Language-Responsive Scaffolding for Comparing Multi-Digit Numbers in Grade 3

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ABSTRACT

Comparing multi-digit numbers requires learners to coordinate number words, base-ten structure, symbolic notation, and spatial magnitude. These demands become more visible when instruction is delivered through a learner's familiar language while formal mathematical symbols remain shared across languages. This conceptual article analyzes an Ilokano Grade 3 Strategic Intervention Material on comparing numbers up to 10,000 and reorganizes its place-value charts, relation symbols, number lines, guided tasks, assessments, and enrichment activities into a language-responsive representational sequence. The sequence moves from contextual language to decomposed quantity, aligned place value, relational symbol, and number-line position. Analysis identifies productive design features as well as mathematical statements that require editorial correction before classroom reuse. A five-phase scaffold and teacher questioning protocol are proposed to help learners explain why one number is greater than, less than, or equal to another. The article offers a source-grounded framework for improving conceptual coherence without claiming unmeasured gains in achievement.

Keywords: place value; multilingual mathematics; Ilokano instruction; number comparison; multiple representations; Grade 3

1. Introduction

Comparing whole numbers appears simple once learners are fluent, but the task integrates several forms of knowledge. A learner must parse a numeral, understand that a digit's value depends on position, compare corresponding places from greatest to least, select an appropriate relation symbol, and explain the result. When numbers have different lengths or share leading digits, surface inspection is insufficient. Instruction must reveal the base-ten structure that makes comparison valid.

Language adds another layer. Mathematical meaning is expressed through ordinary words such as greater than, less than, and equal to, yet the symbols >, <, and = are compact relational statements. In the submitted Strategic Intervention Material (SIM), these ideas are taught in Ilokano through place-value charts, symbolic comparison, number lines, activity cards, assessment cards, and an answer key. The material is intended for Grade 3 learners working with numbers up to 10,000. Its design creates an opportunity to examine how familiar-language explanation and multiple representations can support relational reasoning.

This article asks how the source material can be organized into a coherent language-responsive scaffold. It is a conceptual analysis, not an effectiveness study. No pretest, posttest, sample, or statistical claim is introduced. The contribution is a design framework that teachers and material developers can evaluate empirically in future classroom research.

2. Source and Analytic Approach

The analysis used the 2022 Grade 3 mathematics SIM developed by Rohdalene B. Bucu for the Schools Division of Isabela. Content was coded according to (a) the language function required of learners, (b) the representation of number, (c) the comparison action, and (d) the form of feedback or assessment. The recurring representations were numeral notation, expanded form, place-value charts, relational symbols, verbal statements, contextual quantities, and number lines. These were then arranged into a progression from meaning construction to abstraction and transfer.

The analysis also checked worked statements against place-value logic. This step is necessary because an attractive or culturally responsive material can still transmit a mathematical error. The framework therefore treats linguistic accessibility and mathematical precision as joint requirements.

3. Why Number Comparison Is Conceptually Demanding

3.1 Positional value rather than digit appearance

In a base-ten system, the value represented by a digit is the product of the digit and its place. Thus 9,715 represents 9 thousands, 7 hundreds, 1 ten, and 5 ones. To compare 9,731 and 9,715, learners first note that the thousands and hundreds are equal. The tens differ: 3 tens are greater than 1 ten. The comparison is therefore decided before the ones are considered. This left-to-right algorithm is justified by place value, not by a rule to memorize.

3.2 Relational symbols as complete statements

The expressions 9,731 > 9,715 and 9,715 < 9,731 communicate the same ordering from opposite reading directions. Learners need to read the entire relation, not identify a symbol in isolation. They also need to understand equality as a relation between equivalent quantities. For example, 1,350 = 1,000 + 300 + 50 links standard and expanded forms.

3.3 Magnitude on a number line

A number line makes order spatial: values increase to the right and decrease to the left. In the source, 4,320, 4,400, and 4,650 are located within the interval from 4,000 to 5,000. This representation provides a second justification for symbolic comparison. It also helps expose distance and density, ideas that a place-value chart alone does not display.

4. A Five-Phase Language-Responsive Scaffold

Phase	Learner action	Teacher language move	Representation
1. Contextualize	Identify quantities in a familiar situation	Invite description in Ilokano or another familiar language	Objects, story, local quantities
2. Decompose	Express each number by place value	Ask what each digit is worth, not only what digit it is	Expanded form and place-value chart
3. Compare	Find the first unequal place from left to right	Require a because-statement naming the decisive place	Aligned numerals
4. Symbolize	Write and read >, <, or = in both directions	Connect local terms to formal English and symbols	Relational statement
5. Validate	Locate or estimate values on a number line	Ask whether the spatial order confirms the symbol	Number line and explanation

Table 1. Five-phase scaffold for language-responsive number comparison.

4.1 Contextualize and name the relation

Instruction may begin with quantities familiar to learners: school enrollment, collected recyclables, household items, or distances. Familiar context reduces the burden of interpreting the situation, but the teacher must keep the mathematical question explicit. Learners can initially explain using Ilokano terms such as dakdakkel ngem (greater than), basbassit ngem (less than), and kapada (equal). The formal English term and symbol can then be attached to an already understood relationship.

4.2 Decompose before comparing

The source's place-value chart is a strong bridge between spoken number names and written numerals. Teachers can ask: What is the value of the 7 in 9,731? Which places are equal? At which place do the numbers first differ? Learners should physically or visually align thousands, hundreds, tens, and ones. Numbers with fewer digits may be represented using leading zero placeholders in the chart, while teachers clarify that leading zeros do not change value.

4.3 Compare, symbolize, and reverse-read

After identifying the decisive place, learners write the relation and read it from left to right. They then reverse the order and change the symbol. This practice reduces reliance on mnemonics about a symbol's shape. The focus remains on the quantities: if $a > b$, then $b < a$. Equality is tested by comparing complete values or equivalent decompositions.

4.4 Validate on a number line

The number line should be used as validation rather than decoration. Learners estimate the location of each value using interval size and labeled benchmarks. They then explain that the farther-right value is greater. A useful extension asks which pair is closer or how much must be added to move from one value to another, linking order to difference.

5. Teacher Questioning Protocol

A compact questioning sequence can make reasoning audible: (1) What quantities are being compared? (2) How can each number be decomposed? (3) Which highest place is different? (4) What does that difference tell us? (5) Which symbol records the relationship? (6) How would the statement read if the numbers changed sides? (7) Does a number line confirm the result? These prompts separate conceptual decisions and provide opportunities for learners to use both familiar and formal mathematical language.

6. Editorial Accuracy and Quality Assurance

Source-based adaptation requires accuracy review. Two statements in the submitted SIM illustrate this need. The text states that 9,271 is greater than 9,705; this is incorrect because both have 9 thousands, but 2 hundreds are less than 7 hundreds, so $9{,}271 < 9{,}705$. Another example describes 9,715 as less than 9,731 but prints the greater-than symbol; the correct statement is $9{,}715 < 9{,}731$. Such discrepancies should be corrected before reuse because they directly contradict the intended comparison procedure.

A publication checklist should verify every numeral, expanded form, symbol, answer-key entry, number-line position, translation, and contextual claim. A second mathematics reviewer should independently solve all items. Language review should then ensure that everyday and formal terms express the same relation consistently.

7. Implications for Materials Development

Language-responsive design is more than translation. It coordinates the language learners use to explain reasoning with the representations used to justify it. Activity cards can gradually reduce prompts: early tasks may provide a chart and sentence frame, later tasks only aligned numerals, and enrichment tasks contextual or open comparisons. Feedback should name the decisive place rather than merely mark a symbol correct or incorrect.

Digital or print adaptations can preserve this sequence. Movable digit cards can support decomposition; foldable place-value charts can align numbers; and number-line strips can verify magnitude. Regardless of medium, symbols should appear only after learners have articulated the relationship they encode.

8. Conclusion

The analyzed SIM contains a productive combination of familiar-language explanation, place-value charts, relation symbols, number lines, practice, assessment, and enrichment. Reorganizing these features into a five-phase scaffold clarifies how learners can move from contextual meaning to formal comparison. The framework also highlights that cultural and linguistic accessibility must be accompanied by careful mathematical editing. Future studies may evaluate the scaffold through learner interviews, comparison-error analysis, and classroom trials across Ilokano and other multilingual settings.

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