

Effects of Team Approach (Teach, Engage, Accompany, Mentor) on Grade 6 Learners' Mastery of Fundamental Fraction Skills

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ABSTRACT

This study evaluated the effectiveness of the TEAM Approach (Teach, Engage, Accompany, Mentor) in improving the mathematics performance of Grade 6 students at Soong Elementary School during School Year 2026–2027. Using a quantitative approach, the study employed a quasi-experimental non-equivalent control group pre-test-post-test design. The participants consisted of two Grade 6 sections with approximately 70 learners in total. The intervention focused on enhancing learners' mastery of fundamental fraction skills within the K–12 Mathematics curriculum. Results showed that the TEAM Approach positively influenced learners' understanding of fraction concepts and procedures, classroom participation, collaboration, confidence, and overall academic performance. The approach promoted active engagement through guided instruction, peer support, and mentoring, creating a more supportive and interactive learning environment.

Based on the findings, mathematics teachers are encouraged to continue using the TEAM Approach and incorporate collaborative learning activities, peer mentoring, and guided practice in teaching fractions. Schools should provide adequate training, instructional materials, and resources to support its implementation. Future researchers may conduct similar studies involving larger samples, different grade levels, longer intervention periods, and other mathematics competencies to further validate the effectiveness of the TEAM Approach.

Keywords: TEAM Approach (Teach, Engage, Accompany, Mentor); mathematics performance; collaborative learning; learner engagement; peer mentoring; elementary mathematics.

INTRODUCTION

Rationale

Learning problems with fractions are expected to remain one of the major problems in mathematics education, especially among elementary students in the Philippines. Despite various reform efforts and recovery measures, new findings reveal that many Grade 6 students still display weaknesses in their understanding of fractions, especially in problems that call for both accuracy in procedures and conceptual understanding. The learners are able to perform the procedure accurately but have difficulties in comprehending what the fractions mean or how to use them in novel situations. Such disparity poses some important questions on the structure of mathematical knowledge among learners, especially whether the procedural and conceptual knowledge are separate or interconnected skills. There is recent empirical study that has directly examined such questions, finding that the conceptual and procedural knowledge of fractions are empirically separable but related constructs (Lenz et al., 2020).

As educational systems are becoming increasingly competency and data-driven, it is becoming more important to know about the development and interrelation of different types of knowledge. The question of the difference between conceptual understanding and procedural knowledge is still relevant for mathematics teaching and learning. Recent literature suggests that these two kinds of knowledge can have different developmental paths and are not necessarily connected during teaching and learning processes (Rittle-Johnson & Schneider, 2020). If this is true, it will limit the possibilities of transferring knowledge to more complicated situations.

The purpose of this study is to analyze the hidden structure of fractional knowledge of Grade 6 Filipino learners, whose aim is to determine whether the conceptual knowledge and procedural knowledge are separate but interrelated constructs. It is expected that the findings will help develop the TEAM Approach (Teach, Engage, Accompany, Mentor) as an intervention for instruction based on the needs of learners. Through the determination of whether the challenges faced by learners pertain to their conceptual knowledge or procedural knowledge, it is hoped that this study will contribute to mathematics instruction in the Philippines.

Fractions have been identified as an important mathematical topic since they serve as a gateway to algebra, ratios, and problem-solving skills. However, current studies still show that fractions constitute one of the most difficult topics to learn in mathematics. Current research shows that the understanding of fractions is based on the development of both conceptual and procedural knowledge; nevertheless, the two types of knowledge do not necessarily co-develop (Braithwaite & Siegler, 2021). In many cases, students can perform fraction procedures such as operations on fractions without fully comprehending the numbers.

Recent studies have consistently confirmed the theory that conceptual and procedural knowledge could be developed separately. Research on fraction learning has shown that the ability of students to express their conceptual understanding of fractions is often restricted although they perform well in procedural activities (Morano & Riccomini, 2020; Wiest & Amankonah, 2021). It means that procedural competence might not always serve as an adequate indicator of profound knowledge of mathematics. Moreover, modern research in teaching practice has proved that there are teachers who have conceptual misunderstandings of fractions that influence their teaching (Wiest & Amankonah, 2021).

Going forward, the implications of having poor understanding of fractions are expected to become more pronounced as students move on to higher math courses. It has been noted that fraction knowledge is one of the most reliable predictors of future performance in algebra and other complex mathematical areas, highlighting the long-term effects of learning deficits at an early stage of education (Siegler et al., 2020). Should conceptual understanding fail to develop adequately, students will resort to procedural knowledge, which is fragile and difficult to transfer.

As far as the education system in the Philippines is concerned, there have been attempts to tackle the above issues. For example, the Department of Education (DepEd, 2023) has put in place programs such as the National Learning Recovery Program in order to improve learners' proficiency in fundamental skills, including fractions. However, as per the results of the Second Congressional Commission on Education (EDCOM II, 2023), a significant number of Filipino learners continue to exhibit inconsistent learning patterns, which are marked by procedural proficiency without conceptual proficiency.

The regional data support this claim. There are indications from large-scale studies, for example, the Southeast Asia Primary Learning Metrics (SEA-PLM, 2019), that learners have problems with higher order thinking tasks requiring conceptual understanding. One of the reasons for this is the existence of

cognitive biases, one being the whole number bias where learners use whole number reasoning in fraction problems (Braithwaite & Siegler, 2021). These misconceptions are expected to continue being a major obstacle unless the instruction makes a connection between procedures and concepts.

In fact, new studies highlight the possibilities of using better instructional techniques in order to deal with these problems. For instance, according to the latest synthesis study in the field of mathematics education, the development of conceptual knowledge involves the use of explanation, representation, and teacher knowledge intentionally (Johnson & Roy, 2026). In addition, studies dedicated to the analysis of the processes of students' learning claim that instructional techniques such as self-explanation and peer explanation can help to develop both types of knowledge because of cognitive involvement (Gao et al., 2025).

In line with these changes, peer-assisted and collaborative learning methods are expected to play a greater role in teaching mathematics. The TEAM Approach is designed to be a methodical intervention that encourages active participation, guided practice, and reflection among learners. Through this, learners are encouraged to express their thought processes and evaluate their problem-solving processes. These methods may serve as effective means to narrow down the difference between procedural and conceptual knowledge. With these in mind, there is an urgent need for empirical studies to investigate the organization of conceptual and procedural knowledge among learners.

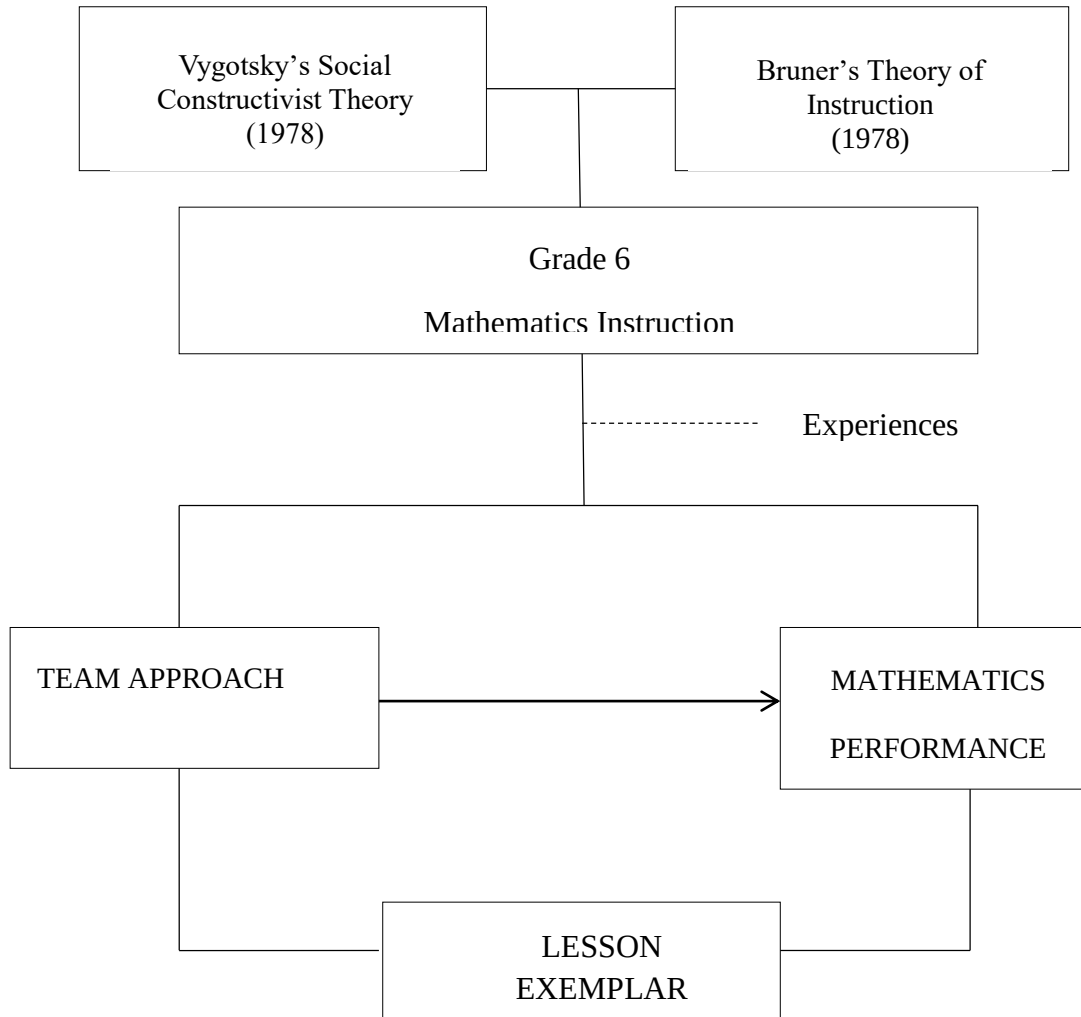
This study will attempt to explore the latent structure of fractional knowledge among Grade 6 students through data-driven analysis of learner performance. Through this, the research hopes to determine whether or not these two knowledge types are separable or interdependent. Ultimately, this study hopes to contribute to the development of a more informed and progressive view of mathematical learning in the Philippine context. With an understanding of the cognitive factors behind fractional competence, the research may provide important insights into developing effective, efficient, and sustainable instructional interventions. In the long run, this will contribute to learners' mathematical readiness and improved academic performance.

Theoretical Framework

This research study titled “Effects of the TEAM Approach (Teach, Engage, Accompany, Mentor) on Grade 6 Learners’ Mastery of Fundamental Fraction Concepts” is founded on the theory that genuine mathematics learning takes place when learners engage in constructing meaning through social interactions and well-structured scaffolding processes. These include two theories, namely the Theory of Social Constructivism by Lev Vygotsky and the Theory of Instruction by Jerome Bruner.

According to Vygotsky’s theory, learning is a socially-mediated phenomenon that is carried out most effectively when it takes place in the ZPD of the learner, which is defined as the zone between the learner’s independent level of functioning and his/her level of functioning in a state of guidance from another individual who possesses better knowledge of the subject matter. With regard to this study, the implementation of the principle lies in the formation of peer mentoring groups through the TEAM approach. Mentors provide immediate feedback, give guided practices and think-aloud explanations to the mentees to uncover and eliminate any misconceptions associated with fractions, equivalence, part-whole relationships, and operations involving like denominators. It should be pointed out that social interaction makes it possible for learners to internalize strategies that they would be unable to discover otherwise, hence turning their assisted performance into independent competence.

Figure 1.
Theoretical Framework of the Study



Along with this socio-cultural underpinning, Bruner's theory of instruction emphasizes the role of scaffolding, sequencing, and representation in the process of teaching. According to Bruner, there should be a move from concrete to pictorial and symbolic representation. For the purposes of teaching fractions, this implies that learners should be encouraged to work with manipulatives or visuals (fraction strips, area models, number lines), then learn to interpret and talk about the representations, and finally do symbolic manipulations. The TEAM approach aims at meeting these requirements. Mentors model the solution of problems through use of appropriate representations, assist the partners in solving problems partially worked out, and transfer responsibility to them as soon as they prove themselves ready to perform independently. At the same time, tasks are gradually sequenced, starting from the recognition and creation of equivalent fractions, then moving on to comparison and ordering, and finally doing addition and subtraction of fractions with different denominators.

Combining the theories provides the theoretical foundation for the proposed study: If peer mentoring (Vygotsky) is incorporated into instructional activities that transition from concrete to abstract (Bruner), students would be able to master fundamental skills related to fractions more successfully. The role of

the TEAM Approach in this context is that of an intervention that unites social interaction, training, and reflection. The outcomes to expect include enhanced performance in fraction tasks, better conceptualization of the meaning of fractions, and increased levels of engagement and self-efficacy among learners. Besides improved performance on tests, the results of the study are expected to provide qualitative data on students' experience and on such issues as how mentoring helps them think about fractions, how modeling helps understand concepts, and how cooperation helps overcome difficulties. Such a theoretical/conceptual synthesis also informs the creation of an instructional guide or example lesson in which TEAM approaches are applied to mathematics teaching. Through the linkage of mentoring practices with scaffolded activities and transitions between representations, the exemplar will be made realistic, replicable, and flexible to suit diverse contexts. In sum, the theoretical framework provides the basis for the assumption of this research: "Targeted peer interaction embedded in carefully sequenced learning activities can facilitate the transition to independent competence with fraction concepts."

Statement of Purpose

This study aims to evaluate the performance of Mathematics teachers in implementing the spiral progression approach at a National High School.

Specifically, it seeks to address the following questions:

1. What is the pre-test and post-test performance in fundamental fraction skills of the control group and the experimental group?
2. Is there a significant difference on the pre-test performance of the students in the Control and Experimental Group?
3. Is there a significant pre-post mean gain on the performance of the students in:
 - 3.1 Control Group
 - 3.2 Experimental Group
4. Is there a significant mean gain difference of the performance of the students between the control and experimental group?
5. What insights can be drawn from the students regarding their experiences in learning fractions under the TEAM Approach?
6. Based on the findings, what lesson exemplar or instructional guide integrating the TEAM Approach can be developed to further enhance learners' mastery of fundamental fraction skills?

Hypothesis

Ho1: There is no significant difference on the pre-test performance of the students in the Control and Experimental Group.

Ho2: There is no significant mean gain difference of the performance of the students between the control and experimental group.

Literature Review

The "Fractional Barrier" and Longitudinal Achievement

The mastery of fractions is widely recognized as the most problematic hurdle in the middle-school mathematics curriculum. According to Siegler et al. (2012), a student's knowledge of fractions in Grade 6 is a more accurate predictor of their success in high school algebra and overall math achievement at age 16 than their family income, intellectual ability, or knowledge of whole numbers. This "fractional barrier" exists because fractions require a "conceptual reorganization" of the numerical system. Unlike

whole numbers, where a larger digit represents a larger value, a larger denominator in a fraction signifies a smaller unit. Lortie-Forgues et al. (2015) argue that this counter-intuitive nature leads to "mathematical stalling," where students stop attempting to understand the logic and instead rely on memorized algorithms that they eventually misapply.

Pedagogical Evolution: From Rote to Constructivism

The Teach and Engage pillars of the TEAM approach respond to a historical shift in mathematics education. Traditional "Direct Instruction" often focused on the procedural (the "how"), but recent research by Rittle-Johnson and Jordan (2016) emphasizes that conceptual knowledge (the "why") must lead the way.

This shift is grounded in Jerome Bruner's (1966) modes of representation. Bruner's theory suggests that students must move through the Enactive (concrete), Iconic (pictorial), and Symbolic (abstract) stages. Literature on the Concrete-Representational-Abstract (CRA) sequence shows that when Grade 6 learners use physical fraction tiles to "see" that $\frac{1}{2}$ is equivalent to $\frac{2}{4}$ they build a mental number line that remains stable even when the numbers become larger and more abstract. Namkung and Fuchs (2016) found that interventions using these multi-sensory strategies were particularly effective for learners who had previously failed in traditional classroom settings.

Socio-Cultural Mediation and Scaffolding

The Accompany pillar is deeply rooted in Vygotsky's (1978) Socio-Cultural Theory. Vygotsky argued that the "More Knowledgeable Other" (MKO) acts as a bridge between a student's current ability and their potential development. In the context of fractions, Van de Walle et al. (2019) describe this as "facilitated struggle." Rather than giving the student the answer, the facilitator "accompanies" the student by asking probing questions that guide the learner through the Zone of Proximal Development (ZPD).

Research by Doabler et al. (2018) indicates that the quality of this accompaniment—specifically the use of mathematical discourse and feedback—is what distinguishes successful remedial approach from those that merely provide extra practice. By providing a "scaffold" (a term coined by Bruner and his colleagues, building on Vygotsky's work), the TEAM approach ensures that the student's cognitive load is managed, preventing the mental fatigue that often accompanies fraction operations.

The Psychological Dimension: Mentorship and Math Anxiety

The final pillar, Mentor, addresses the affective domain of learning. Grade 6 is often the year when "Math Anxiety" becomes a clinical barrier to performance. Ashcraft and Moore (2009) demonstrate that high math anxiety consumes the "working memory" needed to process complex tasks like adding fractions with unlike denominators.

Mentorship serves as the intervention for this anxiety. According to Dowker et al. (2016), the relationship between a mentor and a learner can foster "Math Self-Efficacy," or the belief in one's ability to succeed in math. When a mentor helps a student reframe a failure as a "growth opportunity," they are applying Dweck's (2006) Growth Mindset theory. Recent studies by Mazana et al. (2019) found that students with a strong support system showed higher persistence in mathematical tasks, directly correlating to better mastery of fundamental skills.

Synthesis and the Research Gap

In summary, while the literature extensively covers instructional strategies (Teach/Engage) and the psychology of learning (Accompany/Mentor) in isolation, there is a notable absence of studies evaluating a four-fold integrated model like the TEAM approach. Most current interventions focus on "fixing the skill" without "supporting the learner." This study fills that gap by examining the synergy

between pedagogical rigor and social-emotional support. It seeks to prove that when learners are not only taught but also engaged, accompanied, and mentored, their mastery of fractions becomes a foundation for future success rather than a barrier to it.

METHODOLOGY

Design

In this study, a quantitative approach is used to determine the efficacy of the TEAM Approach in enhancing Grade 6 students' acquisition of basic fraction skills. In particular, a quasi-experimental design, specifically a non-equivalent control group pretest-post test design, was employed. There were two intact Grade 6 classes involved in the study, where one class acted as the experimental group that received instruction using the TEAM Approach including peer mentoring techniques, and the other class acted as the control group that received traditional mathematics lessons.

Pre-test was conducted for both classes to determine their initial knowledge in basic fraction skills before the treatment period. After the five-week period of implementing the TEAM Approach, both classes took the post-test to measure any improvement in their performance and make comparison between the learning outcomes of the two groups. The selected quasi-experimental design was appropriate since random assignment was not possible in a real classroom setting.

Environment

The study was done at Soong Elementary School, which is an elementary public school in Lapu-Lapu City that follows the K-12 Mathematics curriculum prescribed by the Department of Education. There are several Grade 6 sections at Soong Elementary School, making it easy to choose intact groups as both control and experimental groups. The classroom setting, existing method of teaching mathematics, and having several sections of Grade 6 make Soong Elementary School an appropriate venue for the implementation of the TEAM Approach and for determining its impact on the students' understanding of fractions. The researcher chose Soong Elementary School as the research venue because of its accessibility and the fact that it is the place where the researcher is currently working.

Participants

Two Grade 6 classes, each with about 35 students, made up the total sample size of approximately 70 subjects. The researcher used convenience sampling to choose these two intact classes since they were available during the time of the study. One class was selected as the experimental group (TEAM Approach), while the other class served as the control group (traditional teaching method). Intact classes were chosen because randomization would have been impossible in the school setting. A sample size of approximately 70 subjects was deemed appropriate for the study.

Instrument

The key tool used in this research is a researcher-made Mathematics Achievement Test, which was created to measure learners' level of competence in basic skills related to fractions. This tool acts as both the pre-test and post-test in the current research and has been precisely linked to the Grade 6 Mathematics curriculum to guarantee its relevancy to prescribed competencies. The test includes all necessary fraction concepts such as part-whole relationship, equivalence of fractions, operations on fractions, and fraction simplification. The test includes multiple choice questions as well as problem solving tasks, which allows measuring both conceptual and procedural knowledge of learners.

In order to determine the validity of the instrument, the test items were subjected to content validation by three mathematics educators who rated the items in terms of their correctness, clarity, and relevance to

curriculum standards. Their feedback and suggestions were used in order to improve the test items before actual use. The reliability of the instrument was also tested through pilot testing. The internal consistency reliability was calculated through the use of Cronbach's alpha on the 24-item scale, which resulted in an α of 0.69. This result shows moderate inter-item correlation and acceptable reliability, especially since the instrument is exploratory in nature.

From the processes of validity and reliability tests, the final Mathematics Achievement Test produced a valid and fairly reliable instrument for measuring the extent of students' grasp of basic fraction concepts.

Data Gathering Procedure

The figure below illustrates the experimental design that was adopted in this study. In this research, a quasi-experimental design was used which included the control and experimental groups. Pre-test was administered to both groups to determine their level of proficiency in fraction concepts. The experimental group was taught using TEAM approach while the control group was taught using traditional teaching approaches. Post test was then administered to both groups after five weeks of the experiment.

Pre-Data Collection. Authorization was secured from the principal of Soong Elementary School for the study. After the approval at the school level, authorization was then sought from the Department of Education Division of Lapu-Lapu City. The research process was carefully examined to make sure that the research will be done following the ethical principles before its implementation. After the approval of the research process, the parents or guardians of the Grade 6 learners were made aware of the nature, purpose, and procedure of the study. Informed written consent was secured from the parents or guardians of the Grade 6 learners before their involvement in the study. Prior to the implementation of the intervention, a pre-test was conducted among the selected Grade 6 sections to measure their competency in fractions.

Actual Data Collection. After conducting the pre-test, the five-week intervention phase of the study began. Both the control and experimental groups were instructed in the same Grade 6 Mathematics lessons covering basic skills in fractions using the same competencies to be learned, duration of instruction, learning materials, and schedule of assessment. The only difference was the instructional strategy employed. The control group was taught using the traditional approach, while the experimental group was taught using the TEAM Approach (Teach, Engage, Accompany, and Mentor).

In the control group, instruction used the traditional approach. Every lesson started with the teacher giving explanations and solving sample problems, then followed by guided practice and seatwork. Students did their seatwork individually while the teacher checked their work. Classroom interaction was mostly teacher-dominated since students contributed during recitation and seatwork to solidify their understanding of the lesson.

The experimental group was taught using the TEAM Approach. In the Teach phase, the teacher conducted the lesson through explicit instruction, visual representation, and demonstration with the aim of helping the learners gain conceptual and procedural understanding. In the Engage phase, the learners were involved in collaborative learning activities such as pair work and discussion and problem solving within a contextual framework that required them to explain their ideas and collaborate. The Accompany phase involved the teacher monitoring the learners, scaffolding, asking guiding questions, and giving feedback to deal with the learning problems. Finally, in the Mentor phase, peer mentoring was incorporated through the learners helping each other solve problems and explain concepts and validate solutions. Such learning processes helped the learners participate actively, collaborate, build confidence,

and understand the concept of fractions better. At the end of the intervention, the two groups took the post-test in similar conditions to assess the effectiveness of the teaching approaches.

CONTROL GROUP	EXPERIMENTAL GROUP
Pre test	Pre test
↓	↓
Conventional Mathematics Instruction	Instruction using the TEAM APPROACH
↓	↓
Post Test	Post Test

Post-Data Collection. After giving the post-test, the researcher gathered all the test answer sheets and meticulously noted down their scores. These test papers were safely put inside an envelope that was securely closed for confidentiality purposes. The Mean Percentage Score (MPS) of both pre-test and post-test was determined for each group. The researcher then systematically organized and consolidated the test scores for analysis purposes. Both descriptive and inferential statistics were applied in order to find out if there were any significant differences in both the intra-group and inter-group level. When all the computations and analyses had been completed, the test papers were properly disposed of without violating the respondents' confidentiality and privacy rights.

Data Analysis. The data gathered quantitatively was subjected to both descriptive and inferential analysis in order to determine the effectiveness of the TEAM Approach in enhancing the learning of fractions among the students. First, descriptive statistics was computed in order to determine the performance of both the control and experimental groups. In particular, the mean and the standard deviation were obtained from the pre-test and post-test results. The mean is useful in determining the average performance of the students, whereas the standard deviation tells us how far the performances were from the mean.

In order to establish if there is a statistically significant difference in the data collected, inferential statistics was carried out. The paired sample t-test was employed to investigate whether there was any difference between pretest and post-test scores in each group. It would be able to indicate if there was a significant change over time in both groups. An independent samples t-test was also performed to investigate the significance of post-test scores of the two groups. It would establish if the experimental group, which underwent the TEAM approach, did better than the control group under traditional teaching approach.

Before carrying out any inferential test, the assumptions of normality and homogeneity of variance were checked to determine the validity and reliability of the data. 0.05 level of significance was set as the threshold of statistical significance. From the analysis, it was possible to determine whether the TEAM method improved the basic fraction skills of the learners than conventional classroom methods.

Ethical Considerations

This research adhered to the principles and standards set by the University of the Visayas Research and Ethics Committee. Ethical approval was approved based on Ref. No. NTPMAED2026-0237 on May 11, 2026. The respondents of this study were Grade 6 students who willingly participated in this study. Before the distribution of the questionnaires, a cover letter was provided to inform the participants of the

research background, objectives, confidentiality of the collected information, and voluntary participation. They were informed that the information they will provide will be treated as confidential and will only be used for research purposes. There were no offers for financial incentives to participate in the study and the researchers had no conflicting interests in this study.

In addition to this, due to adherence to this ethical principle, the study also aimed to assess the efficiency of the TEAM Approach (Teach, Engage, Accompany, and Mentor) to improve the mathematics performance of Grade 6 students from Soong Elementary School for SY 2026-2027. In appreciation of their participation, each student was given a school supplies kit consisting of one ballpen and one intermediate pad paper per participant.

Results and Discussion

This chapter presents the statistical analysis of the gathered data which aimed to assess the effectiveness of the TEAM Approach (Teach, Engage, Accompany, and Mentor) in improving the mathematics performance of Grade 6 students at Soong Elementary School during the School Year 2026-2027

Table 1

Pre-Test and Post-Test Performance of the Control and Experimental Groups in Fundamental Fraction Skills

Group	Test	Mean	Mean Percentage Score (MPS)	Interpretation
Control Group	Pre-Test	6.84	28.45%	Did Not Meet Expectations
	Post-Test	19.10	79.58%	Fairly Satisfactory
Experimental Group	Pre-Test	5.94	24.75%	Did Not Meet Expectations
	Post-Test	21.40	89.10%	Very Satisfactory

Legend: N = 70, 90 – 100 (Outstanding), 85 – 89 (Very Satisfactory), 80 – 85 (Satisfactory), 75 – 79 (Fairly Satisfactory), Below 75 (Did not meet expectations)

The performance of the control and experimental groups in terms of their fundamental fraction skills before and after the intervention is shown in Table 1. Before the intervention, both groups showed poor performance. The mean score of the control group was 6.84 with the Mean Percentage Score (MPS) of 28.45% and was classified as Did Not Meet Expectations. The mean score of the experimental group was slightly lower and equalled 5.94, resulting in MPS of 24.75%, which is again classified as Did Not Meet Expectations. This result implies the limited mastery of fundamental fraction skills by the two groups before the implementation of the instructional intervention.

After the intervention, both groups have shown considerable performance gains. The mean score of the control group increased from 6.84 to 19.10 with the MPS of 79.58%, which is considered to be Fairly Satisfactory. It can be said that the conventional instructional approach helped learners achieve some gains regarding fraction knowledge.

However, the experimental group showed even better performance. Its mean score increased from 5.94 to 21.40, which equals the MPS of 89.10% and is considered Very Satisfactory. Although the pre-test

mean score of the experimental group was lower than that of the control group, the experimental group outperformed the control group by 2.30 mean points and 9.52 percentage points in MPS.

To conclude, it should be noted that although both instructional approaches helped learners develop their fundamental fraction skills, the intervention performed in the experimental group proved to be more efficient concerning improving academic achievement.

Table 2

Significant Difference in the Pre-Test Performance of the Control and Experimental Groups

Group	N	Mean	SD	t-Value	p-Value	Effect Size	Decision on H ₀
Experimental Group	35	5.94	2.08	1.8297	0.07168	0.44	Fail to reject the null hypothesis.
Control Group	35	6.84	1.905				

Significant at $\alpha = .05$

Source: statskingdom.com

The results of the independent-samples pooled t-test are shown in Table 2. It aimed at assessing whether there was a statistically significant difference between the pre-tests mean scores of the experimental and control groups. The experimental group included 35 participants whose mean score was 5.94 and the standard deviation was 2.08. The control group also had 35 students and its mean was slightly higher and equal to 6.84 while the standard deviation equaled 1.91. Thus, the mean difference in favor of the control group was approximately 0.90 points.

The obtained t-value was 1.8297 while the degree of freedom was 68 with a two-tailed p-value of 0.07168. As it exceeds the significance level of 0.05, the null hypothesis was not rejected meaning that there was no statistically significant difference between the pre-tests mean scores of the experimental and control groups.

The obtained t-value is located in the area of the non-rejection region from -1.9955 to 1.9955 . The confidence interval of the 95% mean difference is between -0.08025 and 1.8517 ; thus, zero belongs to the confidence interval and can be considered as the possible value of the mean difference meaning that the difference may be attributed to the sampling error and is not the reflection of any real difference in initial mean scores.

The effect size based on Cohen's d is equal to 0.44 which shows that there was small to moderate difference between the groups. However, taking into account that the control group had higher pre-test mean score, the obtained difference is not enough to prove its statistical significance.

In other words, the findings show that the experimental and control groups had similar levels of foundation fraction skills before the instructional intervention which is important because it means that the differences in the mean gain after the test can be attributed only to the instructional methods used.

Table 3

Significant Pre-Post-Test Mean Gain in the Performance of the Control and Experimental Groups

Group	Test	N	Mean	SD	Mean Gain	Effect size	t-Value	p-Value	Decision on H ₀
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Group	Test	N	Mean	SD	Mean Gain	Effect size	t-Value	p-Value	Decision on H_0
Control Group	Pre-Test	35	6.84	1.905					
	Post-Test	35	19.10	1.743	12.26	4.11	24.3023	< .00	Reject the Null
Experimental Group	Pre-Test	35	5.94	2.08					
	Post-Test	35	21.40	2.114	15.46	5.56	32.8991	< .00	Reject the Null

Significant at $\alpha = .05$

Table 3 shows the statistically significant mean gains in the performance of the control and experimental groups from the pre-test to the post-test. A paired samples t-test was employed to identify whether there was statistically significant gain made by each group in its performance.

In the case of the control group, the mean score rose from 6.84 in the pre-test to 19.10 in the post-test, with a mean gain of 12.26. The value of t computed was 24.3023 and the corresponding p-value was less than .001. Given that the p-value was less than the level of significance at .05, the null hypothesis was rejected.

An effect size of 4.11 reflects a very large magnitude of change. It is therefore reasonable to conclude that there was indeed a substantial increase in performance of the subjects in the control group both statistically and practically. The instructional strategy employed in the control group was indeed effective in the acquisition of the concept of fractions by the learners.

In the experimental group, the mean scores changed from 5.94 in the pretest to 21.40 in the posttest, hence giving a mean change of 15.46 points. The t-value of 32.8991 also gave a p-value of less than .001. Consequently, the null hypothesis was rejected, implying statistical significance in the performance of the learners in the experimental group.

The experimental group effect size is 5.56, which also shows a very large effect. This means that the TEAM Approach yielded a great improvement in the fundamental fraction skills of the students. From the effect size shown, the post-test scores of the students were significantly better than their pre-test scores.

Both groups achieved statistically significant pre-test and post-test improvements. Nevertheless, the mean improvement of the experimental group is 15.46, while that of the control group is 12.26. In addition, the experimental group had a greater effect size and t-value than the control group. From the results obtained, it seems that the improvement of the students exposed to the TEAM Approach is greater than those in the control group.

However, it cannot be established whether the gains made by the two groups were statistically significant using the two paired-samples t-tests alone. An additional independent samples t-test needs to be conducted to establish whether the gain achieved by the experimental group was significantly higher than the gain made by the control group.

From the results above, one can conclude that the two methods used were effective in boosting students' skills in fractions. However, it seems that the gain and effect size recorded by the experimental group are an indication that the TEAM Approach could be more effective than the other method in teaching fraction concepts.

Table 4
Significant Difference in the Mean Gains of the Control and Experimental Groups

Group	N	Mean Gain	SD	Mean Gain Difference	Effect Size	tt-Value	Pp Value	Decision on H ₀
Control Group	35	12.26	2.98	3.2	1.11	4.6415	<<0.001	
Experimental Group	35	15.46	2.78					Reject H ₀

N₁ = 35, N₂ = 35 Significant_t at $\alpha = .05$

Table 4 highlights the significant difference between the mean gains of the control and experimental groups. The mean gain for the control group was 12.26 with a standard deviation of 2.98, whereas the mean gain for the experimental group was 15.46 with a standard deviation of 2.78. Thus, the difference between the mean gains of the two groups was 3.20 points.

For the difference between means of two unrelated samples, an independent-samples t-test resulted in a computed t-value of 4.6415 with 68 degrees of freedom and a p-value of less than .001. As the p-value is lower than the .05 level of significance, the null hypothesis is rejected. Hence, there is a statistically significant difference between the mean gains of the control and experimental groups.

The experimental group showed more improvement in fraction skills than the control group. While both groups performed better in the post-test compared to the pre-test, the learners who underwent the TEAM Approach improved more in their performance.

According to the computed Cohen's d, there is a large effect size since the value is 1.11. What this means is that not only was the difference in gains made by the two groups statistically significant, but it was also practically significant. Thus, the result supports the idea that the TEAM Approach greatly influenced students' learning of fraction skills as compared to the other approach.

Thus, the results show that the TEAM Approach is effective as an instructional strategy for enhancing students' knowledge, computations, and applications of fractions. **Common Students' Insights and Experiences in Learning Fractions Using the TEAM Approach**

Upon gathering the qualitative data, the team was able to organize, analyze and interpret the feedback provided by the students on their experience using the TEAM approach when studying fractions. The five main themes that have been identified through this analysis include: (1) improvement in conceptual knowledge about fractions, (2) active involvement and collaborative learning, (3) increased confidence and positive attitude, (4) effective use in solving word problems, and (5) ongoing challenges.

Clear explanations, visual representations, and repeated practice improved students' understanding of fraction concepts.

The students reported that fraction concepts became easier to understand when the lessons were presented through clear, step-by-step explanations, guided examples, visual representations, and repeated exercises. These instructional strategies helped them understand denominators, equivalent fractions, mixed numbers, and the processes involved in adding and subtracting fractions.

Student 1 shared, “I understood fractions better because the steps were explained clearly.” Similarly, Student 2 stated, “The pictures and fraction models helped me see how the answer was formed.” Student 3 also explained, “The practice exercises helped me remember the correct steps.”

Such answers show that the learners were able to benefit from the presentation of the mathematical procedure in an organized manner. Dividing the learning process into smaller steps was helpful in preventing confusion, and the use of images, charts, and fraction models was useful in helping the learners make connections between mathematical symbols and concrete models. The learners were also able to recognize and correct any mistakes that they might have been making because of guided and repetitive practice which increased familiarity with the procedure and improved accuracy when solving fraction problems.

These results indicate that the TEAM Approach helped improve the students’ conceptual understanding as well as procedural knowledge. The use of explanations, illustrations, guided exercises, and practice helped provide the students with various opportunities to understand fractions.

Interactive and collaborative activities increased students’ participation and engagement.

The students became more active during classroom discussions, group activities, and problem-solving tasks. They demonstrated increased willingness to ask questions, volunteer answers, exchange ideas, and participate in group work.

Student 4 shared, “I participated more because the activities were interesting.” Student 5 added, “My groupmates helped me understand the parts that were difficult.”

These statements demonstrate that the interactive aspect of the TEAM Approach motivated the learners to engage in an active learning process. The learners had the chance to share their thoughts, solve problems together with other students and participate in group activities rather than listen to lectures only.

In addition, working in groups made it possible for the students to get help from other learners. For some learners, it was easier to ask questions or make sure they understood everything from their peers, especially when they did not want to ask the teacher. Peer explanations sometimes made things clear because these explanations used language and examples that the students could understand.

From these results, it can be concluded that the TEAM Approach created a collaborative and participative learning environment.

Successful learning experiences increased students’ confidence and promoted a positive attitude toward fractions.

The students reported becoming less afraid of fractions and more willing to solve problems independently. Their successful experiences during the activities helped improve their confidence and lessen their anxiety toward mathematics.

Student 6 stated, “Before, I was afraid of fractions, but now I can solve them.” Student 7 similarly shared, “Learning fractions became enjoyable because we had different activities.”

All of these answers clearly indicate positive changes in the students’ perception of the lessons on fractions. Some of the students before the experiment saw the fractions as complicated and scary things.

But now when they have learned the concepts and performed the tasks successfully, they feel more confident in themselves as mathematicians.

The diversity of the activities helped to make the lessons more interesting and attractive. Visualization, group work, practice, and presenting of the solutions made the learning process more exciting than usual teacher-centered learning.

From the above-mentioned facts one can conclude that the TEAM Approach has been successful not only academically but also emotionally. Due to the help, support, and success the students gained more confidence and motivation to participate in math classes.

Contextualized and guided activities improved students' ability to solve fraction word problems.

The students reported that they became more capable of analyzing word problems, identifying the given information, selecting the appropriate mathematical operation, and interpreting their answers.

Student 8 explained, "I learned how to determine which operation to use in a word problem."

This implies that the students became more systematic in tackling contextualized math problems. Through questioning, they were able to figure out what was being asked for, what information was needed, and which operation they should perform – either addition or subtraction.

Additionally, through the use of relatable and realistic scenarios, the problems on fractions became more relevant. Questions pertaining to sharing of food, measurement of ingredients, division of objects, and quantity of something became easy to understand.

From the results obtained, the TEAM Approach enabled students to make use of the knowledge gained about fractions in practical life scenarios. This means that the approach was able to help students gain mathematical reasoning skills together with computation skills.

Some students continued to experience difficulties and required additional instructional support.

Despite the improvements reported by the students, some continued to encounter difficulties in finding common denominators, simplifying answers, and solving problems involving several steps.

Student 9 shared, "I still found some problems difficult, especially when there were many steps."

This reaction proves that the TEAM Approach was not successful in removing all challenges related to learning. Confusion was experienced by the learners where they were expected to do multiple processes like identifying the least common denominator, changing the mixed number, doing the operation, and finally simplifying the answer.

These problems might have been affected by various factors such as differences in prior knowledge, rate of learning, numeracy skills, and confidence. Some of the learners still needed help from the teacher and their peers before engaging in any activity.

However, the students continued to show positive sentiments regarding the approach. Student 10 said, "I hope this approach will also be used in our other mathematics lessons." Such a sentiment shows that the students found the TEAM Approach useful, interesting, and satisfying considering the challenges faced. The results call for the combination of the TEAM Approach with differentiating activities, scaffolding, remedial work, and personal assistance. Students having challenges may require easier examples, visual illustrations, more time, and more guided practices. The results showed that the use of the TEAM Approach had a positive impact on the learning experience of the students in learning fractions. Good explanation, visual illustration, repetition, collaboration, and application played important roles.

In addition, the feedback from the students proved that learning was not only more meaningful but funnier when the students participated actively in the lessons. Learning through collaboration made peer tutoring possible while successful learning experiences reduced their anxiety with fractions.

However, it seems that some students still have trouble with common denominators, simplifying fractions, and complex procedures. Therefore, it is evident that the implementation of the TEAM Approach should be supplemented with differentiated instruction and remediation.

On the whole, it appears that the students' reactions show that the TEAM Approach created the environment of interaction and assistance for learning fractions. Its further application may assist in achieving better conceptual understanding, procedural fluency, and application of fractions to real life situations.

Conclusion

The findings of this study demonstrate that the TEAM Approach (Teach, Engage, Accompany, Mentor) served as an effective instructional strategy for enhancing Grade 6 learners' mastery of fundamental fraction skills. Although both the control and experimental groups showed improvement after instruction, the learners who experienced the TEAM Approach achieved significantly greater gains in mathematics performance. The intervention not only strengthened learners' computational skills but also deepened their conceptual understanding of fractions through collaborative learning, guided practice, visual representations, and structured peer interaction. These results affirm that learner-centered and interactive instructional approaches provide more meaningful learning experiences than conventional teaching methods, particularly when teaching abstract mathematical concepts such as fractions.

Moreover, the qualitative findings revealed that the TEAM Approach contributed positively to learners' engagement, confidence, and willingness to participate in mathematics activities. Students valued the opportunities to collaborate with classmates, receive guidance from peers and teachers, and apply fraction concepts in contextualized learning tasks. While some learners continued to experience challenges with complex and multi-step fraction problems, their responses suggest that these difficulties can be addressed through sustained scaffolding, differentiated instruction, and continuous reinforcement. Overall, the study concludes that the TEAM Approach is a practical, responsive, and effective instructional model that promotes both academic achievement and positive learning experiences, making it a valuable strategy for improving Mathematics instruction in elementary classrooms.

Recommendations

From the results of the study, the TEAM Approach was found to make significant contributions to the improvement of understanding, participation, collaboration, confidence, and performance of the learners in learning fractions. The following are the recommendations that are aimed at sustaining and strengthening the positive impacts.

For Improvement of Practice

1. Mathematics teachers must continue to use the TEAM Approach in teaching fractions since this was found to help improve the learners' understanding of the concepts and processes.
2. The teachers should provide more opportunities for the learners to engage in collaborative work, peer tutoring, and problem solving.
3. The teachers must consistently provide the learners with clear explanations, illustrations, and guided practices to facilitate their understanding of difficult concepts of fractions.
4. The schools must assist the teachers in their efforts by providing the necessary trainings, instructional materials, and resources for teaching the TEAM Approach.

For Future Research

5. Future researchers must conduct studies using larger samples, different grades, longer interventions, and other mathematics competencies to determine the effectiveness of the approach.

6. Proposed Research Title:

Effectiveness of the TEAM Approach in Improving the Conceptual Understanding, Procedural Fluency, and Mathematics Confidence of Elementary Learners

OUTPUT OF THE STUDY

Proposed Output Description

The lesson exemplar may be developed as a reusable instructional guide containing:

1. an ILAW-aligned lesson plan;
2. TEAM-based learner task cards;
3. visual fraction models and manipulatives;
4. differentiated computation and word-problem activities;
5. a group-participation rubric;
6. formative and summative assessment tools;
7. remediation and enrichment exercises; and
8. student reflection and teacher monitoring forms.

The proposed exemplar directly responds to the study findings by combining explicit instruction, visual representations, collaborative learning, guided and repeated practice, contextualized problem-solving, immediate feedback, individual accountability, and differentiated support. It is therefore intended not only to improve students' computational accuracy but also to strengthen conceptual understanding, confidence, engagement, and the application of fractions in real-life contexts.

Proposed Lesson Exemplar or Instructional Guide Integrating the TEAM Approach Based on the Findings

A. Proposed Lesson Title: Adding and Subtracting Fractions and Mixed Numbers Using the TEAM Approach

ILAW Component	Proposed Lesson-Exemplar Elements	Integration of the TEAM Approach	Basis from the Findings
I Intentions	Learning competency: Add and subtract simple fractions and mixed numbers, with or without regrouping.	State clear, learner-friendly objectives and explain the purpose of the collaborative and activity-based tasks.	Students reported improved understanding when procedures were presented through clear, step-by-step explanations.
	Learning objectives: At the end of the lesson, students should be able to: (1) identify like and unlike fractions; (2) determine the least common denominator; (3) add and subtract fractions and mixed	Objectives address conceptual understanding, procedural fluency, collaboration, and application.	The quantitative findings showed weaknesses in simplifying fractions, interpreting concepts, and solving word

ILAW Component	Proposed Lesson-Exemplar Elements	Integration of the TEAM Approach	Basis from the Findings
	numbers accurately; (4) simplify answers; and (5) solve real-life problems involving fractions.		problems before the intervention.
	Success criteria: Students can explain the steps, solve at least four out of five exercises correctly, participate in group tasks, and justify their solutions.	Present a checklist that students can use to monitor their own learning and group participation.	Students became more confident and engaged when expectations and procedures were clearly presented.
	Prerequisite skills: Recognizing equivalent fractions, determining factors and multiples, finding the least common multiple, and converting mixed numbers and improper fractions.	Conduct a brief diagnostic activity and organize peer support based on students' readiness.	Some students continued to need scaffolding, repeated practice, and assistance with prerequisite skills.
L – Learning Experiences	1. Review and activation of prior knowledge: Present fraction strips or visual models showing equivalent fractions and unlike denominators.	Students work in pairs to match equivalent fractions and explain their answers to one another.	Students identified visual and concrete representations as helpful in understanding abstract fraction concepts.
	2. Contextualized motivation: Present a real-life situation involving portions of food, distance, time, or materials that requires adding or subtracting fractions.	Teams discuss what the problem is asking, identify the given information, and predict the required operation.	Students reported improved ability to identify appropriate operations in word problems.
	3. Explicit modeling: Demonstrate the process: identify denominators, determine the LCD, rename fractions, perform the operation, regroup when needed, and simplify the answer.	The teacher models each step while students explain why the step is necessary.	Step-by-step instruction contributed to students' improved conceptual and procedural understanding.
	4. Guided collaborative activity: Provide each team with task cards involving like fractions, unlike fractions, mixed numbers, and regrouping.	Each student performs an assigned role, such as facilitator, solver, checker, illustrator, or reporter. Team members compare strategies and agree on a final solution.	Collaboration, peer tutoring, and shared explanations helped students understand difficult concepts.

ILAW Component	Proposed Lesson-Exemplar Elements	Integration of the TEAM Approach	Basis from the Findings
	5. Visual representation task: Require groups to represent one solution using fraction strips, number lines, diagrams, or shaded models.	Teams connect the visual model to the corresponding symbolic solution.	Visual aids helped students understand how answers were formed and supported conceptual meaning.
	6. Error-analysis activity: Present an incorrect solution involving denominators, regrouping, or simplification.	Teams identify the error, correct the solution, and explain the appropriate process.	Immediate feedback and correction of errors strengthened procedural fluency.
	7. Contextualized problem-solving: Give differentiated real-life problems involving addition and subtraction of fractions and mixed numbers.	Teams use a problem-solving organizer: Given–Asked–Operation–Solution–Answer–Check.	Students improved in selecting operations and applying fraction skills to practical situations.
	8. Individual mastery practice: Students independently answer exercises progressing from basic computation to word problems.	Team support is gradually withdrawn to assess individual understanding and confidence.	Students reported that guided and repeated practice helped them remember the correct procedures.
	9. Generalization: Ask students to complete the statements: “To add or subtract unlike fractions, I must first...” and “I know my answer is reasonable because...”	Each team develops a concise rule and presents an example supporting it.	Students’ improved conceptual interpretation suggests that they benefited from explaining and summarizing mathematical ideas.
A – Assessment	Diagnostic assessment: Short prerequisite-skills check before instruction.	Use results to identify students who need additional support or peer assistance.	Persistent difficulties suggest the need to identify gaps before beginning the main task.
	Formative assessment: Teacher observation, questioning, task-card outputs, group explanations, visual models, and error analysis.	Assess both mathematical performance and TEAM behaviors, including participation, cooperation, explanation, and checking.	Students experienced increased engagement, participation, and collaborative learning.

ILAW Component	Proposed Lesson-Exemplar Elements	Integration of the TEAM Approach	Basis from the Findings
	Individual assessment: A short quiz consisting of computation, simplification, interpretation, and word-problem items.	Include items aligned with the content areas and cognitive levels measured in the study.	The study assessed procedural recall, conceptual interpretation, and real-life application.
	Suggested assessment distribution: 40% computation, 20% simplifying and interpreting concepts, and 40% contextualized word problems.	Use a balanced assessment to prevent overemphasis on routine procedures.	The control group showed stronger procedural recall but weaker conceptual understanding and real-life problem-solving.
	Performance criteria: Accuracy, appropriateness of strategy, completeness of solution, clarity of explanation, and teamwork.	Use a rubric for group work and a separate scoring guide for individual outputs.	Students' experiences indicated that both academic performance and participation were important outcomes of the approach.
W – Ways Forward	Immediate feedback: Discuss common errors in finding the LCD, regrouping mixed numbers, choosing operations, and simplifying answers.	Teams revise incorrect answers and explain what they changed.	Students valued immediate feedback, correction, and repeated practice.
	Remediation: Conduct small-group instruction using fraction strips, guided examples, and scaffolded exercises.	Pair students strategically and provide partially completed solution guides.	Some students continued to experience difficulty with multi-step processes and needed individualized assistance.
	Enrichment: Provide multi-step real-life problems and tasks requiring students to create and exchange their own fraction problems.	Teams design, solve, and evaluate original contextualized problems.	Students who gained confidence and mastery need opportunities to extend and apply their learning.
	Reflection: Students answer: “What helped me understand today’s lesson?” “What remains difficult?” and “How did my team help me?”	Use reflection responses to refine future TEAM activities and determine learner needs.	Students’ insights revealed the value of collaboration, visual materials, engagement, and guided practice.

ILAW Component	Proposed Lesson-Exemplar Elements	Integration of the TEAM Approach	Basis from the Findings
	Home or community application: Students identify a situation at home involving fractions, such as cooking, sharing, measurement, time, or budgeting.	Students present the situation and its solution during the next session.	Contextualized activities help transfer mathematical knowledge to meaningful real-life situations.
	Next lesson: Multiplication or division of fractions and mixed numbers using the same TEAM structure.	Retain successful strategies while adjusting scaffolds according to assessment results.	Students expressed a preference for the continued use of the TEAM Approach in future mathematics lessons.

B. Suggested Instructional Sequence

Lesson Phase	Suggested Time	Teacher's Role	Students' Role	Evidence of Learning
Review and diagnostic activity	10 minutes	Activates prerequisite knowledge and identifies misconceptions	Match, classify, and explain equivalent fractions	Responses and diagnostic results
Contextualized motivation	5 minutes	Presents a meaningful fraction situation	Analyze the situation and identify the possible operation	Oral responses
Explicit instruction and modeling	15 minutes	Demonstrates the process using visual and symbolic representations	Observe, question, explain, and complete guided steps	Guided examples
TEAM collaborative task	20 minutes	Facilitates, questions, and provides scaffolding	Solve task cards according to assigned team roles	Group output and observation checklist
Error analysis and reporting	10 minutes	Presents misconceptions and facilitates discussion	Identify, correct, and explain errors	Corrected solutions and oral explanations
Individual mastery assessment	15 minutes	Administers and monitors independent work	Solve computation and word-problem items independently	Individual quiz
Generalization and reflection	10 minutes	Synthesizes key ideas and gathers feedback	State mathematical rules and reflect on	Exit ticket or reflection sheet

Lesson Phase	Suggested Time	Teacher's Role	Students' Role	Evidence of Learning
			learning	
Ways forward	5 minutes	Assigns remediation, enrichment, or home application	Complete the appropriate follow-up task	Remedial, enrichment, or application output

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