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Needs Analysis for Developing a Fractions Learning Module Based on Local Wisdom to Strengthen Elementary School Students' Conceptual Understanding

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Abstract
Numeracy skills in elementary school need early strengthening. Fractions are a critical topic because students must understand parts of a whole, build representations, and apply ideas in context. This study aimed to analyze the needs for developing a local wisdom based fractions learning module to strengthen Grade IV students' conceptual understanding in elementary schools in Nguntoronadi District. The study used a qualitative approach with a descriptive design. It was conducted in five elementary schools. Participants included Grade IV teachers (n = 5) and Grade IV students (n = 50). Data were collected through teacher and student questionnaires covering seven module need indicators. Open ended items were used to explore participants' experiences, difficulties, and expectations. Data were analyzed interactively through data reduction, data display, and conclusion drawing. Source triangulation was applied by comparing teacher and student responses on the same indicators. The results show that students' conceptual understanding of fractions is still uneven. The highest difficulties occur in comparing fractions, identifying equivalent fractions, and solving word problems. Both teachers and students need a module that integrates local wisdom contexts, uses simple language, provides detailed step by step instructions, includes concept summaries, offers graduated practice, provides brief understanding checks, and delivers clear feedback. Teachers and students are generally ready to use the module, but the module should remain flexible due to limited instructional time.
Keywords: *Fractions, Local Wisdom, Needs Analysis, Learning Module, Conceptual Understanding*

Abstrak
Kemampuan numerasi di SD perlu diperkuat sejak dini. Materi pecahan menjadi titik kritis karena siswa harus memahami bagian dari satu utuh, representasi, dan penerapan dalam konteks. Penelitian ini bertujuan menganalisis kebutuhan pengembangan modul pecahan berbasis kearifan lokal untuk menguatkan pemahaman konsep siswa kelas IV SD di Kecamatan Nguntoronadi. Penelitian ini menggunakan pendekatan kualitatif dengan desain deskriptif. Penelitian dilakukan di 5 SD. Subjek penelitian meliputi guru kelas IV (n = 5) dan siswa kelas IV (n = 50). Data dikumpulkan melalui kuesioner guru dan kuesioner siswa yang memuat 7 indikator kebutuhan modul. Peneliti menggunakan pertanyaan terbuka untuk menggali pengalaman, kesulitan, dan harapan responden. Peneliti menganalisis data secara interaktif melalui reduksi data, penyajian data, dan penarikan kesimpulan, serta melakukan triangulasi sumber dengan membandingkan jawaban guru dan siswa. Hasil penelitian menunjukkan pemahaman konsep pecahan siswa belum merata. Kesulitan paling tinggi muncul pada perbandingan pecahan, pecahan senilai, dan soal cerita. Guru dan siswa sama sama membutuhkan modul yang memakai konteks kearifan lokal, bahasa sederhana, petunjuk langkah rinci, ringkasan konsep, latihan bertahap, cek pemahaman, dan umpan balik yang jelas. Guru dan siswa siap menggunakan modul, tetapi modul perlu fleksibel karena keterbatasan waktu pembelajaran.
Kata kunci: Pecahan, Kearifan Lokal, Analisis Kebutuhan, Modul Ajar, Pemahaman Konsep

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INTRODUCTION

Numeracy skills form the foundation of students' learning success in elementary school. Numeracy does not only involve fast calculation. It also involves how students understand the meaning of numbers, relationships among numbers, and how they apply this understanding to solve everyday problems. Indonesia still faces challenges in numeracy, as shown by international assessment results. In PISA 2022, Indonesia's mathematics score was 366, far below the OECD average of 472 (OECD, 2023a). This gap signals the need to strengthen conceptual understanding in mathematics from an early stage, including at the elementary level.

In elementary school, fractions become a critical topic. Fractions appear when students move from whole numbers to numbers that represent parts of a whole, measurement, and comparison. Fractions also serve as a bridge to decimals, percentages, ratios, and proportions. The Merdeka Curriculum places fractions as an essential component of mathematics learning outcomes in Phase B. By the end of Phase B, students are expected to solve problems involving arithmetic operations with integers, fractions, percentages, and decimals, and to connect these ideas within real contexts (Kemdikbud, 2026). Schools therefore need to prepare students who can reason, not simply memorize steps.

However, classroom practice often does not fully support conceptual strengthening. Many students perceive mathematics as only numbers, formulas, and calculation steps. They do not see how mathematics connects to everyday activities. The Grade VI mathematics teacher guide published by Kemdikbud also notes that students often view mathematics as difficult and unrelated to life (Kemdikbud, 2026). When learning feels distant from students' experiences, students tend to rely on procedural memorization. This condition can trigger misconceptions, especially in fractions.

Students' difficulties with fractions also appear in numeracy assessment contexts. Research that examined students' solutions to AKM (Minimum Competency Assessment) fraction items reported that students' numeracy performance in this topic still requires serious attention (Arnida & Nurmeidina, 2023). Another study that reviewed AKM implementation and students' difficulties in fraction numeracy also found barriers in solving fraction problems and highlighted the need for more appropriate instructional efforts (Lestari et al., 2023). In classrooms, these barriers often appear as comparing fractions only by the numerator, misunderstanding the meaning of the denominator, confusion when converting fractions to decimals, or misreading fractions on a number line. These errors indicate conceptual problems rather than mere carelessness.

Teachers play a major role in building fraction concepts, yet they also face constraints. Teachers need teaching materials that guide learning step by step, from concrete experiences to symbolic representations. Teachers also need materials that support differentiation because students start with different prior knowledge. When teachers rely only on standard textbooks and routine exercises, fraction instruction can shift into procedural practice. As a result, students may solve familiar item types but fail when the context changes.

One practical way to strengthen conceptual understanding is to provide a learning module. A module offers a more structured learning pathway. It includes objectives, content, activities, practice tasks, and feedback. A module also supports independent learning and helps teachers manage activity-based instruction. In ethnomathematics-based module development studies, researchers position the module as a tool that helps students understand fractions and improves learning outcomes. Findings like these strengthen the argument that a module can offer a practical solution when it matches students' needs and school conditions (Rahmani, 2024).

To make the module more meaningful, it must connect fractions to contexts that are close to students' lives. Local wisdom can become a strong learning resource. Local

wisdom includes knowledge, values, practices, and cultural products that live within a community. In mathematics education, the ethnomathematics approach links mathematical concepts with culture and students' daily activities. For example, ethnomathematics-based Realistic Mathematics Education emphasizes connecting fraction concepts with local experiences and culture so learning feels relevant for students (Prismayadi & Mariana, 2022). In elementary settings, local wisdom contexts that can be easily integrated into fractions include sharing harvest yields, measuring ingredients in traditional cuisine, dividing portions during community events, patterns in handicrafts, or buying and selling practices in local markets. These contexts give meaning to fractions as parts, measures, and comparisons.

Nguntoronadi District has distinctive socio-cultural characteristics, like other districts in Indonesia. Schools in this area usually interact closely with the surrounding community. This condition creates opportunities to integrate local contexts into learning. At the same time, schools often face constraints in facilities, time, and the variety of learning resources. Therefore, developing a local wisdom-based fractions module should begin with a real needs analysis. A needs analysis helps researchers identify what teachers and students truly need, not only what theory suggests as ideal.

The needs analysis in this study covers both teacher needs and student needs. From the teacher perspective, needs may include alignment with Phase C learning outcomes, ease of classroom use, availability of contextual activities, completeness of formative assessment, and support for remediation and enrichment. From the student perspective, needs may include familiar local contexts, easy-to-understand representations, appropriate language level, module layout and design, varied practice tasks, and step-by-step thinking support when solving problems. When researchers map these needs in detail, they can design a module that is relevant, practical, and well targeted.

However, previous studies have mainly focused on developing ethnomathematics-based or local wisdom-based learning modules without conducting a systematic needs analysis as the foundation of the development process. In addition, limited studies have specifically examined the needs for developing a local wisdom-based fractions module in elementary schools, particularly in Nguntoronadi District. Therefore, a clear gap exists in identifying actual teacher and student needs prior to designing instructional modules that aim to strengthen students' conceptual understanding of fractions.

Conceptually, this study positions needs analysis as the initial stage that informs module design, which in turn is expected to strengthen students' conceptual understanding of fractions. Based on this background, this study focuses on the needs for developing a local wisdom-based fractions module to strengthen elementary students' conceptual understanding in Nguntoronadi District. The study positions conceptual understanding as the main target because fraction difficulties often stem from misconceptions and weak connections to real experiences. The study also positions local wisdom as the learning context so fractions do not appear as empty symbols, but as tools for understanding situations students encounter.

The research question is: What are the needs of elementary teachers and students for developing a local wisdom-based fractions module to strengthen conceptual understanding in elementary schools in Nguntoronadi District? This study aims to determine the level of teachers' and students' needs regarding the use of a local wisdom-based fractions module to strengthen conceptual understanding of fractions in elementary schools in Nguntoronadi District. It also aims to formulate directions for module development based on these needs so the module aligns with the learning outcomes and school conditions in Nguntoronadi District.

METHOD

This study employed a qualitative descriptive approach with simple quantitative support. According to Sugiyono (2019), qualitative research is used to examine phenomena in natural settings, where the researcher acts as the key instrument and emphasizes meaning rather than generalization. In this study, the qualitative approach was used to explore in depth the needs of teachers and students in developing a local wisdom-based fractions module. However, to strengthen the description of findings, limited quantitative data in the form of percentages (Yes/No responses) were also used to support the interpretation. Therefore, this study is positioned as a dominantly qualitative descriptive study with simple quantification.

The study was conducted in five elementary schools in Nguntoronadi District. The participants consisted of Grade IV teachers and Grade IV students from each school. Participants were selected using purposive sampling, with consideration that the selected schools represented actual classroom conditions and were willing to participate in the study.

The data were collected using teacher and student questionnaires. The questionnaire items were developed based on indicators of module needs, including content relevance, contextualization based on local wisdom, clarity of representation, language suitability, learning activities, and assessment components. The instrument development process involved several stages. First, the indicators were formulated based on literature related to learning modules, ethnomathematics, and conceptual understanding. Second, the instrument was reviewed through content validity by experts (expert judgment) to ensure the relevance and appropriateness of each item. Third, a readability test was conducted on a limited number of students to ensure that the language used in the questionnaire was easily understood.

The questionnaires consisted of both closed-ended (Yes/No) and open-ended items. The closed-ended items were used to obtain a general overview of needs, while the open-ended items allowed respondents to provide explanations, examples, and expectations in more detail. An example of a questionnaire item is: *"Do you need learning materials that connect fractions with local daily activities?"* followed by an open-ended question asking for reasons. Data collection was conducted over approximately two weeks in [month, year], starting from questionnaire distribution to data compilation. The researcher directly distributed the questionnaires to teachers and students in each school.

Data analysis followed the interactive model proposed by Matthew B. Miles and A. Michael Huberman, which includes three stages: data reduction, data display, and conclusion drawing/verification. In the data reduction stage, the researcher selected, focused, and simplified the data obtained from open-ended responses. In the data display stage, the data were organized systematically in the form of descriptive narratives supported by percentage data. In the conclusion drawing stage, the researcher interpreted the findings to identify patterns of needs for module development.

To ensure data credibility, the researcher applied source triangulation by comparing responses from teachers and students on similar indicators. In addition, the researcher maintained consistency in analysis by documenting the coding process and providing an audit trail so that the analysis procedure can be traced and verified.

RESULT AND DISCUSSION

Result

Nguntoronadi District. The data were collected through a questionnaire consisting of seven indicators to identify the need for a local wisdom-based fractions teaching module for Grade IV elementary students.

1. Teacher Responses

Based on the questionnaire administered to teachers, several findings were obtained, as summarized in Table 1:

Table 1. Results of the Grade IV Teacher Questionnaire

Indicator	Yes (%)	No (%)	Notes
Conceptual understanding of fractions	46.7	53.3	Consists of 3 statement items
Difficulties in learning fractions	93.3	6.3	Consists of 3 statement items
Classroom experience in teaching fractions	73.3	26.7	Consists of 3 statement items
Need for a local wisdom-based module	93.3	6.7	Consists of 3 statement items
Need for module design features	93.3	6.7	Consists of 3 statement items
Need for practice and feedback	100.0	0.0	Consists of 4 statement items
Readiness to use the module	73.3	26.7	Consists of 3 statement items

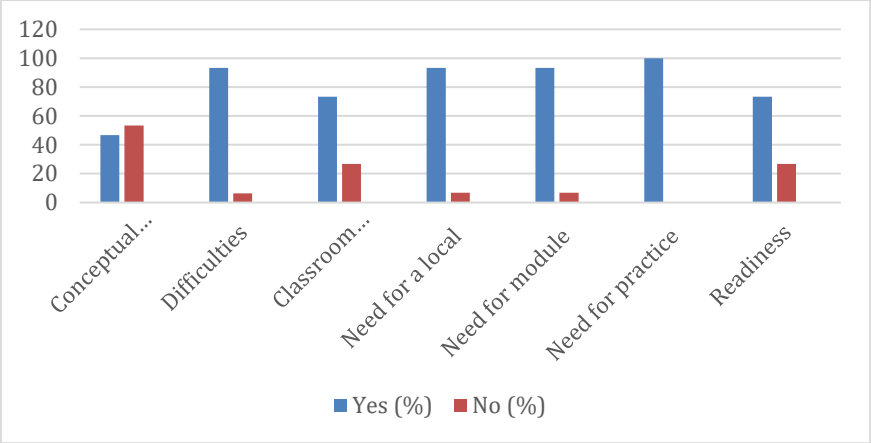

Figure 1. Percentage of Teacher Responses by Indicator

The results of the Grade IV teacher questionnaire (n = 5) indicate a clear need to develop a local wisdom-based fractions module in elementary schools in Nguntoronadi District. This need arises because students' conceptual understanding is not yet strong, and teachers require teaching materials that are more contextual, structured, and equipped with practice tasks and feedback.

For the indicator of conceptual understanding of fractions, the average "Yes" response was 46.7%, while "No" was 53.3%. The higher "No" percentage reflects teachers' observations that students still do not consistently understand fractions as parts of a whole and cannot represent fractions using simple pictures or models. Both of these aspects received only 40% "Yes." However, teachers reported a higher "Yes" response for students' ability to relate fractions to objects in their surroundings (60% "Yes"), suggesting that real-life contexts help students more effectively. This finding supports the need for a module that begins with concrete experiences familiar to students before moving to pictures, models, and fraction symbols.

For the indicator of difficulties in fractions, the average “Yes” response reached 93.3%, while “No” was 6.7%. The “Yes” responses were very high because nearly all teachers stated that students often feel confused when comparing two fractions (100% “Yes”), often struggle with fraction word problems (100% “Yes”), and often have difficulty identifying equivalent fractions (80% “Yes”). The very low “No” responses show that these difficulties occur across almost all classrooms. This means the strongest module needs lie in fraction comparison, equivalent fractions, and word problems. Teachers need a module that strengthens concepts through concrete and visual activities and provides clear, step-by-step guidance for solving word problems, because students’ difficulties involve not only computation but also understanding fraction meaning and applying it in context.

For the indicator of the need for a local wisdom-based module, the average “Yes” response was 93.3% and “No” was 6.7%. The high “Yes” responses occurred because all teachers needed a fractions module that uses examples from students’ daily surroundings (100% “Yes”) and learning activities based on local practices around the school (100% “Yes”). Teachers also needed local pictures or stories to support understanding (80% “Yes”), although 20% responded “No” on this point. This may indicate that some teachers feel examples are sufficient without stories, or they already have alternative visual resources. Overall, the dominant “Yes” responses show that teachers consider local context essential for making fractions easier to understand, especially to address difficulties with word problems, which teachers also reported at very high levels.

For the indicator of module design needs, the average “Yes” response was 93.3% and “No” was 6.7%. The “Yes” responses were high because all teachers needed a module with simple and clear language (100% “Yes”) and detailed, step-by-step activity instructions (100% “Yes”). Teachers also needed a concept summary in each section (80% “Yes”), while 20% responded “No,” possibly because they prefer to deliver summaries orally or rely on existing textbook summaries. Even so, the strong majority of “Yes” responses indicates that teachers need a ready-to-use module that students can understand easily and that helps teachers deliver instruction consistently with minimal interpretation.

For the indicator of practice and feedback needs, the average “Yes” response reached 100% and “No” was 0%. All teachers needed graduated practice tasks from easy to difficult, word problems connected to students’ experiences, brief understanding checks after each subtopic, and worked solutions or an answer key for feedback. The absence of any “No” responses shows that teachers view practice and feedback as core components of the module. Graduated practice helps students build concepts gradually, understanding checks help teachers detect misconceptions early, and worked solutions help students correct errors, leading to stronger conceptual understanding.

For the indicator of readiness to use the module, the average “Yes” response was 73.3% and “No” was 26.7%. The “Yes” responses were fairly high because most teachers were ready to use the module in mathematics instruction (80% “Yes”) and believed that simple classroom resources were sufficient for the activities (80% “Yes”). However, “No” responses increased for time availability, because only 60% of teachers felt they had enough time to implement the module activities. This suggests that the module is feasible to apply, but it should offer flexible activity designs. For example, it can include short core activities and optional extension activities so teachers can still strengthen conceptual understanding even with limited instructional time.

Furthermore, the strong need for contextual and structured modules reflects a gap between existing teaching materials and students’ learning characteristics.

Teachers require instructional support that bridges this gap by integrating local contexts, visual representations, and guided activities. Therefore, the module is not only needed as a teaching aid but also as a tool to transform how fraction concepts are constructed in the classroom.

In addition to the quantitative results, teachers' open-ended responses further strengthen the findings. Several teachers expressed that students often struggle to understand fractions conceptually. One teacher stated, *"Students can perform calculations, but they do not really understand what fractions mean."* Another teacher explained, *"When solving word problems, students are confused because they cannot relate fractions to real situations."* Teachers also emphasized the importance of contextual learning. One response noted, *"If fractions are linked to students' daily life, such as sharing food or measuring ingredients, students understand more easily."* These responses indicate that conceptual understanding and contextualization are key needs in fraction learning.

From a qualitative perspective, the findings indicate that students' difficulties in fractions are not merely procedural but conceptual in nature. Teachers consistently described that students fail to interpret fractions as part-whole relationships and struggle to connect symbolic representations with real-life contexts. This suggests that learning has not yet moved effectively from concrete experiences to abstract representations.

When linked to the research question, the overall table indicates that teachers need a local wisdom-based fractions module to strengthen students' conceptual understanding because students' basic understanding and fraction representations are still weak, while difficulties in fraction comparison, equivalent fractions, and word problems are very high. Teachers also need a module that uses local contexts, applies simple language, provides detailed activity steps, includes concept summaries, offers graduated practice, provides brief understanding checks, and delivers clear feedback, while remaining realistic within classroom time and resource constraints.

Table 2. Synthesis of Main Needs for Fraction Learning Module

Aspect	Identified Needs	Implication for Module Design
Conceptual Understanding	Students have weak understanding of fractions as part of a whole	Use concrete and visual representations
Learning Difficulties	Difficulties in comparison, equivalent fractions, and word problems	Provide step-by-step guidance and scaffolding
Contextual Learning	Need for real-life and local context	Integrate local wisdom examples and activities
Module Design	Need for simple language and clear instructions	Use structured and student-friendly layout
Practice & Feedback	Need for varied exercises and answer feedback	Include graduated tasks and answer keys
Implementation	Limited time and classroom constraints	Provide flexible and adaptable activities

2. Student Responses

   Based on the student questionnaire results, several findings were obtained, as presented in Table 3:

Table 3. Results of the Grade IV Student Questionnaire

Indicator	Yes (%)	No (%)	Notes
Conceptual understanding of fractions	52.0	48.0	Consists of 3 statement items
Difficulties in learning fractions	70.0	30.0	Consists of 3 statement items
Classroom experience in learning fractions	77.3	22.7	Consists of 3 statement items
Need for a local wisdom-based module	83.3	16.7	Consists of 3 statement items
Need for module design features	88.0	12.0	Consists of 3 statement items
Need for practice and feedback	89.3	10.7	Consists of 3 statement items
Readiness to use the module	89.0	11.0	Consists of 2 statement items

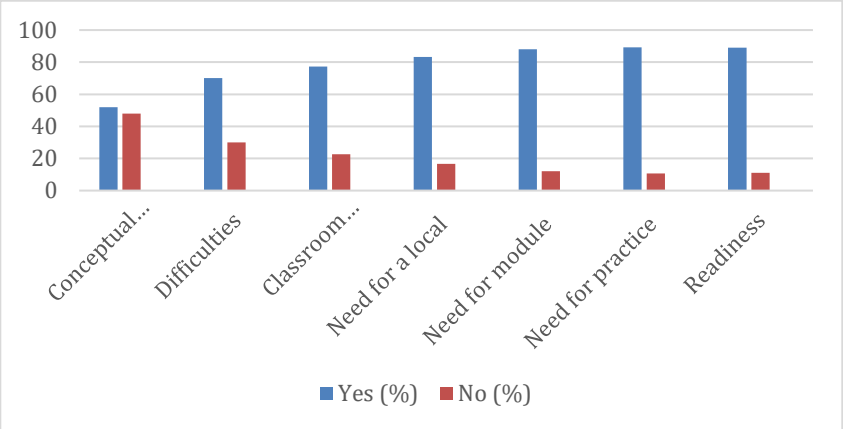

Figure 2. Percentage of Student Responses by Indicator

The results of the Grade IV student questionnaire (n = 50) indicate a need to develop a local wisdom-based fractions module in elementary schools in Nguntoronadi District. This need is reflected in students' conceptual understanding, their perceived difficulty level, and their preferences for module formats that they consider easy to understand.

For the indicator of conceptual understanding of fractions, the average "Yes" response was 52% and "No" was 48%. This distribution shows that students' basic conceptual understanding is still uneven. Many students feel they understand fractions as parts of an object, but their ability to draw fractions and give examples from surrounding objects is not yet consistent. This condition indicates that students need support to strengthen concepts through concrete activities and visual representations.

For the indicator of difficulties in fractions, the average "Yes" response reached 70% and "No" was 30%. The "Yes" responses were high because most students reported confusion when choosing the larger fraction, confusion about equivalent fractions, and the greatest confusion when fractions appeared in word problems. These findings show that students need learning experiences that emphasize meaning-making through models or pictures and provide clear steps for solving context-based word problems.

For the indicator of classroom experience in learning fractions, the average "Yes" response was 77.3% and "No" was 22.7%. Students reported that teachers often use real objects and provide step-by-step explanations when teaching how to solve problems. Most students also felt they could ask questions or discuss, although some did not experience this consistently. This suggests that classroom practice is already moving toward active learning, but it still needs strengthening so all students have equal opportunities to build conceptual understanding through discussion and reasoning.

For the indicator of the need for a local wisdom-based module, the average "Yes" response was 83.3% and "No" was 16.7%. Most students said they understand fractions more easily when examples come from activities around them. They also enjoy learning fractions when the examples are familiar, and they prefer modules that include pictures from their local environment. This indicates that local context supports understanding because students can visualize situations more easily, identify the whole, and recognize its parts.

For the indicator of module design needs, the average "Yes" response was 88% and "No" was 12%. Students strongly preferred modules that use simple words, provide examples before practice tasks, and include brief summaries to help them remember key ideas. This shows that students need a clear, simple, and structured module so they can follow the learning flow without confusion.

For the indicator of practice and feedback needs, the average "Yes" response was 89.3% and "No" was 10.7%. Students wanted fraction practice tasks that progress from easy to difficult, word problems that resemble daily activities, and guidance on correct methods when they make mistakes. These findings show that students need graduated practice and feedback that helps them correct errors so their conceptual understanding becomes stronger.

For the indicator of readiness to use the module, the average "Yes" response was 89% and "No" was 11%. Most students stated that they are willing to learn fractions using a module if the module is easy to understand, and they are willing to try activities such as dividing paper or objects to learn fractions. This indicates that students are ready to use an activity-based module grounded in familiar contexts.

From a qualitative perspective, the findings indicate that students' understanding of fractions is still in a transitional stage between concrete and abstract thinking. Although many students recognize fractions in familiar situations, they still experience difficulty when required to interpret symbolic representations or solve contextual problems independently. This suggests that learning experiences have not fully supported the construction of deep conceptual understanding.

In addition to the quantitative findings, students' open-ended responses provide further insight into their learning needs. Some students expressed that fractions are difficult to understand when presented only through numbers. One student stated, *"I understand better when the teacher uses real objects, like dividing food."* Another student mentioned, *"Word problems are confusing because I don't know what the fraction means in the story."*

Students also showed strong interest in contextual and visual learning. One response noted, *"I like it when there are pictures and examples from daily life."* These responses indicate that students need meaningful and relatable learning experiences to strengthen their understanding of fractions.

Furthermore, students' strong preference for contextual examples, simple explanations, and structured activities indicates that effective learning materials must align with their cognitive characteristics. A module that integrates local wisdom, visual representations, and step-by-step guidance can serve as a bridge between students' everyday experiences and formal mathematical concepts. Therefore,

developing a local wisdom-based fractions module has strong potential for implementation and can support stronger conceptual understanding among elementary students in Nguntoronadi District.

Table 4. Synthesis of Student Needs for Fraction Learning Module

Aspect	Identified Needs	Implication for Module Design
Conceptual Understanding	Understanding is still uneven	Use concrete and visual learning approaches
Learning Difficulties	Difficulty in comparison, equivalent fractions, and word problems	Provide guided steps and visual models
Learning Experience	Learning is partially interactive but not consistent	Strengthen discussion and active learning activities
Contextual Learning	Prefer real-life and local examples	Integrate local wisdom contexts
Module Design	Need simple language and clear structure	Use student-friendly and structured layout
Practice & Feedback	Need gradual exercises and correction support	Provide scaffolded tasks and feedback
Readiness	Students are ready to use modules	Design engaging and activity-based modules

Discussion

1. Conceptual Understanding of Fractions

For the indicator of conceptual understanding of fractions, the findings show that students' understanding is still uneven. Students understand fractions more easily when teachers use real objects and examples that are close to their daily lives. However, students still often hesitate when they must draw fractions or explain fractions using models. This condition indicates that students are not yet strong in transforming concrete experiences into visual and symbolic forms, even though this ability is a key foundation for learning more advanced fraction topics (Kartika et al., 2025).

This finding aligns with expert views that emphasize a learning progression from concrete to abstract. Bruner explains that students build understanding through action, then images, and then symbols. Students need to move through these stages gradually so the concept does not remain at the level of memorized procedures (Forsythe et al., 2019). The CRA approach also reinforces the sequence of concrete, pictorial representation, and abstract forms as a way to build stronger conceptual understanding (Agustina, 2024). The NCTM also emphasizes that students need to create and use representations and be able to shift between representations to solve problems (Rangkuti, 2014).

Based on these points, a local wisdom-based fractions module should place students' everyday experiences as the starting point. The module can invite students to divide objects or situations that they already know, then ask them to draw the results of the division, and finally write them in fraction form (Julianto, 2023). The module should also provide practice tasks that consistently connect these three forms: from objects to pictures, from pictures to symbols, and from symbols to simple stories. A contextual approach such as Realistic Mathematics Education (RME) supports this process because students construct mathematical meaning from situations that feel real to them and then gradually formalize the ideas (Fitri, 2024).

2. Difficulties in Learning Fractions

For the indicator of difficulties in learning fractions, the findings show that students most often face obstacles when comparing fractions, identifying equivalent fractions, and solving word problems. Students tend to hesitate when choosing the larger fraction because they do not yet view fractions as a “value” that can be compared. They also easily make mistakes with equivalent fractions because they focus on the numerator and denominator as numbers, rather than on the size of parts within one whole. When fractions appear in word problems, the difficulty increases because students must understand the sentences, identify key information, convert it into a fraction model, and draw a conclusion that fits the context (Aji & Prasetyo, 2025).

This explanation aligns with expert views that fractions feel difficult because they require a shift in thinking from whole numbers to fractions (Manda, 2022). Students often apply “whole-number logic” to fractions, so they judge the size of a fraction only by the size of the numbers. Research also emphasizes that fractions have multiple meanings. Students need to reorganize their understanding of the “unit whole” and “parts” to compare fractions and understand fraction equivalence. Equivalent fractions are particularly challenging because one value can be expressed in many forms, so students must understand equivalence based on the same whole and consistent proportional relationships (Lubis, 2021).

Therefore, the module you develop should directly target these difficulties through activities that build students’ understanding of fraction magnitude. The module can use concrete and visual models such as paper strips, part–whole pictures, and fraction bars, then move toward number lines and benchmarks such as one-half or one for comparing fractions. NCTM also emphasizes that comparing fractions requires multiple models and benchmarks so students understand how fractions relate to the unit whole (Rangkuti, 2014). For equivalent fractions, the module should include activities that emphasize the “same whole” and require proof through drawings, followed by graduated practice with clear feedback, because studies show that learning equivalent fractions improves with step-by-step difficulty and feedback (Lubis, 2021). For word problems, the module should use simple language, familiar contexts, and fixed solution steps, because word-problem performance is strongly influenced by language comprehension and item characteristics (Nurhasanah et al., 2024).

3. Classroom Experience in Learning Fractions

For the indicator of classroom experience in learning fractions, the findings show that teachers have implemented learning practices that are quite supportive. Teachers often use real objects when introducing fractions. Teachers also usually provide a clear, step-by-step procedure when students work on problems. Students reported the same experience. They observed that teachers use objects and explain the steps in an orderly way. They also often have opportunities to ask questions or discuss, although this does not happen consistently in every learning situation.

These findings indicate that fraction instruction has moved toward concrete and structured learning. However, students still experience confusion in specific topics. This suggests that concrete activities and procedural steps do not always guide students to understand the reasoning behind an answer (Jusniani, 2018). Inconsistent discussion practices can also lead some students to follow methods without truly understanding the concept (Mulyatna et al., 2023). When students do not explain their reasoning, teachers find it harder to detect misconceptions early.

This condition implies that the module should help teachers organize classroom learning experiences more consistently. The module can provide a clear activity sequence from real objects to pictures and then to symbols. It can also

include prompting questions, examples of common student errors, and follow-up strategies to address those errors (Ilahiyah et al., 2019). In addition, the module can include short discussion activities, pair tasks, and quick reflections at the end of each subtopic. With these elements, classroom learning will not only be orderly in procedures, but also stronger in conceptual understanding.

4. Need for a Local Wisdom-Based Module

   For the indicator of the need for a local wisdom-based module, the findings show that both teachers and students want a fractions module that uses examples, activities, pictures, and stories from their local environment. They find it easier to understand fractions when the material starts from things they often see and do. They also view this type of module as more engaging and easier to follow, both during classroom learning and independent study.

   This need is reasonable because local contexts help students construct concrete meaning for fractions (Julianto, 2023). Students grasp the idea of a “whole” and “parts” more quickly when the module uses familiar situations. They also find it easier to imagine a story, identify key information, and translate it into a fraction model. Many mathematics education experts also emphasize that contexts close to students’ lives support conceptual understanding, because students do not begin with symbols, but with experiences they can visualize (Febrianti & Mufidah, 2024).

   The implication is that the module should treat local wisdom as the core of learning activities, not as decoration. The module can begin each subtopic with a local situation, then guide students to divide objects or quantities, represent the results in drawings, and write them as fractions (Kudsiah et al., 2023). The module should also provide word problems that reflect students’ daily activities, supported by local images and clear solution steps (Majid et al., 2025). In this way, the module supports step-by-step fraction understanding and makes learning more relevant to students.

5. Module Design Needs

   For the indicator of module design needs, the findings show that teachers and students want a module that is simple, clear, and easy to use. Teachers need language that students can understand and activity instructions that are detailed and well sequenced so classroom activities run smoothly. Students also prefer modules that use simple words, provide examples first, and then offer practice tasks, so they know what to do at each step (Jusuf & Sobari, 2021).

   These design needs arise because learning fractions often confuses students when they must move from real objects to pictures and symbols. If the module uses complex language or overly general instructions, students can easily lose track, and teachers must repeatedly re-explain the tasks. Therefore, the module should provide a consistent learning flow so students focus on concepts rather than guessing what each instruction means (Danniarti, 2018). Concept summaries in each section are also important because they help students remember the main ideas after completing activities and exercises (Yolanda, 2020).

   The implication is that the module should use a consistent format from beginning to end. Each subtopic can start with a brief objective, followed by an example from students’ environment, then step-by-step activities, followed by graduated practice tasks, and closed with a concept summary (Sepiyana & Juwita, 2024). The module should also present a neat layout, include clear images, and provide space for answers so students can write or draw directly in the module. With this design, teachers can use the module more easily and students can understand it more effectively (Yolanda, 2020).

6. Practice and Feedback Needs

For the indicator of practice and feedback needs, the findings show that both teachers and students need structured practice and support when errors occur. Teachers want fraction exercises that progress from easy to difficult, word problems that reflect students' experiences, and brief understanding checks in each section. Students also want practice tasks that increase in difficulty gradually, and they want clear guidance when their answers are incorrect. This need arises because fractions cannot be understood through only one or two examples (Fatma et al., 2026). Students need many opportunities to try, reflect, and improve their understanding.

The need for graduated practice is closely related to common student difficulties in fraction comparison, equivalent fractions, and word problems (Hidayatullah & Zainil, 2025). When tasks are difficult too early, students tend to guess or memorize procedures without understanding the concept. Word problems connected to students' daily lives help them interpret the situation, identify the unit whole, and determine the part. Brief understanding checks help teachers quickly identify what students have not understood before moving to the next topic. Feedback in the form of worked solutions or step-by-step guidance helps students recognize where they made mistakes and how to correct them (Wahyuddin, 2020).

The implication is that the module should organize practice tasks across several levels. It can begin with picture- and model-based practice, then move to symbolic exercises, and then to contextual word problems. Each subtopic should include a brief understanding check and a short explanation that highlights the reasoning process, not only the final answer (Salsabila, 2024). The module should also include examples of common errors and how to fix them so students do not repeat the same misconceptions. With graduated practice and clear feedback, the module can more effectively strengthen students' conceptual understanding of fractions (Putri et al., 2025).

7. Readiness to Use the Module

For the indicator of readiness to use the module, the findings show that teachers and students are generally ready to use a local wisdom-based fractions module. Teachers believe the module can be used in mathematics lessons, and the activities can be implemented using simple classroom resources. Students also show interest in learning with a module, especially if the module is easy to understand and includes hands-on activities such as dividing paper or objects (Buulolo, 2023). This indicates strong implementation potential because the main users, teachers and students, already accept the idea of using the module.

However, this readiness still has practical limits in classroom implementation. Teachers continue to consider whether they have sufficient time to complete the full sequence of activities. If the module is too long or includes too many activities, teachers may struggle to fit it within lesson periods (Andani, 2024). This means the module must be realistic and flexible so it can be used in different classroom situations without reducing the goal of strengthening fraction concepts (Julianto, 2023).

The implication is that the module should provide implementation options. The module can separate activities into core components that are required and additional components that are optional (Danniarti, 2018). The module should also state the estimated time for each activity and provide alternative materials that are easy to find (Rahmawan et al., 2025). With this design, teachers can adapt the module to the available time, and students can still receive complete learning experiences that strengthen their conceptual understanding of fractions.

CONCLUSION

This study shows that Grade IV students in elementary schools in Nguntoronadi District still do not have an even conceptual understanding of fractions. Students understand fractions more easily when instruction starts from real objects and examples close to their daily lives. However, they often hesitate when they must draw fractions, use models, and interpret fractions in symbolic form. The most prominent difficulties appear in comparing fractions, identifying equivalent fractions, and solving word problems. These findings indicate that the main problem lies in understanding fraction magnitude and modeling contextual situations, rather than in computation skills alone.

From the instructional process perspective, teachers often use concrete objects and provide orderly, step-by-step procedures. However, conceptual discussions do not occur consistently. This condition leads some students to follow procedures without truly understanding the reasoning. The need for a local wisdom-based module is strongly expressed by both teachers and students. They want examples, activities, pictures, and stories drawn from their local environment so students can visualize situations more easily, identify the unit whole and its parts, and connect fractions with everyday experiences. In addition, teachers and students require a simple and clear module design, with detailed instructions, a consistent learning flow, and concept summaries that help students remember key ideas.

Practice and feedback emerge as essential components. Teachers want graduated practice from easy to difficult, brief understanding checks for each subtopic, and worked solutions or answer keys to provide faster feedback. Students also want leveled practice and guidance when they make mistakes. This indicates that the module should provide repeated learning opportunities while helping students correct misconceptions quickly. In terms of implementation, teachers and students are generally ready to use the module, and they can carry out activities using simple classroom resources. However, limited instructional time remains a factor that the module must address through flexible activity design.

The implications of this study confirm that developing a local wisdom-based fractions module should place local context at the core of learning. The module should guide students gradually from concrete activities to pictorial representations and then to symbols. The module should also prioritize topics that are most difficult for students, namely fraction comparison, equivalent fractions, and word problems, through visual activities, graduated practice, and consistent solution steps. An effective module should use simple language, detailed instructions, and concept summaries, and it should include brief understanding checks and clear feedback. The module should also separate activities into core and optional parts so teachers can adjust to available classroom time.

For future research, a recommended next step is to develop a module prototype based on the identified needs and then conduct content validation by subject-matter and media experts. After that, studies can proceed with a small-scale tryout and a larger-scale trial to examine readability, practicality, and effectiveness in improving students' conceptual understanding of fractions. Further research should also measure the module's impact on specific skills, such as representation ability, fraction comparison, equivalent fraction understanding, and word-problem solving. In addition, future work can develop a more detailed implementation guide to help teachers manage time, facilitate discussion, and use simple resources so the module can be applied consistently across different classrooms.

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