

Exploring challenges in numeracy skills of kindergarten learners in Ifugao

Tayaban, Alma D.

Ifugao State University- Main Campus, Philippines

Cadiente, Ma. Theresa C.

Ifugao State University- Main Campus, Philippines

Bolintao, Jeng Jeng M. 

Ifugao State University- Main Campus, Philippines

Vadil, Carlo F.

Nueva Vizcaya State University, Philippines



ISSN: 2243-7703

Online ISSN: 2243-7711

OPEN ACCESS

Received: 18 May 2026

Available Online: 30 July 2026

Revised: 28 June 2026

DOI: 10.5861/ijrse.2026.26142

Accepted: 29 July 2026

Abstract

This study examined the challenges encountered by kindergarten teachers in teaching numeracy skills in Ifugao, a rural province in the Philippines. Anchored on the significance of early numeracy development in shaping learners' cognitive abilities, problem-solving skills, and future academic achievement, the study aimed to explore instructional barriers and generate insights for strengthening mathematics education in early childhood settings. A qualitative research design was employed, utilizing interviews with kindergarten teachers and school administrators, classroom observations, and document analysis of relevant instructional materials and school records. Data were analyzed through thematic analysis to identify emerging patterns and recurring themes. The findings revealed four major challenges affecting kindergarten numeracy instruction. The first involved pedagogical challenges, particularly teachers' limited exposure to innovative, developmentally appropriate, and learner-centered strategies for teaching mathematical concepts. The second concerned curriculum implementation challenges arising from continuous curriculum reforms and policy changes that required teachers to frequently adjust their instructional practices. The third highlighted resource and institutional support challenges, including inadequate instructional materials, limited technological resources, and insufficient opportunities for professional development. The fourth involved parental support challenges characterized by limited family involvement and weak home-school collaboration in reinforcing children's numeracy learning. The study recommends strengthening teachers' pedagogical competencies through sustained professional development, ensuring curriculum stability, improving instructional resources, and enhancing parental engagement initiatives. Collaborative efforts among schools, families, policymakers, higher education institutions, and community stakeholders are essential in creating a supportive

learning environment that promotes effective numeracy instruction and develops foundational mathematical competencies among kindergarten learners.

Keywords: kindergarten education, numeracy skills, early mathematics education, qualitative research, instructional challenges, parental involvement, Ifugao, Philippines

Exploring challenges in numeracy skills of kindergarten learners in Ifugao

1. Introduction

Early childhood education serves as the cornerstone of lifelong learning, with numeracy skills forming one of the most essential competencies that influence children's future academic achievement and everyday problem-solving abilities. Numeracy acquired during the kindergarten years provides learners with the foundational understanding of numbers, patterns, measurement, and logical reasoning necessary for success in mathematics and other disciplines. Research has consistently shown that children who develop strong numeracy skills in their early years are more likely to perform better academically and demonstrate greater confidence in mathematical thinking throughout their educational journey. Consequently, the quality of numeracy instruction in kindergarten has become a significant concern among educators, policymakers, and researchers, particularly in rural and geographically isolated communities where educational resources and support systems are often limited.

Despite the Philippine government's continuous efforts to strengthen early childhood education through the K to 12 curriculum and other educational reforms, numerous challenges continue to affect the effective teaching of numeracy skills in kindergarten classrooms. In provinces such as Ifugao, teachers encounter unique contextual difficulties arising from limited instructional resources, changing curriculum requirements, inadequate professional development opportunities, and varying levels of parental involvement. These challenges may hinder the implementation of effective numeracy instruction and consequently affect learners' readiness for elementary mathematics and future academic assessments. Understanding these challenges is essential for developing evidence-based interventions that address both instructional and systemic issues in early childhood education.

Against this backdrop, this qualitative study explores the challenges encountered by kindergarten teachers in teaching numeracy skills in Ifugao. Through interviews, classroom observations, and document analysis involving school administrators and kindergarten teachers, the study identifies key issues related to pedagogy, curriculum implementation, educational resources and institutional support, and parental collaboration. The findings are expected to provide valuable insights for educators, school leaders, policymakers, and higher education institutions in designing responsive professional development initiatives, strengthening curriculum implementation, improving resource allocation, and fostering meaningful school-home partnerships. Ultimately, the study contributes to the enhancement of early mathematics education and supports the development of equitable and high-quality learning experiences for kindergarten learners in rural communities.

This study aimed to explore the challenges encountered by kindergarten teachers in teaching numeracy skills in the Province of Ifugao, Cordillera Administrative Region, Philippines, an area whose contextual experiences in early mathematics instruction have received limited scholarly attention. Specifically, the study sought to examine teachers' perceptions of learners' numeracy competencies, the instructional strategies they employ, the challenges they encounter in teaching numeracy, and the implications of these findings for the development of a contextualized framework for teaching mathematics in kindergarten classrooms in Ifugao.

Specifically, this study sought to answer the following research questions:

- How do the respondents perceive the numeracy skills of kindergarten learners?
- What instructional strategies do kindergarten teachers employ in teaching numeracy skills?
- What challenges do kindergarten teachers encounter in teaching numeracy skills?
- How can the findings of this study inform the development of a contextualized framework for teaching numeracy in kindergarten classrooms in Ifugao?

2. Related Literature

Foundational skills are essential for preparing learners for life. Once developed, these skills enable individuals to embark on a successful academic journey and prepare them for the workforce (World Bank Group, 2024). The United Nations Sustainable Development Goals (SDG), particularly SDG 4 (Quality Education) under Target 4.2 (equal access to quality preprimary education), recognizes the importance of foundational skills through foundational learning (Küfeoğlu, 2022; UNESCO, 2017).

When discussing foundational skills, which are molded in early childhood education, numeracy is vital alongside literacy (Vasoya & Vansdadiya, 2023). According to Cao Thi et al. (2023), numeracy skills involve a child's ability to understand and work with numbers. These skills include basic arithmetic, understanding shapes and patterns, and developing problemsolving abilities. When children grasp these skills early, they are better prepared for the more complex mathematical concepts they will encounter in later stages of their education, as synthesized from several studies by Wright (2013). On the other hand, when children have a fair proficiency in acquiring this skill at a young age, they are at risk of encountering difficulties in learning mathematics (Lopez-Pedersen et al., 2023).

Further exploring numeracy in early childhood education, several studies have delved into this area. For example, Whyte et al. (2018) conducted qualitative research to explore Kindergarten educators' perspectives on their roles. Pincheira and Alsina (2022) utilized content analysis to examine pre-service teachers' mathematical knowledge in developing algebraic tasks. Furthermore, Henningsen (2013) argued for the benefits of authentic inquiry in preschool. They illustrated how young children's engagement in mathematical and literacy activities nurtures an understanding of these subjects and their broader environment.

Research into strategies for teaching numeracy in early math education has also been extensive. Ali and Mukhtar (2017) demonstrated that implementing the Fun-Learning Kid's tool through play-based methods enhances preschoolers' multiplication skills and cognitive development, irrespective of school type. Chigeza and Sorin (2016) conducted a study in Australia, revealing that integrating child-guided and adult-guided learning alongside arts-based strategies like drawing and postcard exchanges enhances Kindergarten children's grasp of numeracy concepts. They advocate for intentional teaching quality and adopt a numeracy progress monitoring scheme. Spencer (2013) discussed the positive impact of emerging mobile technologies such as iPads on children's motivation and self-efficacy in learning numeracy. Baroodi (2017) emphasized the effectiveness of hands-on experiences using familiar objects, stories, or pictures tailored to children's interests and readiness for learning mathematics. However, researchers face challenges in determining the precise efficacy of these methods, demanding consideration of children's internal thoughts and emotions during learning processes.

In addition to studies on teaching interventions, Björklund et al. (2020) conducted a meta-synthesis of contemporary research presented at mathematics conferences and in special journal issues. They presented that these studies have focused on the effectiveness of these interventions, factors influencing children's mathematical development, and critical mathematical concepts observed in young learners. Another meta-synthesis by Mononen et al. (2014) reviewed 19 peer-reviewed studies on early numeracy interventions for at-risk children aged four to seven, findings revealed that various instructional methods, including explicit teaching, computer-assisted instruction, games, and the use of different levels of math representations, effectively improved children's math skills.

While the interventions discussed in the studies above aim to improve numeracy skills, recent research emphasizes persistent challenges in early childhood numeracy education. This ongoing difficulty suggests that current foundational approaches may not enhance numeracy competence. Wästerlid (2019), examining kindergarten to third-grade learners struggling with math, reviewed 18 articles from ERIC, PsychINFO, and Web of Science. These studies identified low achievers primarily through test scores and teacher assessments of addition, subtraction, and counting skills. Despite using quantitative methods, which focus on numerical outcomes, the

studies imply that understanding how children learn math differently may require qualitative insights. Furthermore, additional research has explored ongoing difficulties in areas such as clock recognition (Earnest et al., 2018; Hus, 2022; MacDonald & Murphy, 2020; Mutlu & Korkmaz, 2020), number sequencing (Gould, 2016; Pasnak et al., 2016), and basic arithmetic operations (Jabeen et al., 2021).

Policymakers and educators could gain insights from studies on numeracy in early childhood education. These works serve as evidence of effective interventions for teaching numeracy skills to young children, inform curriculum development, support professional development, enhance early intervention programs, and promote evidence-based practices in educational policies and programs. However, these existing literatures suggest several areas for further exploration and improvement. Firstly, studies should explicitly connect their findings to specific SDG targets to make parallel to educational interventions with global development priorities. Secondly, they could consider contexts with limited technology and infrastructure to ensure that educational strategies are adaptable and inclusive across diverse settings. Thirdly, while qualitative and quantitative methodologies have been valuable, researchers could benefit from mixed methods approaches, as advocates argue that combining both could offer a more inclusive understanding of the issues investigated, overcoming the limitations of relying solely on qualitative or quantitative methodologies. Lastly, more studies focusing on specific contexts, such as local communities, are needed to ensure that educational practices are equitable, accessible, and inclusive. This micro-level consideration goes with the argument of Castillo (2023) and Castillo and Tunitit (2024), who suggest that integrating local community realities can inform inclusive and practical macro-policies.

In the Philippines, the curriculum emphasizes the development of numeracy skills during early childhood education, specifically in kindergarten. These skills are categorized under the cognitive domain. According to the curriculum, learners are expected to cultivate thinking skills and comprehend mathematical patterns, number concepts, and measurements such as length, capacity, mass, and time through hands-on experiences with concrete objects and materials (Department of Education, 2023).

Based on reviewed studies and the Philippine kindergarten curriculum, this framed the conceptual direction of the study, which pursued dimensions of numeracy skills such as: (1) clock time recognition – involves the ability of learners to identify the hour and minute hands on an analog clock, differentiate between them, and accurately name the hours and minutes they indicate; (2) number sequence identification - encompasses students' ability to recognize numbers that precede, follow, or fit between given sequences, arrange numbers in ascending or descending order, identify missing numbers within sequences, recognize basic number patterns, and compare numerical values to determine relative magnitude; (3) recognizing addition and subtraction phrases - involves learners identifying terms indicating addition ("put together," "add to," "in all") and subtraction ("take away," "less," "are left"), understanding the concepts of combining groups or adding to a set for addition, and removing items from a group or finding what remains for subtraction, while also performing addition and subtraction operations with numbers up to 10; and (4) adding and subtracting quantities using concrete objects - involves learners adding quantities up to 10 and subtracting quantities up to 10 using tangible materials. They understand the concepts of combining quantities to find totals for addition and finding remainders for subtraction and apply these skills to solve simple problems using concrete objects.

Like the contexts discussed in the studies mentioned above, the Philippines faces challenges in achieving its educational goals, as evidenced by its performance in international and national assessments. According to Espinosa et al. (2023), the current teacher education curriculum in the Philippines falls short of meeting the standards of international large-scale assessments (ILSAs). Notably, two ILSAs, the Program for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS), specifically assess numeracy skills. This issue is further corroborated by news reports indicating that the Philippines lags globally not only in mathematics but also in reading and science (Chi, 2023; Hernando-Malipot, 2023).

While kindergarten is not included in these ILSAs, it may indicate an area for improvement in early mathematics education. Findings from these assessments suggest that the foundational numeracy skills taught

during kindergarten may need more attention. Therefore, emphasizing and refining early mathematics education could prove beneficial in preparing learners for future academic challenges and assessments.

Reflecting on the contexts, gaps and connecting realities and experiences as an educator in Ifugao - a province in the Philippines located in the highlands of the Cordillera, the researcher contends that more work is needed to improve the numeracy of kindergarten learners. Observations and initial interviews reveal that this rural province shares common challenges in developing learners' numerical competency. This paper argues that Ifugao could present these challenges from a micro perspective, which could inform actions for targeting pedagogical challenges and providing learner support on a macro level, preparing these learners for future endeavors in education and the community.

Grounded on the rationale presented, this paper holds significance in informing inclusive macro-policies and providing a contextual basis for understanding the numerical competencies of Kindergarten learners and the challenges that may affect them. Above all, it offers a glimpse of progress towards SDG Target 4.2, with a focus on numeracy, especially as the 2030 deadline for measuring overall SDG attainment approaches.

3. Methodology

Research Design. This study employed a qualitative descriptive research method utilizing interview, observation, and document scanning as data collection tools. The qualitative approach is appropriate in exploratory studies when the subject of inquiry is not a very known phenomenon and has not been extensively explored which requires delving deeper into a reality (Hay, 2002).

Research Setting. The study was conducted in Ifugao, a highland rural community in the Northern Philippines particularly in the Cordillera Administrative Region (CAR). It is situated in a geographically challenged area of Ifugao Province which is accessible for an 8-hour ride from the capital city of Manila. Ifugao is known for its rich cultural heritage and unique educational context, providing a distinct environment for this research.

Research Participants. This study utilized purposeful sampling to ensure that the study's respondents were specifically selected for their relevance to the research questions. The inclusion criteria required respondents to be educators in kindergarten with a minimum of two years of teaching experience. This criterion ensured they had sufficient exposure to and understanding of the kindergarten educational environment, enabling them to create meaningful insights. Furthermore, only educators from public schools in Ifugao were included in the study. This focus was chosen to maintain consistency in the educational setting and address the specific challenges and practices in public kindergarten education. The study also included administrators overseeing kindergarten levels in public schools. These administrators, alongside the educators, were considered respondents due to their in-depth knowledge of kindergarten realities. Their firsthand experiences and daily supervision of the kindergarten curriculum and learners provided perspectives that enriched the study's findings. Through this technique, the researcher obtained 105 respondents. These respondents participated in both closed- and open-ended questionnaires.

Data Gathering Tools. An interview guide question was formulated. The study's instrument was validated and refined by language and research experts proficient in both qualitative methodologies, along with two kindergarten educators holding master's and doctoral degrees in Early Childhood Education, who served as master teachers in kindergarten education. After incorporating experts' feedback, the tool was used.

Data Gathering Procedure. In data gathering, a semi-structured interview was utilized where in-depth interviews were conducted personally to school administrators and kindergarten teachers and randomly selected. Secondary data from official documents and reports was secured and the gathered data were scanned and sorted by the researcher as to relevance to research objectives.

Data Analysis. Qualitative data gathered was generally analyzed using thematic analysis. Recorded responses

from key informants were transcribed verbatim by the researchers which were then categorized and coded under different themes. To facilitate readability, these were translated from their original statement such as those in Filipino to English. Translation was done by the researcher using contextual meaning to retrieve the real thought of the statements and which were then verified with the recording. The data were validated through consultation with other researchers.

In document analysis, the collected documents and reports were screened based on their relevance to research objectives. Data were described, transcribed, recorded, and coded which were then categorized and/or measured under certain themes. Data was also validated through cross reference with another researcher-coder. Data was presented using a system of enumeration. Data validation will also be employed through consultation with other researchers and experts in the field through forums and panel discussions.

4. Results and Discussion

The study primarily explored the challenges in teaching numeracy skills in the Kindergarten specifically in Ifugao, Cordillera Administrative Region, Philippines which has not been extensively investigated as to its experiences. This study viewed different challenges that affect the numeracy skills in the kindergarten. Therefore, further pedagogical enhancements are necessary to address these challenges in this component, ensuring learners' progress in more advanced mathematics throughout their educational journey and improving their performance in international examinations. Generally, four (4) challenges in teaching numeracy skills in kindergarten were identified such as (a) Pedagogical Challenges, (b) Curriculum Implementation Challenges (c) Educational Resources and Support Challenges, and (d) Parental Involvement Challenges.

4.1 Pedagogical challenges

The first challenge in teaching numeracy skills in the kindergarten is pedagogical challenges. One issue in this theme is the short attention span of young learners, which necessitates innovative and interactive teaching strategies to sustain interest. One teacher remarked, *"The short span of interest of kids requires constant innovation in teaching strategies to keep learners motivated."*(Note, P20) This reflection directs a need for teachers to continuously develop and employ creative methods to engage learners in numeracy learning. Classroom management is another critical concern, especially when integrating children with disabilities alongside regular learners. This inclusion affects instructional delivery and limits the ability to ensure individualized attention. One teacher expressed this challenge, noting, *"Handling a large number of pupils in class limits the ability to provide individualized attention."*(Note, P50) Furthermore, behavioral issues linked to modern distractions like technology pose additional hurdles. One teacher observed, *"The behaviors of children nowadays...they have a very short span of interest, they manifest laziness,"*(Note, P1)

The fatigue and stress associated with teaching kindergarten are also substantial concerns. One teacher shared, *"Sometimes I felt so tired. It is tough to handle kindergarten; it is the foundation, and the teacher needs to develop skills like mathematics."*(Note, P23) This sentiment reflects the high demands on kindergarten teachers to deliver effective instruction and lay a solid educational foundation for their learners. In addition, the necessity for professional development and the acquisition of advanced teaching strategies is evident. A teacher noted, *"I am still learning strategies to teach mathematics effectively,"*(Note, P17) emphasizing the ongoing need for professional growth and learning. Another teacher mentioned the desire for training in digital tools, stating, *"Nabayagak ti service ngem kayat ku pay kuma maadal nu kas anu nga ag usar ti digital tools tuy classroom ku. Marigatanak nga mag integrate ti ICT ket napansin ku nga mayat nga usaren ta may ayu da ti ubbing nga makiparticipate ti activities."* (Note, P25) (I have been in service for a long time, but I still want to learn how to use digital tools in my classroom. I find it challenging to integrate ICT, but I noticed it is good to use because children participate in activities more.) Moreover, teachers identified specific challenges related to pupil behavior and learning disabilities. One teacher stated, *"Pupils with learning disabilities...I separate a lesson for this kid,"*(Note, P2) illustrating the additional effort required to cater to diverse learning needs.

Another noted, *"Short span of kids' interest...more motivations,"* (Note, P55) reflecting the constant need for motivational strategies to keep learners engaged. Some teachers need more preparedness and specialization to improve their confidence and effectiveness in teaching kindergarten mathematics. Some respondents expressed feelings of inadequacy, with one saying, *"No, since I do not like teaching at the kindergarten level,"* (Note, P26) and another stating, *"No, kindergarten is not my field of specialization."* (Note, P66) These responses point the importance of ensuring teachers are adequately trained and passionate about early childhood education to maximize their effectiveness. External factors such as limited resources and time constraints further exacerbate these challenges. One teacher pointed out, *"Lack of creativity and innovative way in teaching math."* (Note, P40) At the same time, another mentioned, *"I cannot deliver the lesson well"* (Note, P43) due to these constraints. These issues indicate the need for better resource allocation and time management strategies to support teachers in delivering high-quality education.

4.2 Curriculum Implementation Challenges

The second challenge of kindergarten educators in Ifugao calls for help with curriculum implementation, which is exacerbated by frequent changes and inadequate preparation. Introducing new paradigms like the MATATAG curriculum requires continuous adaptation, often disrupting instructional continuity and teacher focus. As one teacher expressed, *"...pero kung minsan yung paiba-iba ang curriculum na susundin like now we have to follow Matatag Curriculum* (Note, P33) (...however, there are times when the curriculum frequently changes, such as the recent shift to the Matatag Curriculum.). This inconsistency can challenge educators' efforts to establish a coherent learning environment. Moreover, the lack of specialized training in kindergarten education further complicates anchoring teaching practices with evolving curricular requirements, contributing to teacher frustration and stress. One respondent agreed in this issue when asked if she enjoys teaching in Kindergarten: *"No because the curriculum is always changed."* (Note, P31) Another teacher explained the consequence of these changes: *"Instead of mastering the different concepts and approaches used in teaching, we need a permanent curriculum or framework to follow in kindergarten."* (Note, P60)

The practical implications of these challenges are noteworthy. A constantly shifting curriculum can lead to confusion and hinder the ability of teachers to deliver consistent and responsive instruction. One teacher remarked, *"More confusion because it will change how to prepare the lessons again."* (Note, P30) Additionally, the burden of paperwork and administrative tasks further exacerbates the situation, as noted by a respondent: *"Sometimes, because of paperwork, I am not prepared to enter my room."* (Note, P5) Furthermore, it is essential to address the professional development needs of educators. As one school head noted, *"Dakel ida'y wadad Kinder ni ag pay laeng nangamta ni ustun pahding da ni menghel nunta wada di nemnem da isunga namama la di Math, agda la awawatan ta da nauuneg ni kamauhal ni hapit, ida kamaligati ni mangibaga ni ustu nunta wada di nemnem da"* (Note, P75) (Teachers sometimes find it challenging to adjust and determine the appropriate teaching techniques, as kindergarteners are at varying stages of cognitive development, which affects their ability to grasp abstract concepts.). Moreover, the difficulty in finding effective teaching methods that cohere with the developmental stages of young children was highlighted: *"Maligatan ya umipakarit hina an mimittulu an manigo hi maphod an uhalon da an muntuddu ya nan effective an strategy an mibagay hinan kailangan di uunga umat hi makapkapya ya matigtigoda"* (Note, P14) (Teachers encounter difficulty in identifying effective teaching methods that consider the developmental stages of young children; while hands-on activities and visual aids are crucial, they can also be challenging to implement effectively).

4.3 Educational Resources and Support Challenges

Educational resources and support deficiencies are educators' third challenge in teaching numeracy in kindergarten education in Ifugao. Teachers often face constraints such as inadequate teaching materials and limited access to professional development opportunities. One teacher emphasized, *"Sometimes lack of resources affects our teaching because we cannot give our best even though we have a very good plan."* (Note, P10) This sentiment points to the challenge of insufficient resources to facilitate effective teaching and learning experiences.

Furthermore, concerns voiced by educators shows issues within kindergarten management. For instance, another teacher noted, "Our school head cannot understand us...very authoritative." (Note, P67) This expression indicates a lack of empathetic leadership, which can hinder teacher collaboration and morale. Also, logistical challenges like poor internet connection and a lack of gadgets further impede instructional delivery, as stated: "*Poor internet connection...Lack of gadgets.*" These practical issues aggravate the challenging task of teaching young children, making it difficult to integrate modern educational tools effectively.

When reflecting on their career in kindergarten education, teachers express a mix of satisfaction and concern. One teacher shared, "*I love kids, only that when we need help related to our teaching, our school head seems not to care. Because they did not experience what we are experiencing.*" (Note, P15) This statement mirrors a common frustration among educators seeking more empathetic and understanding leadership. In terms of professional development, educators recognize the need for continuous improvement. For example, one teacher identified a specific area for growth: "*I want to learn action research to apply in kindergarten.*" (Note, P9) This desire demonstrates a proactive way to deal with classroom challenges through evidence-based practices. Moreover, concerns about inadequate preparation in specific areas, such as mathematics instruction, persist. A teacher acknowledged; I do not feel confident to teach in kindergarten because I can hardly level my teachings. I am new in the service, so I need more training and learning." (Note, P3) The challenges identified by school heads resonate with educators' experiences. One School Head said: *Hay ongal an challenge nadan mimitulu ya nan aton dan manhandle nadan using an wada di learning disabilities da ,nadan using an delay di development da ya nan using an kahapulan da talaga di special needs, kindly nadan mimitulu kailangan da di training ya supported di Deped ke date tapu master and needs nan using munrugi hi kindergarten*" (Note,P53) (A challenge for teachers is how to handle some children who have learning disabilities, developmental delays, or other special needs that require tailored strategies and additional support). (Note, P10) Moreover, a School head pointed out: *Maligatan ya minakari hina an mimitulu an manigo hi method an halon da an muntuudu ya nan effective an strategy an mibagay human kailangan di uunga umat hi makapaknya ya matigtigoda* (Teachers encounter difficulty in finding effective teaching methods that align with the developmental stages of young children, such as hands-on activities and visual aids, which is crucial but can be challenging) (Note,P55)

Another School Head also emphasized the importance of ongoing professional development, stating: *Nadan mihmihitulu ya kailangan da di professional development umat hi schooling ya mak attend seminars in early childhood education ta hay kanayun da an updated hinan best practices di early childhood education* (Teachers may need ongoing professional development to stay current with best practices in early childhood math education).(Note,P33) These statements from the school heads confirm the educators' struggles to adapt teaching strategies to suit kindergarten learners' cognitive and developmental levels and their need for educational resources and support through professional learning opportunities and advancement. Furthermore, issues of lack of collaboration among colleagues further compound the challenges. Several teachers mentioned, "*No participation among teachers... No collaboration.*" This lack of teamwork and shared effort can hinder the exchange of best practices and mutual support among educators, limiting professional growth and collective problem-solving.

4.4 Parental Involvement challenges

Effective collaboration between educators and parents is necessary for kindergarten children's academic success. However, educators encounter significant challenges in Ifugao due to parents' need for more active collaboration. One teacher pointed out, "*Sometimes parents are not supportive. Instead of supporting, they criticize us sometimes.*"(Note, P22) This testament confirms a common frustration where parental criticism replaces constructive engagement. Another teacher emphasized, "*There is poor parents' involvement in school likewise with stakeholders, so I always conduct PTCA,*"(Note,P11) stressing the need for regular parent-teacher meetings despite limited parental participation. In some cases, parents' attitudes complicate matters. According to one respondent, "*Sometimes parents are harsh, and it is hard for them to understand the situation of children in school. May mga parent na kunsintidor* (Sometimes parents are harsh, and it is hard for them to understand the situation of children in school. There are parents who are permissive)."(Note,P8) This response suggests that parents need

more empathy or understanding regarding their children's educational needs. Furthermore, the consequence of insufficient parental collaboration is profound. As a respondent said, "*Children with no support and guidance from parents are very hard to handle.*" (Note, P12).

This study revealed that the effective development of numeracy skills in kindergarten education is influenced by challenges in pedagogical practices, curriculum implementation, availability of educational resources and support, and parental involvement. In this portion of the paper, it synthesizes empirical analysis from four challenges – Pedagogical challenges, curriculum implementation challenges, educational resources and support challenges, and parental support challenges – suggesting their common influence on kindergarten learners' numeracy skills in Ifugao.

Through this examination of converging qualitative data, this analysis elucidates the possible interplay between instructional strategies, curricular coherence, resource allocation, and parental engagement in ensuring the attainment of numeracy competencies among young learners. Importantly, these findings inform inclusive macro policies and a contextual basis for understanding the numeracy skills of kindergarten learners and the factors that may influence them. Successful interventions based on these insights could contribute to progress toward SDG Target 4.2, particularly within rural communities.

Firstly, the pedagogical challenges identified in teaching kindergarten numeracy skills in Ifugao reveal a possible relationship of challenges that affect student skill acquisition, which suggests room for improvement and these challenges are illuminated through insights into classroom dynamics and instructional practices. The short attention spans typical of young learners necessitate innovative teaching strategies to sustain engagement, which is required for developing skills such as clock time recognition and identifying number sequences. Classroom management is a pressing concern, particularly in integrating diverse learners and effectively considering individual learning needs. This challenge emphasizes the importance of contextualized instructional approaches and creating supportive learning environments. Furthermore, the difficulty in maintaining student interest in arithmetic calls for responsive teaching methods and ongoing professional development for educators. While using concrete objects in teaching addition and subtraction represents efforts to facilitate engaging learning experiences, a clear need remains for more effective activities to enhance skill acquisition and deepen conceptual understanding.

Drawing from recent studies, integrating digital tools and advanced teaching methods, as suggested by Ali and Mukhtar (2017), could enhance pedagogical strategies in Ifugao. Similarly, adopting child-guided and adult-guided learning approaches, along with arts-based strategies, as advocated by Chigeza and Sorin (2016), may effectively address engagement and learning pace variations among young learners. Spencer's (2013) findings on mobile technologies present their potential to boost student motivation and self-efficacy, directing innovative solutions for sustaining interest in arithmetic concepts. Furthermore, Baroody (2017) accentuates the importance of hands-on experiences to children's interests, which ensures engaging activities to improve numeracy skills. These data support the need for continuous professional development and resource allocation to optimize teaching practices in kindergarten mathematics in Ifugao.

Secondly, the curriculum implementation challenges, including frequent changes and lack of continuity, pose barriers to the effective teaching and learning of numeracy skills in kindergarten education. These challenges are echoed in the literature, where Björklund et al. (2020) emphasize the importance of consistent instructional frameworks and coherent curricular approaches for enhancing numeracy outcomes. Moreover, Mononen et al. (2014) highlight that effective curriculum design and implementation are crucial for supporting numeracy interventions and improving student performance.

To address the challenge numeracy skills and overcoming curriculum implementation obstacles, stakeholders should prioritize the development of a stable and cohesive kindergarten curriculum that guides educators with clear learning objectives and instructional guidelines. Training programs focusing on curriculum articulation and instructional planning for kindergarten can empower educators to navigate curriculum changes effectively. Collaborative efforts between educational institutions and local authorities can ensure curriculum revisions

consider regional needs and realities, encouraging greater coherence and relevance in kindergarten education in Ifugao. Further, establishing support scheme such as curriculum implementation task forces or mentorship programs can provide educators with the guidance and resources to implement new frameworks successfully. This method is essential for maintaining instructional continuity and ensuring teachers can focus on delivering high-quality education rather than constantly adapting to new curricular demands. Above all, continuing professional development and access to innovative teaching resources are essential for educators to successfully steer curriculum changes and enhance the quality of kindergarten education in Ifugao.

Thirdly, teaching numeracy skills in kindergarten potentially influenced by educational resources and support challenges. The convergence of findings disclosed issues such as inadequate teaching materials, kindergarten management problems, logistical challenges, and insufficient collaboration and research capacity. These factors collectively contribute to the challenges of kindergarten teachers in teaching the numeracy skills, emphasizing the need for enhanced resource allocation, supportive leadership, improved technological infrastructure, a collaborative teaching environment, and strengthened research capabilities to enhance numeracy skills in kindergarten education. These finding from Ifugao, a micro-level perspective, reflects the relevance of integrating local community realities, such as those mentioned educational resources and support challenges, into macro-level policies, as recommended by Castillo (2023) and Castillo and Tunitit (2024). Policymakers can develop more inclusive frameworks to support kindergarten education, which initiatives will be responsive to local needs and sustainable in improving learners' numeracy skills.

Finally, the parental involvement challenges reveal that inadequate parental support, including a lack of reinforcement at home and animosity among parents, may interfere with children's ability to practice and master numeracy skills consistently and these challenges impact all dimensions of numeracy, Foundational skills, like numeracy, are vital as they form the basis for future engagements of individuals (World Bank Group, 2024). In fact, it was an internationally recognized skill through the foundational learning prioritized by the SDG target 4.2 (Küfeoğlu, 2022; UNESCO, 2017). Parents play a role in this process by supporting numeracy skill development. Without consistent reinforcement at home, children may struggle to retain and build upon classroom learning. Moreover, parental animosity can create a stressful environment that impedes learning. This scenario needs attention and action since unresolved issues between teachers and parents can create a stressful learning environment that hinders children's educational progress and collaboration.

Proactive measures are integral to addressing this finding. Schools should prioritize building bridges between educators and parents through clear communication and inclusive initiatives. Regular parent-teacher meetings and workshops can educate parents about their role in supporting early childhood education and clarify school expectations. However, the findings in this particular aspect only reflect the perspectives of few participants. A more comprehensive study is therefore recommended to identify other challenges affecting the teaching of numeracy skills in the Kindergarten level. However, these provide an initial scope in framing indicators for improving and overcoming the challenges that hinders the quality education in the Philippines.

5. Conclusions

This study explored the challenges of kindergarten teachers in teaching numeracy skills. However, it must be noted that teachers teaching numeracy skills in the kindergarten are often constrained by persistent challenges that hinder effective teaching and learning. Thus, educators reported challenges in teaching numeracy skills in kindergarten. As such, frequent curriculum changes and a lack of continuity hinder effective teaching, while inadequate resources and support exacerbate these issues. Parental involvement, or the lack thereof, also emerged as a significant factor, with insufficient reinforcement at home and occasional parental animosity influencing learners' ability to practice and master numeracy skills. Primarily, this study was confined within the context of a rural area. Thus, the findings of this should only apply within its contexts. But this provides preliminary insights in better contextualizing to enhance numeracy education for kindergarten learners in Ifugao. Finally the study concludes that fostering strong numeracy skills in young learners is not solely the responsibility of teachers but

needs a well-integrated effort from schools, parents, and policymakers.

Recommendations - Based on the study's findings, several recommendations can be proposed to enhance numeracy education for kindergarten learners in Ifugao. First, educators need to implement professional development programs focused on innovative strategies that sustain student engagement and cater to diverse learning needs. Furthermore, it is essential to develop a consistent kindergarten curriculum across educational institutions and review regularly, involving all stakeholders to gather input and ensure readiness for any changes. Additionally, it is important to improve access to teaching materials and technological resources necessary for effective numeracy teaching and learning. Enhancing parental engagement through regular communication and workshops to support kindergarten numeracy development is also vital.

To realize these recommendations, schools in Ifugao should conduct benchmarking activities to identify and implement best practices from successful educational institutions. Moreover, higher education institutions in the province can establish extension programs to support these efforts. Collaboration among all stakeholders in the province—including educators, parents, policymakers, and community leaders—is crucial to addressing the persisting challenges in kindergarten education.

Methodologically, future studies may explore other dimensions and challenges of teaching numeracy skills in kindergarten, in addition to the findings of this study, to come up with more comprehensive indicators for assessment. A tool may be developed to generalize the findings of this study. Future researchers may also consider expanding the scope of this study to include perspectives of other public schools in the provinces, especially the public schools in Cordillera region. A similar study may also be conducted focusing on private schools and those schools in urban areas.

By addressing these challenges through targeted interventions and holistic support systems, we can create a more effective and equitable foundation for early mathematics education, ensuring that all children—regardless of background—develop the numeracy skills necessary for lifelong learning and success.

6. References

- Ali, S. R., & Mukhtar, F. (2017). A case study of fun learning with numeracy of preschoolers. *International Journal of Early Childhood Education Care*, 6(2017), 51-58. <https://doi.org/10.37134/saecj.vol6.6.2017>
- Allen A. Espinosa, M. A. (2023). International large-scale assessment (ILSA): Implications for pre-service teacher education in the Philippines. *Issues in Educational Research*, 33, 553-569.
- Almalki, S. (2016). Integrating quantitative and qualitative data in mixed methods research-challenges and benefits. *Journal of Education and Learning*, 3, 5. <https://doi.org/10.5539/jel.v5n3p288>
- Baroody, A. J. (2017). Chapter two - The use of concrete experiences in early childhood mathematics instruction. *Advances in Child Development and Behavior*, 53, 43-94. <https://doi.org/10.1016/bs.acdb.2017.03.001>
- Björklund, C., Heuvel-Panhuizen, M. v., & Kullberg, A. (2020). Research on early childhood mathematics teaching and learning. *ZDM Mathematics Education*, 52(2020), 607-619. <https://doi.org/10.1007/s11858-020-01177-3>
- Castillo, L. F. (2023). Civic competence as a social service dimension: Context of a local community in the Philippines. *Journal of Social Service Research*, 49(4), 403-425. <https://doi.org/10.1080/01488376.2023.2232826>
- Castillo, L. F., & Tumitit, A. A. (2024). SDG 16 at a glance: Exploring moral values and service dedication among aspiring law enforcers in a state university of the Cordilleras, Philippines. *Journal of Criminal Justice Education*, 1-23. <https://doi.org/10.1080/10511253.2024.2336590>
- Chi, C. (2023). Philippines still lags behind world in math, reading and science — PISA 2022. *philstarglobal*. <https://www.philstar.com/headlines/2023/12/06/2316732/philippines-still-lagsbehind-world-math-reading-and-science-pisa-2022>
- Chigeza, P., & Sorin, R. (2016). Kindergarten children demonstrating numeracy concepts through drawings and

- explanations: Intentional teaching with playbased learning. Australian Journal of Teacher Education, 41(5). <https://doi.org/10.14221/ajte.2016v41n5.5>
- Dawadi, S., Shrestha, S., & Giri, R. A. (2021). Mixed-methods research: A discussion on its types, challenges and criticisms. Journal of Practical Studies in Education, 2(2), 25-36. <https://doi.org/10.46809/jpse.v2i2.20>
- Department of Education. (2023). MATATAG curriculum. Retrieved from GOVPH: <https://www.deped.gov.ph/matatagcurriculumk147/>
- Earnest, D., Gonzales, A. C., & Plant, A. M. (2018). Time as a measure: Elementary students positioning the hands of an analog clock. Journal of Numerical Cognition, 4(1), 188–214. <https://doi.org/10.5964/jnc.v4i1.94>
- Gould, P. (2016). Hurdles in acquiring the number word sequence. 39th annual conference of the Mathematics Education Research Group of Australasia. Adelaide: MERGA. <https://files.eric.ed.gov/fulltext/ED572391.pdf>
- Hands, A. S. (2022). Integrating quantitative and qualitative data in mixed methods research: An illustration. Canadian Journal of Information and Library Science, 45(1), 1-20. <https://doi.org/10.5206/cjilsresib.v45i1.10645>
- Henningsen, M. (2013). Making sense of experience in preschool: Children’s encounters with numeracy and literacy through inquiry. South African Journal of Childhood Education, 3(2), 41-55.
- Hernando-Malipot, M. (2023). 2022 PISA results a ‘clear indication’ that PH education system is in ‘worst state’ --- PBed. Manila Bulletin. <https://mb.com.ph/2023/12/6/2022-pisa-results-a-clear-indication-that-pheducation-system-is-in-worst-state-pb-ed>
- Hus, Y. (2022). Detecting time concept competence in children with autism spectrum and attention disorders. Neuropsychiatric Disease and Treatment, 18, 2323–2348. <https://doi.org/10.2147/NDT.S3319854>
- Jabeen, S. M., Aftab, M. J., Naqvi, R., Awan, T. H., & Siddique, M. (2021). Prevalence of students with learning difficulties in basic arithmetic operations in the subject of mathematics at elementary level. Multicultural Education, 7(5). <https://doi.org/10.5281/zenodo.5110685>
- Küfeoğlu, S. (2022). SDG-4 Quality education. Emerging Technologies, 255–275. https://doi.org/10.1007/978-3-031-07127-0_6
- Lopez-Pedersen, A., Mononen, R., Aunio, P., Scherer, R., & Melby-Lervåg, M. (2023). Improving numeracy skills in first graders with low performance in early numeracy: A randomized controlled trial. Remedial and Special Education, 44(2), 126-136. <https://doi.org/10.1177/07419325221102537>
- MacDonald, A., & Murphy, S. (2020). Young children’s understandings of clocks at the start of school. International Journal for Mathematics Teaching and Learning, 21(1), 19-30. <https://doi.org/10.4256/ijmtl.v21i1.231>
- Mejeh, M., Hagenauer, G., & Gläser-Zikuda, M. (2023). Mixed methods research on learning and instruction - Meeting the challenges of multiple perspectives and levels within a complex field. Forum: Qualitative Social Research, 24(1). <https://doi.org/10.17169/fqs-24.1.3989>
- Mononen, R., Aunio, P., Koponen, T. K., & Aro, M. (2014). A review of early numeracy interventions for children at risk in mathematics. International Journal of Early Childhood Special Education, 6(1), 25-54. <https://doi.org/10.20489/intjecse.14355>
- Mutlu, Y., & Korkmaz, E. (2020). Investigating clock reading skills of third graders with and without dyscalculia risk. International Online Journal of Primary Education, 9(1), 97-110.
- Pasnak, R., Schmerold, K. L., Robinson, M. F., Gadzichowski, K. M., Bock, A. M., O’Brien, S. E., . . . Gallington, D. A. (2016). Understanding number sequences leads to understanding mathematics concepts. The Journal of Educational Research, 109(6), 640-646. <https://doi.org/10.1080/00220671.2015.1020911>
- Pincheira, N., & Alsina, Á. (2022). Mathematical knowledge of pre-service early childhood and primary education teachers: An approach based on the design of tasks involving patterns. Australian Journal of Teacher Education, 47(8). <https://doi.org/10.14221/ajte.2022v47n8.4>
- Sharma, L. R., Bidari, S., Bidari, D., Neupane, S., & Sapkota, R. (2023). Exploring the mixed methods research

- designs: Types, purposes, strengths, challenges, and criticisms. *Global Academic Journal of Linguistics and Literature*, 5(1), 3-12. <https://doi.org/10.36348/gajll.2023.v05i01.002>
- Spencer, P. (2013). iPads: Improving numeracy learning in the early years. 36th Annual Conference of the Mathematics Education Research Group of Australasia. Melbourne: Mathematics Education Research Group of Australasia, Inc. 2013. <https://eric.ed.gov/?id=ED573028>
- Thi, H. C., Le, T. A., Ngoc, B. T., & Phuong, T. P. (2023). Factors affecting the numeracy skills of students from mountainous ethnic minority regions in Vietnam: Learners' perspectives. *Cogent Education*, 10(1). <https://doi.org/10.1080/2331186X.2023.2202121>
- UNESCO. (2017). Education for sustainable development goals: Learning objectives. UNESCO. <https://doi.org/10.54675/CGBA9153>
- Vasoya, N., & Vansdadiya, R. (2023). Effective strategies for promoting foundational literacy and numeracy in early childhood education. *Journal of Social Sciences*, 19(92-95). <https://doi.org/10.3844/jssp.2023.92.95>
- Whyte, K. L., Stein, M. A., Kim, D., Jou, N., & Coburn, C. E. (2018). Mathematics in early childhood: Teacher educators' accounts of their work. *Journal of Early Childhood Teacher Education*, 39(3), 213-231. <https://doi.org/10.1080/10901027.2017.1388306>
- World Bank Group. (2024). Foundational learning. <https://www.worldbank.org/en/topic/education/brief/foundational-learning>
- Wright, R. (2013). Assessing early numeracy: Significance, trends, nomenclature, context, key topics, learning framework and assessment tasks. *South African Journal of Childhood Education*, 3(2), 21-40. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1187408.pdf>
- Zohrabi, M. (2013). Mixed methods research: Instruments, validity, reliability and reporting findings. *Theory and Practice in Language Studies*, 3(2), 254-262. <https://doi.org/10.4304/tpls.3.2.254-262>