Lived Experiences of Grade 7 Mathematics Teachers in Teaching Fundamental Operations on Integers: A Descriptive-Phenomenological Study

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ABSTRACT

This qualitative, descriptive-phenomenological study explored the lived experiences of fifteen Grade 7 mathematics teachers in Bukidnon, Philippines, as they taught fundamental operations on integers. The aim was to shed light on the 'front-line' realities and post-pandemic context of teaching. Data collection involved brief online screening conversations and open-ended digital prompts in English and Cebuano Visayan, producing detailed narratives of classroom experiences. Through thematic analysis and cross-case synthesis, four main themes emerged: (1) The Cognitive Strain of Fragile Foundations, describing teachers' struggles with arithmetic deficiencies from elementary school; (2) Navigating the “Sign Rule” Confusion, focusing on students’ dependence on memorization, errors, and difficulty understanding operations and signs; (3) Resilience through Concretization and Gamification, showing teachers’ adaptations using kinesthetic, visual, and contextual strategies like the “Integer Walk” and “Kwarta ug Utang” (Money and Debt); and (4) The Emotional Weight of Affective Barriers, highlighting issues such as overcrowded classrooms, math anxiety, and the emotional effort needed to keep students engaged in resource-limited settings. The results revealed that students often enter junior high with unresolved gaps in fundamental operations, leading to cognitive overload and emotional stress for teachers when abstract integer rules are introduced. In response, teachers displayed resilience and pedagogical adaptability by redesigning lessons, contextualizing concepts, and using gamification to address learning gaps. The study emphasized that effective instruction depends on teacher flexibility and empathy, along with systemic support such as structured remediation, smaller classes, and better learning environments to enable teachers to serve as dynamic instructional leaders in remote and underserved schools.

Keywords: fundamental operations on integers, Grade 7 mathematics, descriptive phenomenology, cognitive load, mathematics anxiety

INTRODUCTION

The teaching of integers marks a crucial yet delicate point in the Filipino mathematics curriculum. As students move into Grade 7, they encounter abstract ideas that often lead to mental blocks and emotional frustration. This issue is part of a larger educational challenge; reports from PISA 2022 and OECD (2023) show that Filipino students score well below average in mathematics literacy, especially in tasks that need basic number skills. This lack of arithmetic fluency is not just a cognitive problem but is also closely connected to environmental pressures.

Teachers in Bukidnon, especially those in remote and underserved rural areas, face challenges such as overcrowded classrooms with over 50 students and a lack of basic resources. These issues, along with the "spiral progression" gaps highlighted by the Philippine Institute for Development Studies (2021), create an

environment where mathematics anxiety tends to develop. In this setting, teachers become the main observers of students' internal struggles. They report seeing intense frustration and noticeable panic right when negative emotions surface. Consequently, teachers' experiences are characterized by continuous efforts to address the systemic shortcomings and meet the urgent cognitive needs of their students.

Objectives of the Study

This study aimed to explore the lived experiences of Grade 7 mathematics teachers in teaching fundamental operations on integers. Specifically, it sought to:

1. Identify the key observations of Grade 7 mathematics teachers on students' understanding and engagement when learning fundamental operations on integers.

2. Determine the struggles and challenges personally encountered by Grade 7 mathematics teachers in teaching fundamental operations on integers.

3. Explore how Grade 7 mathematics teachers have coped with and addressed the challenges in teaching fundamental operations on integers.

4. Gather the insights and recommendations of Grade 7 mathematics teachers for fellow educators teaching fundamental operations on integers.

Scope and Delimitation of the Study

This study is limited by the absence of direct classroom observations. The data relied on teachers' self-reported lived experiences, which lacked a student perspective or real-time verification of pedagogical efficacy in the classroom.

Future research may employ video-stimulated recall (VSR). By recording integer lessons and having teachers reflect on specific student interactions, such as the panic during sign-rule application, researchers can capture a more nuanced view of real-time cognitive and emotional shifts.

METHODOLOGY

Research Design

This study used a descriptive phenomenological design to explore the lived experiences of Grade 7 mathematics teachers in teaching fundamental operations on integers. The aim was to describe the essence of their instructional realities, including students' difficulties, teachers' challenges, and adaptive strategies, without experimental manipulation. Phenomenological reduction and bracketing guided the analysis so that themes arose from teachers' own accounts rather than from prior assumptions.

Research Participants

A purposive sample of fifteen Grade 7 mathematics teachers from public and private junior high schools in Bukidnon, Philippines, participated. They were recruited through online messaging. A brief chat-based screening confirmed that each teacher (a) was currently teaching or had recently taught Grade 7 mathematics, (b) had experience teaching integer operations, and (c) was willing to participate voluntarily. The sample included teachers from rural, far-flung, and suburban schools, many of whom were handling large classes and students with substantial learning gaps. Data collection continued until recurring patterns indicated thematic saturation, with later responses largely confirming and deepening existing themes.

Data Collection

Data were gathered in two online stages. First, a short messaging exchange established eligibility and clarified the study's purpose. Second, the main qualitative data were collected via Google Forms, using four

open-ended prompts on: (1) observations of students' understanding and engagement with integer operations, (2) personal struggles in teaching them, (3) ways of coping with these challenges, and (4) recommendations for other teachers and curriculum developers. Teachers responded in English, Cebuano Visayan, or a mix of both, producing detailed written narratives of classroom episodes and reflections.

Data Analysis

Written responses were read repeatedly and analyzed using thematic analysis within a phenomenological frame. Significant statements related to the four guiding questions were highlighted and coded (e.g., weak basic operations, sign-rule confusion, non-readers, gamified strategies, overcrowded classes). Related codes were grouped into categories and then synthesized into four core themes: fragile foundations, sign-rule confusion, resilience through concretization and gamification, and the emotional weight of affective and environmental barriers. A simple cross-case matrix was used to compare how these themes appeared in different school contexts.

Trustworthiness was enhanced through several strategies. Credibility was supported by detailed, open-ended responses, use of verbatim quotations, and informal member checking with selected participants to verify the accuracy of the themes. Dependability and confirmability were addressed by keeping an audit trail of coding decisions and theme development, and by repeatedly revisiting earlier responses to ensure that interpretations were grounded in multiple accounts. Transferability was facilitated by describing key contextual features such as large class sizes, presence of non-readers, resource limitations, and the use of local language and cultural analogies in teaching. Ethical procedures included informed consent, confidentiality through coded identifiers, voluntary participation, and secure handling of all data.

Ethical Consideration

The researcher adhered to strict ethical guidelines throughout the study to protect participants' rights and well-being. Before collecting data, the researcher obtained permission and informed consent from all fifteen Grade 7 mathematics teachers, ensuring that participation was voluntary and free from coercion. Participants were fully informed about the study's purpose, their involvement, and their right to withdraw at any time without penalty. Confidentiality and anonymity were maintained by using coded labels such as Participant 1-15 instead of their names. All recordings, transcripts, and related data were securely stored and used solely for academic purposes. The researcher also ensured that interviews were conducted respectfully and non-intrusively, providing a comfortable environment for participants to share their experiences in their preferred language. These steps maintained the integrity of the research and protected the trust teachers placed in the process.

RESULTS AND DISCUSSIONS

The following section presents the findings, including the four main themes, participants' responses supporting these themes, the implications of the results, and relevant literature and studies underpinning the outcomes of this qualitative, descriptive-phenomenological study, which explored the lived experiences of grade 7 mathematics teachers teaching fundamental operations on integers.

Table 1 details the specific pedagogical challenges and engagement strategies identified by all fifteen participants in the Bukidnon region.

Table 1: Dimensions of Teacher Lived Experiences

Participant Code	Years of Experience	Teaching Setting	Primary Pedagogical Challenge	Successful Engagement Strategy
Participant 1	2 years	Public	Weak foundations in basic operations; confusion	Number line games and visual aids

Participant 2	1 year	Public	Retention gaps and reading deficiencies	Jump-based number line on the floor
Participant 3	1 year	Private	Reliance on rote memorization vs. understanding	Human number line activity
Participant 4	1 year	Private	Confusion with subtraction and sign rules	Real-life "gains and losses" scenarios
Participant 5	3 years	Private	Lack of prerequisite knowledge for new topics	Integer chips and singing the "Law of Signs"
Participant 6	1 year	Public	Slow learner progress; "expect the worst" realities	Math video tutorials and solving practice
Participant 7	1 year	Private	Presence of non-readers; students offering to "dance."	"Traffic Light" grouping system
Participant 8	3 years	Public	Attitudinal barriers; students acting "choked" by 4x8	Multiplication table drills and memorization
Participant 9	1 year	Private	Inability to distinguish the operation from the sign	"Integer Walk" (Tape on floor)
Participant 10	1 year	Public	New-to-job pacing; difficulty applying learning styles	YouTube video tutorials and worksheets
Participant 11	1 year	Private	Attention issues; competing with student hearsays	"Dogshow" (humor) and DaMath games
Participant 12	2 years	Private	Pacing differences between fast and slow learners	Differentiated board work and board engagement
Participant 13	1 year	Public	Limited resources and abstract concept confusion	"Kwarta ug Utang" (Money/Debt) analogies
Participant 14	2 years	Public	Comparing values (e.g., -5 vs -2); memorization traps	Play money and acting out scenarios
Participant 15	2 years	Private	50+ students; last period afternoon exhaustion	Daily practice worksheets and board work

In analyzing the teachers' narrative accounts, four interrelated themes emerged that capture their cognitive and emotional experiences in teaching fundamental operations on integers.

Theme 1: The Cognitive Strain of Fragile Foundations

Teachers consistently reported that many Grade 7 students entered integer lessons with weak basic arithmetic skills, which made teaching fundamental operations on integers significantly more difficult. Several participants noted that students could not recall simple multiplication facts, struggled with the four operations, and needed extensive review before they could even attempt integer problems. As one teacher explained, "students are having difficulty with fundamental operations of integers because many of them still struggle with basic math skills like addition, subtraction, multiplication, and division. This weak foundation affects their understanding of sign rules and solving integer problems" (P1). Another teacher described how, when

asked for 4×8, "they'll act as if you choked them… can't memorize multiplication table" (P8), illustrating how basic fact deficits triggered visible anxiety and paralysis.

Participants also described the need to reteach elementary content inside Grade 7 classes. One teacher shared, "I really struggle to give a lesson that requires prerequisite knowledge… the most difficult day would be the first day of teaching a new lesson that requires prerequisite knowledge" (P5), highlighting how integer lessons frequently stalled because students had not mastered earlier competencies. Another noted, "I can't proceed directly to our topic knowing that the students don't quite grasp basic arithmetic yet… they could follow while I was lecturing, but when it was their turn to answer, they struggled" (P10), especially when sign rules were involved. Teachers repeatedly described having to "go back to the very basics," sometimes teaching skills that should have been learned in elementary school before any progress could be made with integers.

The theme of fragile foundations indicates that integer instruction becomes cognitively overloaded when learners must simultaneously recall basic operations and apply new sign rules. This aligns with findings by Lin and Powell (2022), who showed through meta-analytic structural equation modeling that initial mathematics and cognitive skills are among the strongest predictors of subsequent mathematics performance, emphasizing the long-term impact of early numeracy gaps. The pattern also resonates with OECD's PISA 2022 results for the Philippines, which highlight low performance in basic number skills and more complex tasks, and with analyses by the Philippine Institute for Development Studies (2021) that point to cumulative "learning loss" and unmastered prerequisite skills in the basic education system. In the present study, teachers' narratives illustrated how these systemic gaps are concretely felt at the classroom level, as Grade 7 integer lessons are repeatedly repurposed into remedial arithmetic sessions and teachers assume a dual role as subject teachers and remedial educators.

Theme 2: Navigating the "Sign Rule" Confusion

Teachers identified confusion about sign rules as a central conceptual hurdle when teaching integer operations. Many students treated the minus symbol as having only one meaning and struggled to distinguish between subtraction as an operation and the negative sign attached to a number. One teacher explained that "most students are only used to positive numbers from elementary school," and when they encounter integers, "they get confused, especially when negative signs are involved" (P9). This confusion emerged clearly in tasks like $(-5) + (-3)$ and $(-5) - (-3)$, where students could not explain why the results differed.

A clear example came from a teacher's first lesson on subtracting negative numbers. During the discussion of $(-5) - (-3)$, "many were lost" and "most of the students' answers were -8 because they thought they should just add the two negative numbers anyway" (P9). When the teacher probed their thinking, one student responded, "Ma'am/Sir, if it's still minus, then we just subtract" (reported by P9), revealing that learners saw minus as a single undifferentiated idea rather than as both an operation and a sign. Other teachers observed similar patterns in multiplication, noting that students often answered $(-3) \times (-4)$ as -12 because they forgot or could not justify why "negative times negative is positive" and were "confused by the signs" (P14).

Teachers also described how memorized rules failed under pressure. One participant remarked that students "rely only on memorizing the concept rather than understanding" (P3). Another observed that learners seemed to understand during lectures, yet "when it was their turn to answer, they struggled… this happens specifically with topics involving signs" (P10), even after repeated explanations. These accounts showed that procedural recall was often shallow and unstable.

These classroom accounts aligned with research on symbol sense and negative numbers. Vlassis and Demonty (2022) argue that the transition from arithmetic to algebra requires learners to develop nuanced symbol sense, including understanding the minus sign as both an operation and a unary negative, and document that students often overgeneralize familiar meanings of symbols when operations and signs overlap. Similarly, Geary (1994) cautions that heavy reliance on rote memorization without conceptual grounding leads to fragile mathematical performance that breaks down in unfamiliar or complex tasks. In this study, teachers' experiences of students who can recite sign rules yet fail to apply them in assessments exemplify this fragility, suggesting that Grade 7 integer instruction should deliberately cultivate symbol sense rather than focusing solely on rule recall.

Theme 3: Resilience through Concretization and Gamification

Despite foundational gaps and conceptual confusion, teachers demonstrated strong pedagogical resilience by shifting toward concrete, visual, and game-based strategies to teach integer operations. Many participants described moving away from purely lecture-based lessons and deliberately turning their classes into spaces where students could physically model and play with integers. One teacher summarized this approach: "In every meeting, there is practice of skills in solving integers before the proper lesson. Human number activity line is what we did to make the students engage while learning" (P3).

A particularly prominent strategy was transforming the classroom into a living number line. One teacher described using a large floor number line for problems such as -5 + 10, where a student "should start from -5 then step or jump and land on the number 5," making the answer visible through movement (P2). Another teacher extended this to an "Integer Walk" activity by taping a line from -10 to +10 on the classroom floor and assigning a "player" to move right for positive steps and left for negative steps, noting that "it was like they were just playing, but at the same time, they were learning" (P9). These strategies helped students visualize operations instead of merely memorizing rules.

Teachers also relied on contextualized analogies and manipulatives. Several participants integrated "kwarta ug utang" (money and debt) scenarios to connect positive and negative values to familiar financial situations. One teacher reported that using money-and-debt role-plays with play money made students "more active and enjoyed themselves… it was easier for them to understand because they actually experienced it" (P14). Others used integer chips, songs for memorizing sign rules, or simple games about temperature changes and gains and losses to make abstract ideas more concrete. Alongside these concrete tools, teachers introduced humor and games to re-engage students who believed math was difficult. One teacher recounted beginning with a formal discussion of integers and realizing that "I didn't have their attention and others truly couldn't understand… So, I changed my approach, I 'dogshowed' the class, and that's when they finally understood" (P11). Other strategies included DaMath, mentorship sessions, and differentiated grouping systems such as the traffic-light approach.

These practices align with existing research on game-based and contextualized mathematics instruction. Drawing from international examples, Hwa (2018) contends that digital and game-based learning can catalyze pedagogical change by making abstract mathematical concepts more accessible and engaging, especially when teachers integrate interactive tasks into regular lessons. In the Philippine context, Martus et al. (2024) report that integrating DaMath into mathematics teaching can enhance student engagement and provide alternative avenues for practicing computation and reasoning. The present findings extend these insights by showing how teachers in rural and suburban schools adapt such principles using low-cost materials like tape on the floor, printed number lines, play money, songs, and simple games to concretize integer operations and sustain participation despite resource constraints.

Theme 4: The Emotional Weight of Affective Barriers

Teachers' narratives also illuminated the emotional and environmental burdens that shape their experiences of teaching integer operations. Many participants taught classes with more than 50 students, handled groups that included non-readers, and worked in classrooms where noise, heat, or heavy rain competed with instruction. One teacher described a particularly difficult day: "It was a rainy day, and I found myself competing with the loud sound of the rain. I was teaching a section where about 20% of the students are non-readers… they are the ones who need the most support, yet they are also the noisiest" (P7). The same teacher recalled students laughing at their own mistakes and one saying, "I'll just dance instead, Ma'am, because I don't know the answer" (reported by P7), revealing avoidance and embarrassment.

Overcrowding and time of day compounded these difficulties. One teacher who handled a last-period Grade 7 class of "more than 50 students" noted that "they are too tired and bored and just want to be dismissed or go home" (P15). The same participant also observed that students at the back who needed more support were often overshadowed by stronger students seated in front. Another teacher described struggling to hold attention

because "students prefer to hear the 'chismis' rather than my topic inside the class" (P11), especially during the first introduction of the lesson.

These environmental pressures were intertwined with mathematics anxiety and negative beliefs. Teachers noticed that students who initially showed interest often "go back to their belief that math is hard, and so are the integers" as difficulty increased (P15). Several described students "panicking" when negative signs appeared or losing confidence about whether to add or subtract when both positive and negative numbers were involved. Teachers, therefore, carried not only the task of teaching procedures but also the emotional work of sustaining attention, reducing fear, and encouraging participation.

These findings mirror global and local analyses of learning conditions and mathematics anxiety. The joint report by the World Bank, UNESCO, and UNICEF (2021) identifies large class sizes, inadequate facilities, and limited instructional support as major drivers of learning loss in low- and middle-income countries. These conditions closely resemble the overcrowded and noisy classrooms described by teachers in Bukidnon. In the Philippine context, Capuno et al. (2019) found that negative attitudes toward mathematics and poor study habits are associated with weaker performance among junior high school students, underscoring the role of affective factors and learning environments. The present theme reinforced these conclusions by illustrating how environmental stressors and mathematics anxiety manifest in everyday interactions, "…as students avoid participation, joke about not answering, or revert to the belief that 'math is hard", and by highlighting the emotional labor teachers invest in countering these dynamics while teaching integer operations.

Transferability and Global Contexts

The findings from Bukidnon are highly transferable to other Philippine provinces, particularly those in remote and underserved areas. The challenges of learning loss, overcrowding, and the need for vernacular translation are systemic. The successful contextualization of math rules (e.g., Kwarta ug Utang) offers a blueprint for other regions facing similar gaps in prerequisite skills (PIDS, 2021).

The Bukidnon experience reflected a broader global education crisis. According to the World Bank (2021) and the OECD (2023), large class sizes and inadequate facilities are primary drivers of learning loss in low- and middle-income contexts. Representative examples, such as those found in developing nations like Indonesia and Ghana, mirror the Bukidnon teachers' need to revert to basic manipulatives and contextualized analogies to bridge the gap between abstract curricula and the realities of under-resourced classrooms.

Cross-Case Synthesis Matrix

Table 2: Cross-Case Synthesis of Teaching Contexts for Grade 7 Integer Instruction

Contextual Setting	Participants	Perceived student readiness and barriers	Teacher adaptations and resilience
Public schools (rural, resource-limited)	P1, P2, P6, P8, P10, P13, P14	Substantial gaps in basic operations (e.g., difficulty with 4×8 and long division), perceived learning loss from prior grades, and fragile foundations that make students easily overwhelmed by integer problems.	Emphasis on concretization and contextualization, including floor-taped number lines and "Integer Walk" activities, vernacular explanations, and local analogies such as kwarta ug utang (money and debt) to make positive and negative values more visible and relatable.
Private schools (suburban, often large classes)	P3, P4, P5, P7, P9, P11, P12, P15	Reliance on rote memorization of sign rules, persistent sign-rule errors, presence of non-readers, mathematics anxiety, and exhaustion in classes often exceeding 50 students, especially in last-period lessons.	Use of gamification and differentiated support, including humorous "Dogshow" discussions, DaMath, human number lines, and traffic-light grouping, so that more proficient students support peers while teachers focus on those with the greatest need.

This cross-case synthesis illustrates how the four themes: The Cognitive Strain of Fragile Foundations, Navigating the "Sign Rule" Confusion, Resilience through Concretization and Gamification, and The Emotional Weight of Affective Barriers, manifest differently in public and private school contexts, shaping teachers' lived experiences of teaching fundamental operations on integers in Bukidnon.

CONCLUSION

This study explored the experiences of fifteen Grade 7 mathematics teachers as they faced the challenges of teaching basic operations with integers. Results consistently showed that the main cognitive obstacle is students' "fragile foundation," marked by cumulative arithmetic weaknesses from elementary school. This weak base leads to immediate cognitive overload when abstract integer concepts are introduced, causing teachers to handle classrooms where simple number facts, like 4 x 8, often cause students to feel "panic" or "choking." The study also found that rote memorization acts as a maladaptive coping strategy that impedes deep understanding. Teachers noted that students often confuse the operation with the sign, such as mixing up subtraction and negative numbers, a confusion rooted in reliance on procedural drills without understanding symbols. As a result, teachers are shifting from traditional lectures to more flexible teaching methods. In response to systemic gaps, educators showed resilience by using contextualized and kinesthetic techniques. The key breakthrough in student understanding often occurs through relatable analogies like "Kwarta ug Utang" (Money and Debt) and activities like the "Integer Walk," which help turn abstract rules into concrete, lived experiences. These strategies are vital survival tactics, especially in remote and underserved schools.

The study emphasized that effective teaching of integers depends heavily on the teacher's high emotional resilience. Teachers are encouraged to serve as the primary point of engagement to address environmental and emotional challenges, such as overcrowded classrooms with more than 50 students and the detrimental impact of mathematics anxiety. Although individual teacher creativity can help address learning gaps worsened by limited resources, the study concludes that lasting instructional success depends on systemic support, such as structured remediation for foundational gaps and better learning environments.

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