

Research Article

Mastery Levels and Experiences in Learning Addition and Subtraction of Fractions Through Flipped Classroom Model Approach Among Grade 5 Learners

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Abstract

As the education sector in the Philippines returned to face-to-face classes after the two-year implementation of remote education due to the pandemic, learning gaps and losses became an ostensible problem among learners. At the onset of the post-pandemic, flexible, effective, active, and student-centered teaching strategy becomes necessary to deal with the demands of transition from remote to face-to-face learning. Hence, this study aimed to investigate the effectiveness of the flipped classroom (FC) model approach in teaching fractions. Specifically, it sought to assess the mastery levels and experiences of the subjects in learning addition and subtraction of fractions in implementing the flipped classroom model approach. Video lessons and worksheets were used in this study. Pre-posttest and interview questionnaires were used to gauge the mastery levels and experiences of the learners, respectively. Results showed that a significant change in the mean percentage score (MPS) is perceived, implying the effectiveness of the FC model approach in teaching addition and subtraction of fractions. Challenges and beneficial effects of the implemented approach and remarks on the materials used were noted based on the learners' accounts. With the findings of the conducted study, it is recommended that the FC model approach should be considered in teaching Mathematics, especially in teaching the least learned competencies.

Keywords

Flipped Classroom Model Approach, Mathematics, Fractions, In-class Learning

1. Introduction

The COVID-19 pandemic brought dramatic impacts across every aspect of people's lives—the education sector wasn't excused from these as many schools across the globe were closed for two years [25] to mitigate the spread of COVID-19. The two-year pause of face-to-face classes brought depression and anxiety, not just to teachers, but much to learners in the Philippines [6] and across the globe [3, 12, 22] because of the rapid change of modality in education.

After the distressing COVID pandemic, the post-pandemic

followed—the transition and the recovery period. Many schools around the globe are now trying to reopen schools for face-to-face learning. As part of the Department of Education (DepEd) transition program from remote education to face-to-face learning, DepEd Order No. 17, s. 2022 was released last April 6, 2022, stipulating the guidelines on the progressive expansion of face-to-face classes—providing the mechanism and standards for face-to-face classes implementation. Apparently, on the return of face-to-face learning, learning loss, and

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gaps become a predominant problem not only in the Philippines but across the world [8, 17].

In the researcher's context, mathematics learning outcomes remain the lowest even before the pandemic. As revealed in the Schools Monitoring, Evaluation, and Assessment (SMEA) Report of Baresbes Elementary School for the last four (4) school years, Mathematics had a very low overall mean percentage score (MPS). For the SY 2017-2018, the overall MPS was 80.82%, for SY 2018-2019 the overall MPS rose to 81.23% and last SY 2019-2020, the MPS was 81.82%. Then, last year, when the school delivered the competencies through purely modular distance learning, the MPS worsened to 79.85%, and last school year 2021-2022, mathematics remained one of the learning areas that had the lowest MPS with 80.56%.

Reviewing the previous item analysis for the last three years, it was consistently exposed that one of the least mastered competencies during the first quarter was the addition and subtraction of fractions (M5NS-Ie-84 and M5NS-If-85 for the K-12 Basic Education Curriculum Guide; and M5NS-Ie-84 for the K-12 Most Essential Learning Competencies).

In the transition of education from remote to blended face-to-face learning, one of the recently discovered and well-known learner-centered teaching approaches implemented by educators in different learning levels and contexts is the flipped classroom model approach. The flipped learning model is an ideal learner-centered teaching approach as this mode provides learners with active learning, peer learning, cooperative learning, problem-solving learning, and participatory learning [13]. Learner-centered teaching has five characteristics: (1) engages students in the learning, (2) motivates and empowers learners by giving them some control over learning processes, (3) encourages collaboration, (4) encourages students to reflect on what they learn and how they achieved it, and (5) teaches learners to think, analyze, and generate hypotheses [24].

Numerous investigations were conducted by educators at different educational levels and contexts regarding the effectiveness of flipped learning in improving learning outcomes [1, 4, 7, 18, 20, 21, 23, 14]. Various Researchers also found that flipped learning increases learners' motivation, and engagement [2, 9, 18], and attitudes towards learning to better

attain learning outcomes [11]. A study on students' experiences in flipped classroom courses concluded that learners preferred learning the content before in-person classes and application during class time [15, 16].

A well-designed flipped learning offers avenues to develop mathematical thinking and understanding among learners [5].

Hence, this research aimed to gauge the mastery and experiences of the Grade 5 learners in addition, and subtraction of fractions after employing the flipped classroom model as a teaching strategy.

2. Research Objective

The study aimed to investigate the effectiveness of utilizing the flipped classroom (FC) model approach in the mastery levels and experiences of Grade 5 learners. Specifically, it aimed to (1) ascertain the mastery levels of the Grade 5 learners in adding and subtracting fractions before and after the implementation of the FC model approach; (2) identify the significant difference in the mastery levels of the Grade 5 learners before and after the implementation of FC model approach; (3) determine the experiences of the learners in the implementation of the FC model approach; and (4) identify the necessary improvement to enrich the flipped classroom model approach.

3. Methodology

This action research used a quantitative-qualitative descriptive-comparative experimental research method. Video lessons were given to the pupils as their activity during out of the class, while worksheets were used during class time. Availability of cell phones with installed Facebook messenger or any available gadgets for audiovisual material at home, and mastery level in Mathematics during the fourth quarterly exam of SY 2021-2022 were considered in determining the 35 or 68.62% participants of the study. Validated teacher-made pre-posttest and interview questionnaires were used to determine the mastery levels and experiences of the subjects, respectively.

4. Results and Discussion

Table 1. Mastery Levels of Pupils BEFORE and AFTER the Implementation of Flipped Classroom Model Approach.

Competencies	Pretest		Posttest	
	MPS	QD	MPS	QD
Addition and Subtraction of Fractions	37.50	Little or No Mastery	76.01	Partial Mastery of Target
Addition of Dissimilar Fractions	20.27	Little or No Mastery	60.81	Little or No Mastery
Subtraction of Dissimilar Fraction	21.28	Little or No Mastery	70.61	Partial Mastery of Target

Competencies	Pretest		Posttest	
	MPS	QD	MPS	QD
Addition of Mixed Fraction	14.86	Little or No Mastery	55.07	Little or No Mastery
Subtraction of Mixed Fraction	10.81	Little or No Mastery	46.96	Little or No Mastery
Over-all	20.95	Little or No Mastery	61.89	Little or No Mastery

Table 1 shows the mastery levels of pupils before and after implementing the flipped classroom model approach. It can be gleaned from the result that there is an increase in the mean percentage score of the learners from 20.95% (pretest) to 61.89% (post-test), however, both pre-and post-mastery levels remain in the Little or No Mastery qualitative description.

The result implies that even if there is an improvement in

the MPS of the learners, their mastery levels remain at the lowest level. Hence, it suggests further instruction to pupils to elevate their understanding of the identified sub-concepts in Mathematics.

Difficulties in learning fractions could be much less likely to meet mathematics achievement, prefiguring struggles to more advanced mathematics [10].

Table 2. Difference in the Mastery Levels of Pupils BEFORE and AFTER Implementation of the Flipped Classroom Model Approach.

Competencies	Type of Test	Mean	QD	t-value	p-value	Effect size	QD
Addition and Subtraction of Fractions	Pretest	37.50	Little or No Mastery	-10.883	0.000	0.767	Medium
	Posttest	76.01	Partial Mastery of Target				
Addition of Dissimilar Fractions	Pretest	20.27	Little or No Mastery	-8.0348	0.000	0.642	Medium
	Posttest	60.81	Little or No Mastery				
Subtraction of Dissimilar Fraction	Pretest	21.28	Little or No Mastery	-13.138	0.000	0.8274	Large
	Posttest	70.61	Partial Mastery of Target				
Addition of Mixed Fraction	Pretest	14.86	Little or No Mastery	-8.4581	0.000	0.665	Medium
	Posttest	55.07	Little or No Mastery				
Subtraction of Mixed Fraction	Pretest	10.81	Little or No Mastery	-7.3691	0.000	0.6013	Medium
	Posttest	46.96	Little or No Mastery				
Over-all	Pretest	20.95	Little or No Mastery	-	0.000	0.8050	Large
	Posttest	61.89	Little or No Mastery				

Table 2 discloses the difference in the mastery levels of the Grade 5 learners across the identified sub-concepts along with the addition and subtraction of fractions before and after implementing the flipped classroom model approach. All the competencies received significant improvement as inferred from the computed t-values and p-values in each sub-concept with effect size ranging from medium to large effect. Generally, there is a significant improvement in the mastery level of the Grade 5 learners before and after the implementation of the tested teaching strategy as implied by the com-

puted $p=0.000$ and $t(36)=-12.1927$ with an effect size equivalent to a large effect ($\eta^2=0.8050$). The result is consistent with the findings of other researchers who studied the effectiveness of flipped learning in promoting better academic performance and achievement at all levels in various disciplines—in undergraduate classes [18, 20], high school [14, 21, 23], and even elementary school [7]. Conversely, the result opposes previous research which concludes that the flipped classroom approach shows no measurable impact on the academic achievement of students when compared to traditional learning [4, 15].

A well-designed flipped classroom strategy offers a great opportunity to promote mathematical potential and understanding among learners [5]. Moreover, positive attitudes towards flipped classrooms using video or any ICT media correlated with positive and effective learning outcomes [18]. Thus, the use of various instructional materials in flipped classrooms can have a great impact on students' learning and

their interests in learning.

Moreover, the effectiveness of the flipped learning strategy can also be linked to its flexibility and mobility. The flipped classroom model allows students to learn at their own pace, encourages students to actively engage with the lecture material, and creates effective, creative, fun, active, and productive in-class learning [2, 9].

Table 3. Experiences of the Grade 5 Learners in the Implementation of Flipped Classroom Model Approach.

Themes	Sub-themes
Challenges Encountered	Slow/Lack of Internet Connection Lack of Assistors at Home Promote Independent Learning
Beneficial Effects of the Flipped Classroom Model Strategy	Advance Learning Active In-class Learning Self-instructional video lesson
Remarks on the Materials Used	Instructive Worksheet

Table 3 presents the experiences of research participants in implementing the flipped classroom approach. Based on the responses of the participants in the interview questionnaire, the researcher generated three thematic areas—challenges encountered, beneficial effects of the flipped classroom strategy, and remarks on the materials used.

For the challenges encountered, two of the problems identified were considered external factors such as the difficulty in accessing the videos due to slow or lack of internet connection at home and the difficulty of independent learning. The lack of assistors or more knowledgeable others at home who could assist them in understanding the learning videos was another problem encountered by the respondents. Learning assistance is needed to help students overcome learning difficulties [19].

“I have difficulty in watching the video at home due to slow internet” (Respondents 4 and 17). “The video is choppy.” (Respondents 12 and 16).

“Even if I repeatedly watched the video, I can still hardly understand the lesson” (Respondent 7). “I do not know how to do it. No one can help me at home” (Respondent 15). “My parents cannot help me, because they do not understand also the lesson” (Respondent 23).

On the other hand, the beneficial effects of the teaching model were noted based on the participants' accounts. Some learners found that the approach promotes independent learning and encourages students to recite and be active in class. It made learning interactive among learners. It can be implied that flipped learning stimulates students' classroom engagement. The flipped learning strategy opportunities for students to interact with their teachers and peers, thus providing an active learning

environment [2, 11, 18].

“The video gives me an idea about our lesson the next day” (Respondents 8 and 19). “I learn to solve fractions through the video lesson” (Respondent 27).

“I have already an idea about our lesson, so I can already participate during the class discussion” (Respondents 28 and 1).

Additionally, some participants' transcriptions detail their positive remarks on the materials used in implementing the flipped learning strategy, describing the video lesson and worksheets as self-instructional and instructive, respectively.

5. Conclusions and Recommendations

The mean percentage score of the learners increased after implementing the flipped classroom model approach. Nonetheless, their mastery level remained as Little or No Mastery, implying that the learners need further explanation or remediation in the addition and subtraction of fractions. It is recommended that a review of the results of the post-test shall be done to gather the errors and misconceptions of the learners which are necessary in the conduct of remedial instruction.

Likewise, the strategy leads to significant improvement in the learning of the learners with medium to large effect which implies that the teaching strategy is effective in increasing learning. Hence, Mathematics educators are encouraged to implement a flipped learning approach in their Mathematics teaching to improve learning outcomes.

Various experiences were noted from the learners' transcriptions. The learners encountered challenges on external factors such as slow/lack of internet connection and lack of assistors at home thus, teachers must converse with the learners to ensure that their concerns and issues are attended.

Abbreviations

FC	Flipped Classroom
MPS	Mean Percentage Score
COVID	Coronavirus Disease
DepEd	Department of Education
SMEA	School Monitoring, Evaluation, and Assessment
K-12	Kindergarten to Grade 12

Author Contributions

Cinense Johnnefer Caballero is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

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Research Fields

Cinense, Johnnefer Caballero: education research, quantitative-qualitative research, descriptive-comparative research, action/experimental research, mathematics education, blended learning