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Utilization of Comic-Book Based Techniques on Solving Fractions among Grade 7 Students

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A B S T R A C T

This study explored the potential of comic book as an educational tool to address Grade 7 students' difficulties in solving fractions. Using a random sampling technique, thirty (30) students were randomly selected from the recommended section, Antonio Maglilo. A quantitative one-way pretest-posttest design was used to assess the intervention's influence to the students' skills. The study aimed to identify students' learning preferences, measure pre-test and post-test scores, and analyze the significant difference between them. Results showed a strong preference for visual learning (mean = 125.5). Pre-test scores averaged 11.9, improving significantly to 25.23 after the intervention. A t-value of 4.79 at a significance level of 0.000 confirmed the differences made by the technique. This research contributes to growing evidence that creative instructional strategies, such as comic-based technique, can significantly enhance mathematical comprehension and improve students' numeracy skills. .

Keywords: Comic-book based Technique, Solving Fractions, Learning Style, Visual Learning

Introduction

Competence in fractions is fundamental for acquiring advanced mathematical skills, as it serves as a cornerstone in building a solid mathematical foundation. Nevertheless, mastering fractions poses a considerable challenge for numerous students, particularly those facing difficulties in learning mathematics. The problem, therefore, is two-fold: Grade 7 students' struggle with fractions and the need for effective teaching strategies to address this problem.

One aspect of effective learning is the quality of teaching materials. Nowadays, commonly used resources, mainly textbooks, often lack appeal and fail to captivate students' interests. Although there have been attempts to introduce variations, they have not significantly increased students' interest for reading. Hence, there is a need for the enhancement of teaching materials to better engage students. The development of teaching materials should align with curriculum requirements, cater to the characteristics of the target audience, and address problem-solving needs. Teaching materials encompass a systematic collection of content, both written and unwritten, designed to create a conducive environment that supports learning activities and facilitates the achievement of students' educational objectives.

To address these issues, educators and researchers are exploring alternative pedagogical approaches, and in this present study, a unique and innovative method will be introduced—integrating comics as an educational tool. This approach aimed to utilize the engaging potential of comics to make the learning process more accessible and enjoyable, thereby bridging the comprehension gap and enhancing students' mastery of fractions.

Grade 7 mathematics education employs a variety of teaching approaches, including traditional instruction with visual aids, collaborative learning, technology integration, and cognitive-behavioral strategies. These methods, personalized to meet individual needs, are designed to improve fraction-solving skills and provide students with a well-rounded educational experience. Adapting to the changing needs of students, especially in subjects like Mathematics, is crucial. Traditional lecture-based methods are no longer sufficient in today's visually oriented world.

Comics, as a form of artistic expression, are commonly found in daily newspapers. They often feature a combination of colorful or black-and-white visuals accompanied by text, sound effects, and images of words integrated into the panels. The spatial arrangement of these panels is a distinctive feature that sets comics apart from other media forms like television and films. In comics, the sequential arrangement of panels plays a crucial role in conveying the narrative, allowing readers to progress through the story at their own pace and engage with the content in a unique way.

According to Bizimungu in 2020, Fredrick-Ebert Stiftung (FES) Rwanda launched a virtual book and an SDG comic book project that contributes to SDG 4, Quality Education. The comic books demonstrate different concepts, making education more relatable and aiming to raise awareness of the SDGs, particularly quality education. Spreading the comic in unexpected places builds a sense of community while increasing awareness among local leaders in

achieving inclusive and equitable education for all. This offers an opportunity for teachers to leverage digital comics in learning to create immersive and impactful educational experiences, enhancing narrative, visuals, and interactivity. As stated by İlhan (2021), digital comics have proven to be effective tools in education, drawing attention and improving instructional efficiency. By incorporating comic-based, the researcher sought to investigate its potential use in instructing fractions by leveraging experiential learning, visualization, and storytelling. In the Philippines, where 33-40% of the population engages with comics for entertainment, education, and social commentary, leveraging this versatile medium can be particularly effective.

Theoretical Background

According to Firmansyah et.al. (2022), teachers should use Neil Fleming's VAK (Visual, Auditory, Kinesthetic) model since it works wonders for boosting students' motivation, cooperation, interest in and activity in their studies, all of which lead to better learning procedures and results. Comics, with their combination of text and images, offer a multi-sensory approach that caters to visual learners, facilitating a deeper understanding of mathematical concepts. For solving fractions, this approach can support metacognitive skills by helping students analyze fraction problems in context, self-pace their learning, and evaluate their comprehension through interactive and visually stimulating materials.

The study is framed within the ADDIE model—an instructional design framework encompassing Analysis, Design, Development, Implementation, and Evaluation phases. During the Analysis phase, the researchers' focus is on gathering information and identifying the specific learning needs, goals, and constraints of comic-book approach for Grade 7 students. The Design phase will concentrate on selecting relevant content and devising engaging activities aligned with comic-book methodologies. In the Implementation phase, the researchers will center on the utilization of the developed comic-book on the teaching-learning processes. The Evaluation phase will assess the effectiveness of the comic-book approach through data collection and analysis. The systematic application of the ADDIE model ensures a methodical and effective process in creating a valuable learning resource for students encountering challenges in fraction problem-solving. According to Stapa and Mohhamad (2019), ADDIE model is a popular instructional design framework that researchers use to create software or applications in the field of education. This model ensures a well-structured and effective learning experience, with the ultimate goal of improving understanding and proficiency in fraction-solving through a visually appealing medium.

Research Objectives

This research study aimed to determine the influence of Utilizing a Comic-book based Technique on Solving Fractions among Grade 7 students.

This study was conducted to:

1. Determine the learning styles of selected Grade 7 students at Don Manuel Rivera Memorial Integrated National High School (DMRMINHS).

2. Assess the pre-test score of Grade 7 students on solving fractions before the intervention of comic-book-based techniques.

3. Assess the post-test score of Grade 7 students on solving fractions after the intervention of comic-book-based technique.

4. Examine the significant difference between the pre-test and post-test results of Grade 7 students on the use of Comic-book based techniques on Solving Fractions.

4. Data and Methods

The following statistical procedures were used to interpret the data gathered from the respondents of the study.

The percentage for learning style quantified the distribution of different learning styles among respondents, revealing the proportion of students preferring each style.

The mean, standard deviation (SD), and mean percentage score (MPS) for pre-test and post-test assessed students' performance before and after the intervention, providing information into the average scores, score variability, and percentage-based performance. Raganit (2021) mentioned that using MPS for decision-making ensures student-centered outcomes, as the data is directly from students.

In 2024, Kent State University stated that paired t-test were used to analyze groups of subjects who received two distinct treatments, such as before and after intervention. This method ensures accurate data interpretation and enhances the reliability of the research findings.

Results

Table 1 summarizes the Mean and Percentage Level of the Learning Style of selected Grade 7 students.

Table 1 - Summary of Mean and Percentage Results

Table 1

N	Learning Style	M	SD	Percentage Level				
				Always	Frequently	Occasionally	Rarely	Often
30	Visual	125.5	13.68	44.44%	29.45%	11.11%	8.89%	5%
	Auditory	111	8.94	28.89%	39.44%	17.22%	11.67%	2.77%
	Kinesthetic	111.33	8.29	29.95%	40%	13.33%	13.33%	3.3%

suggests varying preferences among the participants for different learning styles—visual, auditory, and kinesthetic. In terms of visual learning, the majority of the students who answers "Always" employ visual methods, with percentages of 44.44%, mean of 125.5 and standard deviation of 13.68. Meanwhile, kinesthetic learning showed a considerable preference for "Frequently" and a second choice of respondents' learning style with a percentage of 40%, mean of 111.33 and standard deviation of 8.29. Auditory learning, on the other hand, the majority falls on the level of "Frequently" and being the third choice of respondents' learning style with a percentage of 39.44%, mean of 111 and standard deviation of 8.94.

These findings imply that a significant portion of the participants may benefit from incorporating visual aids into their learning experiences. For those who are inclined toward visual learning, vibrant illustrations, graphics, and visually appealing characters in the comic can cater to the preferences of those who learn best by seeing and creating strong visual associations. Shahani's (2023) study revealed that forty-eight percent (48%) of learners today are visually inclined, while others exhibit auditory and haptic learning preferences. It is important to tailor activities that cater to these diverse learning styles in order to enhance learning in the new normal.

Table 2 summarizes the Pre-Test Score of Grade 7 students on Solving Fractions before the intervention.

Table 2 – Summary of Mean Results

N	Items	Mean Score	SD	Min Score	Max Score	Mean Percentage Score (MPS)	Interpretation
30	50	11.9	3.11	5	18	24%	Low Mastery

Legend: 96%-100% Mastered, 86%-95% Closely Approximating Mastery, 66%-85% Moving towards Mastery, 35%-65% Average, 15%-34% Low, 5%-14% Very Low,

0%-4% Absolutely No Mastery

Table 2 outlines the result of the Pre-Test Score of 30 selected respondents who took a pre-test, with the mean (M) score of 11.9 and a standard deviation (SD) of 3.11. The minimum score recorded was 5, while the maximum score reached 18. The MPS (Mean Percentage Scores) results to 24% typically indicates that, on average, participants or test-takers achieved 24% of the total possible score on a given assessment or test. The low pre-test scores suggest that the participants had limited prior knowledge or understanding of the material. This was due to insufficient exposure to the content or gaps in foundational knowledge. The results indicate a need for targeted instruction to address these deficiencies and improve comprehension.

This analysis highlights the result of pre-test scores, where some students demonstrate consistent performance, while others show greater variability. As Makhubele (2021) examined, the errors learners make with fractions are often linked to inadequate mastery of foundational concepts. Despite the concept of sharing being a common aspect of their daily lives, students still find fractions to be a significant challenge. Therefore, these difficulties call for innovative interventions, such as comic books, which hold educational potential by presenting challenging topics in a visually appealing and relatable manner (Akcanca, 2020). By incorporating elements of storytelling and engaging visuals, comics can transform abstract concepts into tangible learning experiences that resonate with students.

Table 3 summarizes the Post-Test Score of Grade 7 students on Solving Fractions after the intervention.

Table 3 – Summary of Mean Results

N	Items	Mean Score	SD	Min Score	Max Score	Mean Percentage Score (MPS)	Interpretation
30	50	25.23	5.02	18	31	50%	Average Mastery

Legend: 96%-100% Mastered, 86%-95% Closely Approximating Mastery, 66%-85% Moving towards Mastery, 35%-65% Average, 15%-34% Low, 5%-14% Very Low,

0%-4% Absolutely No Mastery

Table 3 outlines the results of the Post-test Score of Grade 7 Students, with the mean (M) score of 25.23 and a standard deviation (SD) of 5.02. The minimum score recorded was 18, while the maximum score reached 31. The MPS (Mean Percentage Scores) results to 50% typically indicates that, on average, participants or test-takers achieved 50% of the total possible score on a given assessment or test. This suggests that on average, participants have demonstrated a level of understanding or performance that is right in the middle of the possible range. This is because the post-test measures the same framework as the pre-test after the intervention, students were likely more familiar with the content and assessment format, contributing to their better performance.

Research shows that visual literacy interventions, like comics, have gained attention for helping learners better interpret visual information. Following the introduction of comics, improvements in students' comprehension and engagement have been observed (Golding & Verrier, 2020).

Table 4 summarizes the Difference between the pre-test and post-test results of Grade 7 students on the use of Comic-book based techniques.

Table 3 - Summary of Paired t-test Results

N	Variables	Mean Score	SD	t-value	t-tab	Sig. (2-tailed)	Verbal Interpretation
	Pre-Test	11.9	3.11				
30	Post-Test	25.23	5.02	4.79	1.70	0.000	**Significant**

Legend: 5.00 – 4:21 Extremely Literate, 4:20 – 3:41 Highly Literate, 3:40 – 2.61 Moderately Literate, 2:60 – 1.81 Limited Knowledge, 1.80 – 1.00 No Knowledge

Table 4 shows the results of paired sample t-test from the pre-test and post-test results of Grade 7 students. A paired sample t-test was further used to analyze and determine whether there is an improvement between the results of the pretest and the post-test (Musa et al, 2020). The paired sample t-test with a group of 30 respondents showed a significant positive change in scores after an intervention. The average scores increased from 11.9 before the intervention to 25.23 afterward. The computed t-value of 4.79, compared to the critical value of 1.70, indicates a substantial and reliable improvement. The low significance level of 0.000 confirms the statistical significance of the change.

In practical terms, the significant rise in students' scores demonstrates that the comic book-based teaching method was effective in improving their fraction-solving skills. This implies that the comic book approach was highly effective in facilitating learning and achieving better educational outcomes. The findings suggest that there is a need to match the curriculum and teaching materials of educational institutions with inventive techniques, such as incorporating comic strips, to maintain coherence in both teaching methodologies and assessment procedures like this (Casumpang & Enteria, 2019). The improvement in students' fraction-solving skills, as demonstrated by the higher post-test scores, highlights the substantial influence of using comic books as an innovative teaching tool. This approach aligns well with the recommendation to integrate creative methods into education to enhance learning outcomes and ensure that teaching strategies are both engaging and effective.

Conclusions

The post-test results were significantly better than the pre-test results, indicating that the technique helped improve their understanding and skills related to fractions. Therefore, the researcher rejected the null hypothesis, providing evidence that there is a significant difference between the pre-test and post-test results of Grade 7 students on the use of Comic-book based techniques on solving fractions. .

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