

## Blind Special Education Students' Mathematics Psychology in the Pandemic: The Impact of Flipped Classroom Learning

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Received: 27-December-2022

Revised: 10-February-2023

Accepted: 09-March-2023

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### Abstract

Blind students' mathematics learning results during the Covid-19 epidemic will be examined in this research using a Flipped Classroom approach. This research makes use of a quasi-experimental approach that includes non-equivalent control groups. Blind kids in grades IV and V make up the study's population of 16 participants. Saturated sampling was used to collect the samples. Students in the experimental class are taught using the Flipped Classroom paradigm, while those in the control class are taught using a direct learning approach as a comparison. A p-value greater than 0.05 indicates that the data are normal and homogenous. The average of two unpaired samples from data is compared using the independent sample t-test. There is no H<sub>0</sub> for a t-statistic of less than 0.05; if it is less than 0.05, it is not accepted. First, the Sig.t count (2-tailed) or the P-value are compared to make the first decision. After the second judgment, H<sub>0</sub> is no longer a valid hypothesis. Learning arithmetic in a traditional classroom or without any treatment utilizing the Flipped Classroom methodology was shown to be less beneficial for blind pupils during the covid-19 outbreak.

**Keywords:** Learning Outcomes; Flipped Classroom; Covid-19; Mathematics education; Blind Students, Special Education, Psychology

### Introduction

Philippines was plagued by a Covid-19 epidemic in 2020. All facets of life are affected by the pandemic era, including schooling. Online distance learning during a pandemic is one of the government's strategies in this scenario (PJJ) (Aini et al., 2020). Learner comprehension is projected to be fully realized in online education using media, according to Jomezai et al., (2021). Children with disabilities, including those who are blind, must also feel this optimism. There are many aspects of everyday life, like teaching and learning, that might be hindered by blindness, like the inability to see (Lebrasseur et al., 2021). An individual who is blind must first master the abilities of hearing and touching. According to an interview conducted by the researcher, learners in Class V were having difficulty learning mathematics during this pandemic since a blind student frequently demands extra attention from the teacher at school. Mathematics and counting that should be mastered, like two-dimensional diagrams, tables, fractions, measures, and lines, are all examples of mathematics that may be mastered. Because of this, the student's ability to see is required for the use of these resources (Hunt et al., 2019).

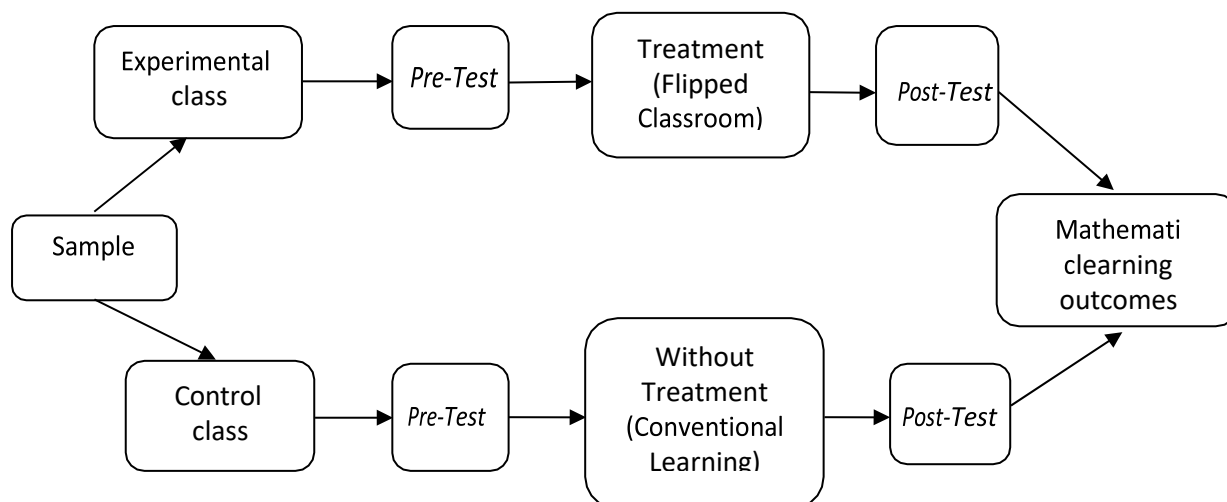
Because they were unable to communicate with their pupils face-to-face, teachers at the school found it challenging to teach online. A technique of teaching media that may be conveniently utilized by blind students when they are away from school and studying at home is the Flipped Classroom approach. If you're teaching a visually impaired pupil, you must employ media that are both tactile and auditory, like braille writing and embossed graphics, in order to help them learn. An educational approach in which content explanations are offered outside of class time and homework assignments are carried out at school is known as the flipped classroom. For example, learners were given homework from their instructor at home, and the instructor will finish them in class as part of the notion of a "Flipped Classroom" (Strelan et al., 2020). As a result, the Flipped Classroom learning paradigm is a method of reversing school and home activities.

When teaching visually impaired pupils in a Flipped Classroom, the media should be able to help them by highlighting the audio. There are several benefits to using the Flipped Classroom paradigm in the classroom (Tsai et al., 2020). Because it is so simple, the Flipped Classroom approach is ideal for anyone with visual impairments who want to study online. Learners who are blind will benefit from the Flipped Classroom technique since it allows them to hear the book's information without having to read it. Filipinos who prefer to listen to information rather than read books can benefit greatly from the Flipped Classroom audio model, which may also be used to assist blind pupils in understanding the content of a reading book (Murillo-Zamorano et al., 2019).

In light of these issues, the study question posed is: What is the relationship between blind pupils in the Covid-19 pandemic's classrooms using the Flipped Classroom model? Students with visual impairments might benefit from studying the Flipped Classroom model's impact and results, particularly in mathematics, which requires extra care and attention. There are several challenges that blind learners have while studying mathematics, and this study focuses to alleviate them. Covid-19 may also be used to examine the influence of Flipped Classroom instruction on the arithmetic achievement of visually impaired pupils. Learners, instructors, and researchers are all anticipated to benefit from this new video-based learning method. For learners, the Flipped Classroom concept is supposed to help them understand mathematical information and sense a different kind of learning environment. Teachers are encouraged to utilize this study as a guide for implementing the Flipped Classroom learning paradigm for blind students in order to enhance their math learning results and their willingness to learn.

### Method

The researcher in a quasi-experiment accepts the subject's situation as easily as possible. In order to avoid having to re-randomize the topic selection since the problem has already been discussed in each particular class, this was the only option. A Flipped Classroom learning treatment is used in the experimental class, whereas a conventional learning treatment or no Flipped Classroom treatment is used in the control class. The results of a description exam used to gauge blind pupils' arithmetic achievement serve as the study's dependent variable. Direct instruction or instruction without the Flipped Classroom treatment are the only things that aren't influenced by this study's design in the experimental group. The Nonequivalent Control Group Design is the form of quasi-experimental research employed in this study:



**Figure 1. Control Research Design Without Equivalents**

The even semester of the school year 2020/2021 ran from September 5 to August 8, 2021, when this study was carried out. Four learning meetings were held in the experimental and control courses as a result of this study. First, on September 5, 2021, a pre-test was administered, followed by learning sessions on September 6 and 7, 2021, and a post-test and learner surveys during the final meeting on September 8, 2021. A post-test was administered to see whether the experimental and control groups had different levels of material knowledge in mathematics. In this study, blind kids in grades VI and V were the subjects. There were 16 persons in all, split into two groups. Researchers in this study utilized a sampling method known as saturation sampling to choose

their sample. There are eight learners in the first class and eight students in the second class. In order to implement the Flipped Classroom learning paradigm, which needs groups to discuss prior content, the course selected for this purpose is class VI, which has 8 blind learners on board.

This study's data collecting tool is a test with description questions for measuring blind children' mathematics learning results. For the purposes of comparing the average mathematics learning outcomes between the experimental class and the control class, the study findings are tabulated and statistical tests are used to examine them. Independent Sample T-Test, Gain Score Homogeneity Test, and Kolmogorov-Smirnov Normality Test are all used to determine whether the average of two samples that are not in pairs from the data differs.

### Result and Discussion

After two sessions, a test consisting of description-based questions is given to examine the progress of pupils who are blind in learning mathematics. A student's experiences in the classroom have the potential to have an impact on their future behavior (Liu et al., 2019). A person's personality changes as a result of learning. Statistics for the experimental and control classes Table 1 summary the outcomes of the tests.

**Table 1.** Experiment and Control Class Statistical Test Results

Class	$\bar{X}$	Xmin	Xmax	Std. Deviation
Experiment	92,32	85	100	7,164
Control	82,32	75	100	11,327

Table 1 shows that blind learners in the experimental class who got the Flipped Classroom learning approach had better average mathematics learning results than learners in the control class who received direct instruction. Flipped classrooms have the potential to both boost student happiness and creativity (Lg & Saele, 2019). According to this argument, the experimental class has a greater grasp of mathematical content than the control class does. This is a significant finding. It is important to conduct a statistical test in order to establish whether or not the difference in the average of the two classes is significant. A normality and homogeneity test must be carried out before deciding on the sort of test to be employed. Table 2 shows the results of the normality tests.

**Table 2.** Result of the Normality Test.

	Class	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
	Pre-Test of Experimental Class (FC)	0.182	8	0.201	0.959	8	0.819
	Post-Test of Experimental Class (FC)	0.292	8	0.118	0.823	8	0.090
Result	Pre-Test of Control Class (Conventional)	0,255	8	0.201	0.865	8	0.213
	Post-Test of Control Class (Conventional)	0.203	8	0.201	0.852	8	0.168

A statistical test is used in Table 2 to see whether the data is regularly distributed. Kolmogorov-Smirnov test for normality using SPSS 25 software. The retrieved data have a significance value greater than or equal to 0.05. The variable is then assumed to have a normal distribution. We may use the Independent Sample t-Test and Paired Sample t-test tests, which both assume normally distributed data, to discover the solutions to these issues. Pre-test and post-test data from the experimental class (Flipped Classroom model) and control class (conventional model) were used in a paired sample t-test. Table 3 shows the Paired Sample t-Test findings.

**Table 3.** Paired Sample t-Test Outcomes

		Paired Differences							
		Mean	Std.Dev	Std. Error Mean	95% Confidence Interval of the Difference		t	Df	Sig. (2-tailed)
					Lower	Upper			
First Pair	Pre and Post-Test of Experimental Class	-57,334	11,689	4,772	-69,601	-47,066	-13,224	5	0.000
Second Pair	Pre and Post - Test of Control Class	-52,666	14,719	6,010	-68,115	-37,220	-9,599	5	,000

Based on the findings of Table 3, blind learners' average mathematics learning scores improved significantly between the pre-test and post-test of the experimental class. This is flipped in a classroom Sig. (2-tailed) results in 0.000 0.05, based on the data. Pre-test and post-test findings for the control class demonstrate a difference in the average mathematics learning outcomes for the remaining blind, it is feasible to conclude. Once the paired sample t-test interpretation was decided, the Homogeneity Test was performed to assess the data. The homogeneity test results are shown in Table 4.

**Table 4.** Results of the Homogeneity Test

		LS	df <sub>1</sub>	df <sub>2</sub>	Statistical Significance
Post Test	Mean	0.000	1	11	1.000
	Median	0.000	1	11	1.000
	Median and with adjusted df	0.000	1	9.495	1.000
	trimmed mean	0.000	1	11	1.000

Note: LS- Levene Statistic

As can be observed in Table 4, the significant value (2-tailed) of the outcome shows an average difference between the experimental class and the control class in regards of blind learners' mathematics learning results. So, it may be stated that the Flipped Classroom Model has an impact on the math learning results of blind learners in the covid-19 pandemic. The independent sample t-test, which examines if the means of the two unpaired samples vary, is the last test to be performed once the data have been pronounced regular and homogenous. Table 5 displays the test findings using an independent sample t-test.

**Table 5.** The Independent Sample t- Test's Outcome

Levene's Test for Equality of Variances					t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Result	Equal variances assumed								Lower	Upper
			0.000	1.000	5,813	11	0,004	24,334	5,933	11,315

	Equal variances not assumed			5,720	10,919	0,002	24,334	5,845	11,304	33,360
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Table 5 shows the independent sample t-test result of  $1.000 > 0.05$  for Sig. Levene's Test for Equality of Variances. Neither the experimental class nor the control class showed any variation in data variance (the comparison class). The first row of the table may be explained as follows: We regarded the two population variances to be equivalent. Using the Mean Difference column, you can see how much the two groups' means vary from each other. For this reason, the experimental (flipped) classroom therapy group had an overall higher average than its control group (class without Flipped Classroom treatment). If the Sig. t-count is less than 0.05,  $H_0$  is approved; otherwise,  $H_0$  is rejected, according to Huang et al. Based on Sig.t count data, the Equal Variances guideline t-count is significant enough to imply rejection of  $H_0$  and acceptance for  $H_1$ .

Using t-count and t-table with the following criteria, depending on the second decision: If t is less than or equal to  $t_{1-\alpha}$ ,  $H_0$  is approved; otherwise,  $H_0$  is refused. Because the t-count value is 4.720 and the t-table (68; 0.024) is 1.997,  $H_0$  is rejected and  $H_0$  is not sufficient to accept. This means that students with visual impairments who were exposed to the covid-19 virus were more likely to benefit from studying mathematics via the Flipped Classroom methodology than those who were not. According to Huang et al. (2022), the Flipped Classroom may boost student happiness and creativity. Students who utilize the Flipped Classroom learning model are more responsible when they study on their own, therefore their learning results are better than those of learners who use conventional methods (Lopes & Soares, 2018). As this study demonstrates, the Flipped Classroom learning model may considerably increase math students' accomplishment and is also extremely effective for enhancing learning achievement at all levels of education in the cross-scientific area (Qiu et al., 2021). (Chen et al., 2020).

Math outcomes for blind students in the covid-19 pandemic are better with the use of a flipped classroom learning paradigm. With the Flipped Classroom learning paradigm, students learn by doing rather than by listening to lectures, which allows for more time for discussion and hands-on exercises. As a result, learners are instead required to view videos from their instructor before to a meeting in order to better comprehend the topic they would be discussing with their professors in person or online. The flipped classroom learning technique was used to conduct this study, which included both classroom and non-classroom activities. When studying outside of the institution, pupils who are blind have difficulty understanding the content, thus the school provides activities to help them better understand it. There are five stages to an activity in a classroom: 1) Begin the exam by giving a preliminary test or warm-up exercise; 2) discussing with peer; 3) presenting the results of the study of the material's comprehension; and 4) concluding the course; 5) Giving learners a post-test and a survey.

Learning the Flipped Classroom paradigm, outside of the classroom, consists of the following: 1) Using audio intonation, the instructor creates a particular learning video for pupils who are blind or visually impaired. Recordings of the instructor's voice were used to demonstrate concepts like direct classroom learning in the video. 2) Teaching a video to learners using this method involves uploading an instructional video on youtube that is then shared with students through their WhatsApp group. Students may access a webpage with a collection of math tutorial videos, which they can see online or save to their computer for later viewing or downloading. 3) Before class begins, students view the movie in the comfort of their own homes or wherever they happen to be. Learners are supposed to be able to comprehend the information presented in the video at this point.

The five phases of a Flipped Classroom deployment are as follows: First step, learners take a pre-test to see how well they comprehend the subject in the instructional video they've just seen. Give learners a pre-test is critical in order to get them to view the video before class starts. As a consequence of the pre-test, teachers may use this information to motivate pupils who are blind to do better on the pre-test at a subsequent meeting. Presenting the outcomes of assessments to students motivates students to be eager and autonomous learners, according to Lin et al. (2018).

The second step is to have a discussion. During the pre-test, the instructor provides time for pupils to ask any questions they may have concerned the information covered in the previous lesson's video. With the learners'

permission, the instructor initiates a debate. If pupils don't grasp what's going on in the meeting, it's time to implement. In addition, other peers were permitted to address questions from peers who were unable to comprehend the movie. It's a good way of encouraging students to pay attention in class the following time, so they can answer questions from their peers who aren't as familiar with the content.

The third step is for learners to complete the activities. After there were no more questions from the other learners, the instructor sat down with the blind pupils and had a one-on-one discussion with them. It's up to the students to decide what they want to talk about. To help pupils better grasp the content, the instructor provides an activity. It will be simpler for students to answer problems on the next exam if they are used to working on activities while learning or studying.

Presenting the discussion outcomes in an online course is the fourth stage in the process. Learners were required to complete the activities and submit the outcomes of their discussions when they had completed them. A question-and-answer period is opened if any learners want to raise concerns about the information presented by their peers.

The last step is to wrap up all of the learning experiences. During a lesson, students and teachers reflect on what they have learned and draw conclusions about the information that has come before them. Then, the instructor instructs pupils to view the films that have been posted on the web page for the next meeting and encourages them to do their best on the upcoming tests.

Learners with visual impairments may benefit from using a Flipped Classroom model like the one above. Because of the Flipped Classroom methodology, kids have adequate time at home to grasp the arithmetic concepts they are learning in class. It is possible for students to keep playing until they have mastered the content. Direct learning courses are not the same as this. The content is just once explained by the instructor. When pupils inquire, the instructor is only able to recreate some aspects of the lesson. Due to the restricted amount of time available for instruction, students must not be able to review previously learned content. Learner arithmetic results are better when they study the Flipped Classroom methodology rather than the traditional way of doing things.

Learners in the Flipped Classroom learning model class have prepared preparations from comprehending the subject discussed in class before having a virtual class or online through zoom meeting. This is a significant improvement over a traditional classroom setting. In a natural learning class, learners begin studying content that they may have only a rudimentary grasp of or may not even be familiar with. One reason for this is that many of the pupils arrive to class unwilling to learn. The instructor's manner may help students grasp the information. Students who come to the class having a solid foundation in the subject matter will do better than those who don't have any prior knowledge of the subject matter. As a result of this assertion, one of the reasons for the disparity between the math learning results of learners in the Flipped Classroom learning model and those in the conventional class learning model may be identified.

Learners who are blind may benefit from a film that stresses aural intonation and plays it back and forth until they get the concept. Using this strategy, students will be able to access their learning information over and over again, making it easier for them to retain it. It's a win-win situation for learners since they can access their learning resources whenever and whenever they choose (Lapitan et al., 2021). Students in a class using the direct learning style are unable to complete this task. This study's Flipped Classroom implementation experienced challenges despite its numerous benefits. In the beginning, learners had problems downloading movies since the size of the capacity is too high, forcing them to view on the web page utilizing their learner data package. In addition, some pupils lack the necessary technology to watch videos. Learners may also have trouble following explanations on videos that are difficult to follow—i.e., not grasping the content by the 15<sup>th</sup> minute. Even after hearing the recording, the pupils were left perplexed for the following several minutes. There are some kids who prefer to be taught in a classroom setting since they may ask the instructor questions right away if they don't comprehend what the instructor has said.

## **Conclusion**

It is possible to draw the following conclusion based on the findings of the studies and statistical analyses that have been carried out: the Flipped Classroom learning model has an effect on the mathematical learning results

of blind learners in the covid-19 level. This impact is produced because the learning process of the Flipped Classroom model offers learners more time to grasp the overall topic, and because the existence of the video compels students to play it again if they feel as though they have forgotten about the preceding material. Additionally, this impact is produced because the video compels students to play it again if they feel as though they have forgotten about the preceding material. The learning style known as the Flipped Classroom often involves students participating in activities both inside and outside the classroom. Both of these pursuits are very essential and should be carried out to their full potential in order to achieve desirable outcomes. The Flipped Classroom learning paradigm, although having a number of benefits, also has the potential to have a number of drawbacks, which might make it more difficult to resolve these issues. The role of the instructor is necessary in order to handle the situations that have the potential to distract the class.

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