, the teacher recognizes the pressing need to provide better support and strategies. This study uses a structured evaluation approach to improve learners' problem-solving skills and enhance their overall academic performance after the systematic implementation of the proposed classroom-based intervention called **Problem-solving Routines to Outstand and Build Learning Engagement in Mathematics (PROBLEM)**.

In response to learners' low performance in solving word problems, the **PROBLEM** intervention was developed as a structured 30-minute daily learning routine. The sessions guided

learners from understanding simple problems to solving more complex ones through discussion, collaboration, practice, and assessment. Activities were arranged carefully to avoid overwhelming learners, following the idea that learning is more effective when information is given in manageable amounts (Sweller, 1980). The intervention also used real-life and familiar situations to make learning meaningful and easier to understand (Kolb, 1984). Additionally, it applied Polya's four-step problem-solving process and Wood's model to help learners think clearly and solve problems step by step (Polya, 1945; Wood, 1987).

Methodology

This study used a quantitative method under Action Research, focusing on numerical data from written tests and a Likert Scale Survey Questionnaire. Using purposive sampling, all Grade 3 learners, who were all similarly categorized as below proficient learners in terms of problem-solving, were selected as participants. Data were gathered through pen-and-paper tests, validated worksheets, and the RMA Post Test, along with a 5-point Likert Scale based on content validity (Lawshe, 1975). For analysis, descriptive statistics such as frequency, mean, and Mean Percentage Score (MPS) were applied, while a paired sample t-test was used to determine any significant difference between pre-test and post-test results.

Results and Discussion

The results showed clear improvement in learners' problem-solving skills across all operations after the intervention. In addition, several learners progressed from not proficient to proficient and nearing proficiency levels. In subtraction, learners improved significantly, with some reaching proficiency from zero mastery. In multiplication, although many remained at low levels, a few advanced to proficiency level and showed gains from zero scores. In division, progress was modest, with some reaching nearing proficiency despite continued difficulty. Overall, the improvement supports that structured and guided problem-solving approaches enhance learning outcomes (Polya, 1945; Sweller, 1980).

References

- Cherry, K. (2022). *Why behaviorism is one of psychology's most fascinating branches*. Verywell Mind. <https://www.verywellmind.com/behavioral-psychology-4157183>
- Department of Education. (2018, March 26). *Policy guidelines on the administration of the revised Philippine Informal Reading Inventory (DO 14, s. 2018)*. <https://www.deped.gov.ph/2018/03/26/do-14-s-2018-policy-guidelines-on-the-administration-of-the-revised-philippine-informal-reading-inventory/>
- Department of Education. (2019,

- November 22). *Hamon: Bawat bata bumabasa (3Bs initiative) (DM 173, s. 2019)*. <https://www.deped.gov.ph/2019/11/22/november-22-2019-dm-173-s-2019-hamon-bawat-bata-bumabasa-3bs-initiative/>
- Department of Education. (2020). *Adoption of the basic education learning continuity plan for school year 2020–2021 in light of the COVID-19 public health emergency (DO_s2020_012)*. https://authdocs.deped.gov.ph/deped-order/do_s2020_012-adoption-of-the-be-lcp-sy-2020-2021/
- Labastida, M. (2019). *Second language acquisition: A case study of a one-and-a-half-year-old Filipino child*. *International Journal of Education and Research*, 9(5). <http://www.ijern.com/journal/2021/May-2021/08.pdf>
- Mena, U., Nurihsan, A., & Ifiandra. (2020). Foreign language classroom anxiety: An international student's perspective on Indonesian language learning. *PUPIL: International Journal of Teaching, Education and Learning*, 4(2), 193–205. <https://doi.org/10.20319/pijtel.2020.42.193205>
- Munger, E. (2022). *Steps to success: Crossing the bridge between literacy research and practice*. <http://milnepublishing.geneseo.edu/steps-to-success/>
- OECD. (2019). *PISA 2018 results: Combined executive summaries*. https://www.oecd.org/Pisa/Combined_Executive_Summarie_s_PISA_2018.pdf
- Oxford Learning. (2022). *Benefits of group study vs. self study*. <https://www.oxfordlearning.com/studying-alone-vs-studying-in-a-group/>
- Paulsen, K., & The IRIS Center. (2004). *Comprehension and vocabulary: Grades 3–5*. http://iris.peabody.vanderbilt.edu/wpcontent/uploads/pdf_case_studies/ics_compvoc.pdf
- Peng, K. (2021). A comparative analysis of theory and pedagogy on intercultural language teaching and learning. *Education Journal*, 4(4), 7. <https://doi.org/10.31058/j.edu.2021.44002>
- TeacherVision. (2022). *Cooperative learning: Teaching strategy (Grades K–12)*. <https://www.teachervision.com/professional-development/cooperative-learning>
- Wakke, D., & Heller, V. (2022). Helping as a concurrent activity: How students engage in small groups while pursuing classroom tasks. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.784906>
- Watson, J. B. (n.d.). *Psychology as the behaviorist views it*. Bobbs-Merrill.
- Project Pro. (2000). National Reading Panel conclusion. http://projectpro.com/ICR/Research/Releases/NIH_NRP.htm

Pagtuturong Resiprokal: Pag-unlad sa Kasanayang Pag-unawa ng mga Mag-aaral sa Filipino 10

Katrina Jane R. Costillas, Master Teacher II
Schools Division of Leyte

Introduction

Ang pag-unawa sa pagbasa ay isa sa pinakamahalagang kasanayang dapat malinang ng mga mag-aaral sapagkat ito ang nagsisilbing daan upang makakuha at makapagproseso ng impormasyon sa iba't ibang asignatura. Ang pag-unawa sa binasa ay isa sa pinakamahalagang kasanayang dapat malinang ng mga mag-aaral sapagkat ito ang susi sa pagkatuto sa iba't ibang asignatura. Batay sa resulta ng Phil-IRI ng Kananga National High School para

sa taong panuruan 2024–2025, may mga mag-aaral pa ring nasa antas ng pagkabigo at pagkatuto sa pagbasa. Napansin din ang mababang interes sa pagbasa, kakulangan sa bokabularyo, at kahirapan sa pag-unawa ng mga tekstong pampanitikan. Dahil dito, isinagawa ang pag-aaral upang matukoy kung mabisa ang paggamit ng Pagtuturong Resiprokal (Reciprocal Teaching) sa pagpapaunlad ng kasanayang pag-unawa sa pagbasa ng mga mag-aaral sa Filipino 10.

Isa sa mga nakikitang dahilan nito ay ang paggamit ng mga konbensyunal at tekstbuk-oryentadong pamamaraan sa pagtuturo. Bilang tugon sa suliraning ito, isinagawa ang pananaliksik upang matukoy kung epektibo ang Pagtuturong Resiprokal (Reciprocal Teaching) bilang estratehiya sa pagpapahusay ng kasanayang pag-unawa sa pagbasa ng mga mag-aaral sa Filipino 10. Ang estratehiyang ito ay nakatuon sa apat na pangunahing gawain: paghihinuha, pagtatanong,

paglilinaw, at pagbubuod.

Methodology

Gumamit ang pag-aaral ng aksyong pananaliksik na may kombinasyon ng kwalitatibo at kwantitatibong pamamaraan. Ang mga kalahok ay mga piling mag-aaral sa Ikasampung Baitang ng Kananga National High School na kabilang sa frustration level batay sa resulta ng PHIL-IRI. Ginamit ang purposive sampling sa pagpili ng mga kalahok. Ang interbensyon ay isinagawa sa pamamagitan ng Pagtuturong Resiprokal sa loob ng unang markahan. Ang mga mag-aaral ay hinati sa maliliit na pangkat at binigyan ng mga tiyak na tungkulin bilang tagapamahala, tagahinuha, tagatanong, tagalinaw, at tagabuod. Gumamit ng mga tekstong pampanitikan at reciprocal worksheets bilang kagamitang panturo. Ang pangangalap ng datos ay isinagawa sa pamamagitan ng pre-test at post-test gamit ang PHIL-IRI, obserbasyon, field notes, at mga output ng mag-aaral. Ang mga kwalitatibong datos ay sinuri sa pamamagitan ng thematic analysis samantalang ang mga kwantitatibong

datos ay sinuri gamit ang paghahambing ng mean scores at t-test.

Results and Discussion

Ipinakita ng resulta na sa pre-test, 14% ng mga kalahok ay nasa frustration level, 24% ay nasa instructional level, at 62% ay nasa independent level. Sa post-test, wala nang naitalang nasa frustration level at tumaas sa 90% ang bilang ng mga mag-aaral na nasa independent level. Lumabas din sa paired t-test na may makabuluhang pagkakaiba sa mean scores ng pre-test (81.98) at post-test (95.98), na nagpapahiwatig ng positibong epekto ng interbensyon. Sa kwalitatibong pagsusuri, nabuo ang limang pangkalahatang tema: masusing pagsusuri, mataas na antas ng pagsusuri, maunlad na komunikasyon, pagpapalawak ng bokabularyo, at pag-unlad sa kritikal na pag-iisip. Ang mga natuklasang ito ay nagpapatunay na ang pagtuturong resiprokal ay epektibong estratehiya sa pagpapaunlad ng pag-unawa sa pagbasa ng mga mag-aaral sa Filipino 10.

References

- Brown, A. L. (1986). Guided, Cooperative Learning.
- Brown, A. L., & Palincsar, A. S. (1985). Reciprocal Teaching of Comprehension Strategies: A Natural History for One Program for Enhancing Learning.
- Palincsar, A. S., & Brown, A. L. (1983). Reciprocal Teaching of Comprehension: Fostering and Comprehension-Monitoring Activities.
- Nugraha, A. (2011). The Use of Reciprocal Teaching to Improve Students' Reading Comprehension.
- Okkinga, M., et al. (2018). Effects of Reciprocal Teaching on Reading Comprehension of Low-Achieving Adolescents.
- Palincsar, A. S. (1982). Improving the Reading Comprehension of Junior High Students through Reciprocal Teaching of Comprehension Monitoring Strategies.

The Effect of Concrete-Pictorial-Abstract (CPA) Approach on Grade 8 Students' Mathematical Conceptual Understanding and Representation on Learning Fractions

Johannes Paulus Yu,
Schools Division of Ormoc City

Introduction

Mathematics is often considered one of the most challenging subjects in school. Nevertheless, mathematics is fundamental part of our lives not only for academic success but also for navigating everyday life, decision making, and fostering education. Thus, the study of mathematics is foundational across various fields making a key driver of societal advancement.

However, in the recent results of the 2022 Programme for International Student Assessment (PISA) highlight significant challenges in the Philippine Mathematics Education. The results show what Filipino students know and can do in mathematics states that, "In the Philippines, 16% of students attained at least Level 2 proficiency in mathematics, significantly less than on average across OECD countries (OECD average: 69%). At a minimum, these students can

interpret and recognize, without direct instructions, how a simple situation can be represented mathematically (e.g. comparing the total distance across two alternative routes, or converting prices into a different currency). Over 85% of students in Singapore, Macao (China), Japan, Hong Kong (China)*, Chinese Taipei and Estonia (in descending order of that share) performed at this level or above. Furthermore, almost no students in the Philippines were top performers in

mathematics, meaning that they attained Level 5 or 6 in the PISA mathematics test (OECD average: 9%). Six Asian countries and economies had the largest shares of students who did so: Singapore (41%), Chinese Taipei (32%), Macao (China) (29%), Hong Kong (China)* (27%), Japan (23%) and Korea (23%). At these levels, students can model complex situations mathematically, and can select, compare and evaluate appropriate problemsolving strategies for dealing with them. Only in 16 out of 81 countries and economies participating in PISA 2022 did more than 10% of students attain Level 5 or 6 proficiency.” Education experts also concurred that this poor performance indicates persistent difficulties and understanding the fundamental mathematical concepts and applying them to real world situations (PNA).

With this result, there is an urgent need for reforms in the way that mathematics is taught, specifically, in addressing diverse student needs and ensuring that learners are equipped with the skills necessary to compete globally. Consequently, the implementation of the MATATAG Curriculum by the Department of Education, which main goal is for Filipino learners to become mathematically proficient and critical problem solvers. Thus, the researcher used concrete-pictorial-abstract approach for students’ conceptual understanding and representation on fractions and enhance their critical thinking skills.

The conceptual understanding and representation of fractions is crucial for students as it forms the foundation for more advanced mathematical concepts. However, many Grade 8 students struggle with fractions, often due to traditional teaching methods which is a one-fit size activity that fail to engage diverse learning styles (BAL, AP 2016). On the other hand, good mathematics instruction engages all students as active learners (NAEYC & NCTM, 2002). Using Concrete-Pictorial-Abstract (CPA) provide students to build their own knowledge by doing different level of mathematical activities. Differentiated math instruction

based on student readiness meets the needs of students who are below grade level, as well as those who exceed benchmarks. When applied correctly, differentiation in mathematics ensures student success (Grimes & Stevens, 2009).

The Concrete-Pictorial-Abstract (CPA) approach, which encourages students to first explore concepts using concrete materials, then pictorial representations, and finally abstract symbols, is posited to enhance understanding and retention. It also facilitates deep understanding of mathematical ideas. Since fractions are challenging area for student, as they require strong understanding and the ability to represent mathematical ideas in multiple forms. This action research aims to investigate the effect of the CPA approach on Grade 8 students’ mathematical conceptual understanding and mathematical representation, addressing gaps in comprehension and improving overall mathematical proficiency.

Methodology

This action research investigated the effect of the Concrete-Pictorial-Abstract (CPA) approach on Grade 8 students’ mathematical conceptual understanding and representation in learning fractions. Specifically, it examined the students’ Mean Percentage Scores (MPS) before and after exposure to the traditional approach and the CPA approach, determined the effect of the CPA approach on conceptual understanding and representation, and compared the gain scores of students taught using the two approaches. The study used a mixed-method design. In the quantitative phase, 120 Grade 8 students of New Ormoc City National High School during Academic Year 2025–2026 were selected through cluster random sampling and divide into two groups, the experimental group (CPA approach) and the control group (traditional approach). Data were gathered using pre-test and post-test on fractions and were analyzed

using MPS, paired t-test, and independent t-test at 0.01 level of significance. In the qualitative phase, purposively selected students from the CPA group participated in classroom observations and engagement surveys, which were analyzed thematically.

Results and Discussion

This section presents the results of the study and the interpretations drawn from the data. The findings are organized based on the research questions and discussed to highlight the effect of the intervention on students’ learning.

1. Mean Percentage Score (MPS), the mathematical conceptual understanding and representation, before and after the exposure of the two approaches in learning fractions;

The result showed that students taught using the traditional approach demonstrated an increase in their Mean Percentage Score (MPS) in both mathematical conceptual understanding and mathematical representation in learning fractions. The MPS in mathematical conceptual understanding increased from 37.62 in the pre-test to 73.57 in the post-test that results in an MPS gain of 35.95. While, in mathematical representation, the MPS improved from 25.93 in the pre-test to 50.19 in the post-test, with a gain of 24.26.

Moreover, it also showed that the students who were exposed to the CPA approach exhibited a greater increase in their MPS compared to the students who were exposed to the traditional approach. In mathematical conceptual understanding, the MPS increased from 35.24 in the pre-test to 89.35 in the post-test, resulting a gain in MPS of 54.11. Likewise, in mathematical representation, the MPS increased substantially from 23.43 to 89.63, yielding a gain of 66.20.

Although, the increased in MPS in traditional approach indicated that it also contributed to students’ learning fractions. Classroom discussions and explanations, drills, and practice enabled

students to improve their test performance. However, the gains suggested that learning through traditional approach relied mainly in procedural understanding, with limited opportunities for learners to visualize and concretize fraction concepts. Whereas the high increase in MPS in students who were exposed in CPA approach compared to the traditional approach indicated that CPA approach was highly effective in improving students' performance in learning fractions. From using concrete materials that enabled the students to manipulate fraction parts to pictorial representations that helped them visualize relationship among fractions and to abstract stage that reinforced their learning through symbols and numerical expressions. These stages collectively led to a meaningful learning and significantly improved students' performance in learning fractions.

2. Difference between Pre-Test and Post-Test Scores of students' mathematical conceptual understanding in learning fractions using CPA Approach.

The result showed that students' mathematical conceptual understanding has significantly improved in learning fractions after exposure to the concrete-pictorial-abstract (CPA) approach. The computed t-value of 11.80 in mathematical conceptual understanding and the p-value is almost equals to zero indicate a significant positive effect.

The results indicated a positive effect of CPA approach on students' both mathematical conceptual understanding and mathematical representation in learning fractions. The structured progression from concrete to pictorial to abstract experiences allowed the students to develop a deeper understanding of fractions. This confirms that CPA approach facilitates conceptual learning by making abstract ideas more accessible and meaningful to learners and effective in enhancing representational skills in mathematics.

Similarly, the results of the qualitative survey conducted support

further that the Concrete-Pictorial-Abstract (CPA) approach improved the students' mathematical conceptual understanding. Students' responses were analyzed thematically according to the constructs of the study. Furthermore, Analysis of students' responses revealed that most learners strongly agreed, (56.76%-72.91%), that they improved understanding of fractions after the implementation of the CPA approach. Likewise, the remaining students (27.03%-43.24%) agreed with this statement. Furthermore, students reported that the lessons were easier to follow and more meaningful due to the step-by-step progression from concrete materials to pictorial representations and finally to abstract symbols. Furthermore, it is also noted that no neutral or negative ratings, that is, all responses were positive strongly confirming the existence of difference in their pre-test and post-test results.

3. Difference between Pre-Test and Post-Test Scores of students' mathematical representation in learning fractions using CPA Approach.

The result showed the difference between the pre-test and post-test scores of students' mathematical representation in learning fractions using the CPA approach. The results indicated that students' mean score significantly increased from the pre-test, mean is 4.20 and SD is 3.60, to the post-test, mean is 16.10 and SD is 4.00

The computed t – value of 17.32 with an almost zero p – value signifies a highly significant improvement in students' mathematical representation after the exposure to the CPA approach. This result confirmed that the CPA approach has a positive effect on students' ability to represent fractions using symbols, diagrams, and mathematical expressions.

4. Difference in the gain scores between

students exposed to CPA approach and those taught using traditional approach in their mathematical conceptual understanding in learning fractions.

The result showed that the concrete-pictorial-abstract approach group obtained a higher mean gain score compared to the traditional approach in mathematical conceptual understanding. The mean gain score in mathematical conceptual understanding in traditional approach is 1.95, while in CPA approach is 3.68. Consequently, the computed t-value in mathematical conceptual understanding is 3.96 and the p – value equals to 0.00013 indicating a significant difference between the two groups.

The results demonstrated that CPA was more effective than the traditional approach in improving students' mathematical conceptual understanding and mathematical representation. In addition, the significant difference in gain scores suggest that students benefited more from the experiential and visual learning opportunities provided by the CPA approach.

5. Difference in the gain scores between students exposed to CPA approach and those taught using traditional approach in their mathematical representation in learning fractions.

The result presented the difference in the gain scores between the CPA approach and the traditional approach in terms of mathematical representation. It showed that students exposed to the CPA approach obtained a higher mean gain score compared to those taught using the traditional approach. The computed t – value of 7.59 and a p – value of 8.36e-12 indicate a high statistically significant difference between the two groups.

This finding implied that students who experienced the CPA approach demonstrated significantly better improvement in mathematical representation in learning fractions than those taught using the traditional

approach. The traditional method, which often emphasizes symbolic manipulation, may not sufficiently support students' representational skills compared to the CPA approach, which systematically integrates concrete and visual models.

References

- Bacelonia, W. Ex-DepEd CHIEF: Harmonize PISA standards with PH society. Retrieved from: <https://www.pna.gov.ph/articles/1218440#:~:text=To%20gain%20better%20PISA%20results,progression%20of%20teachers%20and%20removed>
- Bruner, J. S. (1996). *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.
- Concrete-Pictorial-Abstract Approach (CPA). (2001). Singapore Math. Retrieved from <https://www.singaporemath.com>
- Grimes, K. J., & Stevens, D. D. (2009). Glass, bug, mud. *Phi Delta Kaplan*, 7(5), 677- 680.
- Guerrero, S. (2020). The effects of CPA approach on Mathematical Performance in Fraction Operations. *Journal of Mathematics Education*, 8(2), 34-39.
- Matatag Curriculum Mathematics Grades 1,4 and 7 (n.d). Retrieved from: <https://www.deped.gov.ph/wp-content/uploads/MATATAG-Mathematics-CG-Grades1-4-and-7.pdf>
- NAEYC & NCTM (National Council of Teachers of Mathematics), (2002). Joint Position Statement. Early childhood mathematics: Promoting good beginnings.
- Odicta, G. (2017). Effects of Differentiated Instruction on Mathematics Achievement and Critical Thinking Skills of Students. 17-26. Retrieved from: <https://wvsu.edu.ph/files/pdf/urdc%20research%20journals/June202017%20issues/2DIFFERENTIATED20INSTRUCTION.pdf> Online: www.naeyc.org/about/positions/pdf/psmath.pdf
- PISA 2022 Results (Volume I and II) – Country Notes: Philippines (2023). Retrieved from: https://www.oecd.org/en/publications/pisa-2022-results-volume-i-and-ii-countrynotes_ed6fbcc5-en/philippines_a0882a2d-en.html
- Purwadi, I M. A., Sudiarta, I G. P., & Suparta, I N. (2019). The Effect of Concrete Pictorial Abstract Strategy toward Students' Mathematical Conceptual Understanding and Mathematical Representation on Fractions. *International Journal of Instruction*, 12(1), 1113-1126.
- Putri, H. E., Rahayu, P., Muqodas, I., & Wahyudy, M. A. (2020). The Effect of Concrete Pictorial Abstract (CPA) in Improving Elementary School Students' Spatial Sense Ability. *Mimbar Sekolah Dasar*, 7(1), 16-29. doi:<http://dx.doi.org/10.17509/mimbarsd.v7i1.19585>.
- Putri, H., Suwangsih, E., Rahayu, P., Nikawanti, G., Enzelina, E., & Wahyudy, M. (2020). Influence of Concrete-Pictorial-Abstract (CPA) Approach on the Enhancement of Primary School Students' Mathematical Reasoning Ability. *Mimbar Sekolah Dasar*, 7(1), 119-132. doi:<https://doi.org/10.17509/mimbar-sd.v7i1.22574>.
- Wong, M., & Evans, D. (2007). Improving Fractions Learning Through the CPA Approach: A classroom Experiment. *International Journal of Mathematics Education*, 5(3), 45-62.



ABOUT THIS PUBLICATION

This Research Bulletin is a quarterly publication of the Department of Education Region VIII. It highlights studies conducted by DepEd Teachers and Employees under the Basic Education Research Fund (BERF).

This publication is part of the Region's projects to disseminate the findings and recommendations of highlighted studies to promote the use thereof. The views and opinions expressed here are those of the authors and do not necessarily reflect those of the Office.