

The Effect Of Class-Wide Discussion Method On Students' Conception Of Right Triangles

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ABSTRACT

The main purpose of the study is to determine the effect of the Class-wide Discussion Method (CWD) on students' level of conception on Right Triangles. The study involved one intact class which consists of twenty-four students of STI College - Paranaque during the first semester of school year 2010-2011. The instruments used in the study were researcher-made two-tier concept test administered in the pretest and the posttest, concept test for drills and exercises which were given during the Class-wide Discussion Method, questionnaire on the students' perception on the use of class-wide discussion method and the interview guide. The data gathered were interpreted quantitatively and qualitatively. This research study sought to answer the following specific problems: 1. What is the students' level of conception of right triangles before and after the class is taught using the Class-wide Discussion method? 2. What is the level of conception in each category of right triangle before and after the use of Class-wide Discussion method? 3. Are there differences on the students' level of conception of right triangles before and after the class is taught using the Class-wide Discussion method? 4. What is the students' perception on the use of the Class-wide Discussion method in solving right triangles? The effect of the Class-wide Discussion Method was determined by comparing the students' pretest and posttest scores in the Concept Test. Based on the result of the pretest and posttest, majority of the students' level of conception improve after the implementation of the Class-wide Discussion Method. As regards to students' views on the use of Class-wide Discussion method, students found the lessons interesting and enjoyable that eluded boredom. It was concluded that the use of Class-wide Discussion Method is enjoyable, helped students develop positive attitude towards mathematics, and enhanced students' conception on right triangles.

Keywords: Class-wide discussion method

INTRODUCTION

A true educator is one who endeavours to find ways and means of continually improving the learning situation with which he is connected. He evaluates the trends in education and chooses for his purpose what is believed the best, to achieve the goal of mathematics in the curriculum.

Trigonometry is an integral part of every tertiary mathematics program. One can be drawn to the subject as interesting as trigonometry because of its nature as an applied mathematics where concepts are easily concretized through applications. However, a student who is taking the course may see it as an added burden to the learning difficulties that it presents.

As has been observed from the researchers' previous classes, most of the students find difficulty in solving right triangles. The teaching approach employed by

teachers is one big factor that contributes to the learning of the students. The teacher should therefore find ways for new and effective teaching strategy that will suit the level of understanding of the students. One way to tackle this difficulty is to engage students in active discussion in situations where their current understandings will be challenged where they can experiment with alternative conceptualizations (Hake, 1998). Learning environments that involves active learning are known to develop critical thinking and deep conceptual understanding in students (Anderson et al., 2001).

In an attempt to improve concept learning in sciences, some higher education researchers have harnessed development in information and communications technology to help support the management of interaction and discussion in large classes. They have modified the traditional lecture format in science education. Mazur (1997) and Dufresne et al., (1996) are two of the researchers who have refocused teaching on core concepts in the discipline using a sequence that involves cycles of short presentations followed by concept questions (tests), immediate feedback and peer group and/or class-wide discussion.

Class-wide Discussion method is one of the approaches that involve active learning. Class-wide Discussion method allows students the opportunity to develop and test their ideas before being asked to share them with the entire class. Small group discussions can encourage students to voice their thoughts during a class-wide discussion since students can develop allies with other students who agree with them. Class-wide Discussion method was developed by Dufresne et al., (1996). The traditional lecture methods to the teaching of solving right triangles are the most commonly used approaches by teachers. It employs a lecture format of instruction in which majority of the students are passively listening while jotting down notes. This approach focuses on algorithms rather than conceptual understanding, even more difficult to provide adequate opportunity for students to critically think through the arguments being developed. Students simply memorize rules for solving right triangles. These things do not make sense to most students and could possibly develop students' misconception. Students even find it hard to understand and connect prior knowledge to new problem situations. The objective of the teacher for the students to learn is not achieved.

This study would like to find out the effect of Class-wide Discussion method (CWD) on students' level of conception on right triangles.

METHODOLOGY

The study employed both qualitative and quantitative methods of research. It is a pretest- posttest single group design approach determining the effect on the students' level of conception in right triangle with Class-wide Discussion method as the teaching strategy.

The respondents are composed of one intact section of 24 students enrolled in the only Trigonometry class for the semester. The study was conducted at STI College-Paranaque during the first semester of school year 2010-2011. Purposive sampling was utilized.

The researcher used four instruments, namely: the two-tier Concept Test for the pretest and posttest, two-tier Concept Test for the drills and exercises, the questionnaire on the students' perception on the use of Class-wide Discussion method, and the interview guide.

RESULTS

Students' Conceptions of Right Triangle

Students' conception of right triangles was determined through a concept test before and after the use of Class-wide Discussion. To further support the results of the concept test, a perception questionnaire and an interview was given to the students. Problem 1: What is the students' level of conception of right triangles before and after the class is taught using the Class-wide Discussion method?

The succeeding tables specifically answer students' levels of conception of right triangles.

Table 5
Level of Conception Before Class-wide Discussion Method

Student Number	Item Number										Total	Mean	Interpretation
	1	2	3	4	5	16	17	18	19	20			
1	2	2	1	1	2	2	2	2	1	1	31	1.6	PM
2	2	1	1	1	1	1	1	1	2	1	24	1.2	SM
3	1	2	1	2	1	1	1	1	1	1	26	1.3	SM
4	1	2	1	1	1	1	2	1	1	1	24	1.2	SM
5	1	2	1	1	1	1	1	1	1	1	23	1.2	SM
6	1	1	1	1	1	2	2	1	1	2	27	1.4	SM
7	2	2	1	1	1	1	1	1	1	1	23	1.2	SM
8	1	1	1	2	1	1	1	1	1	1	24	1.2	SM
9	1	1	1	2	2	2	1	1	1	1	26	1.3	SM
10	1	2	1	1	1	1	2	1	1	1	25	1.3	SM
11	1	1	1	1	1	1	1	1	1	1	20	1.0	SM
12	1	2	1	1	1	1	1	1	2	1	27	1.4	SM
13	1	2	1	1	2	2	1	1	1	1	24	1.2	SM
14	2	1	2	1	1	2	1	1	1	1	30	1.5	PM
15	1	2	1	1	1	1	1	1	1	1	25	1.3	SM
16	1	2	1	1	2	1	1	1	2	2	27	1.4	SM
17	1	2	2	1	1	1	1	1	1	1	27	1.4	SM
18	1	1	1	2	1	1	1	2	1	1	26	1.3	SM
19	1	2	1	2	1	2	1	1	1	1	24	1.2	SM
20	2	2	1	1	1	2	1	1	1	1	24	1.2	SM
21	1	1	1	2	1	1	1	1	1	1	24	1.2	SM
22	1	1	1	2	2	1	2	1	2	1	29	1.5	PM
23	1	2	1	2	1	1	1	1	1	1	24	1.2	SM
24	2	2	1	1	1	2	1	1	1	1	28	1.4	SM
Grand Mean												1.3	SM

Note: SU-Sound Understanding;

PU-Partial Understanding;

PM-Partial Understanding with Specific Misconceptions

SM-Specific Misconceptions

Table 5 shows students' level of conception before the implementation of Class wide Discussion method. Three students have partial understanding with specific misconceptions and 21 students have specific misconceptions. The overall mean is 1.3 which can be interpreted as with specific misconceptions.

Table 6
Level of Conception After Class-wide Discussion Method

Student No.	Item Number										Total	Mean	Interpretation
	1	2	3	4	5	16	17	18	19	20			
1	1	1	2	1	1	1	1	4	1	4	36	1.8	PM
2	1	4	4	1	4	3	4	4	2	4	64	3.2	PU
3	1	2	2	1	2	2	2	3	1	1	35	1.8	PM
4	1	2	1	1	2	2	2	1	1	2	29	1.5	PM
5	2	2	4	1	2	1	2	1	1	2	31	1.6	PM
6	1	3	2	1	1	4	2	1	1	1	33	1.7	PM
7	1	1	1	2	1	1	1	1	1	1	27	1.4	SM
8	1	4	1	1	2	2	4	1	1	2	35	1.8	PM
9	4	4	4	4	4	4	4	4	4	4	77	3.9	SU
10	4	4	4	1	4	4	4	4	4	4	77	3.9	SU
11	1	2	2	1	1	1	1	2	1	1	30	1.5	PM
12	4	4	4	1	4	4	4	4	1	4	72	3.6	SU
13	1	2	1	1	1	2	2	2	1	2	30	1.5	PM
14	1	2	1	2	1	1	2	1	1	2	29	1.5	PM
15	1	4	1	1	1	2	1	1	1	1	25	1.3	SM
16	2	4	3	3	2	4	2	4	4	4	69	3.5	SU
17	1	2	1	1	1	1	4	4	1	4	44	2.2	PM
18	1	4	4	4	4	4	4	4	4	4	77	3.9	SU
19	3	4	4	4	4	4	4	4	4	4	78	3.9	SU
20	1	2	1	2	1	1	2	1	1	2	30	1.5	PM
21	4	4	4	1	4	2	4	1	1	2	48	2.4	PM
22	4	3	4	4	4	4	4	4	4	4	77	3.9	SU
23	1	4	4	1	4	4	4	1	4	4	59	3.0	PU
24	4	4	3	3	1	4	4	4	3	4	72	3.6	SU
Grand Mean												2.5	PU

Note: SU-Sound Understanding;

PU-Partial Understanding;

PM-Partial Understanding with Specific Misconceptions

SM-Specific Misconceptions

Table 6 presents students' level of conception after the implementation of Class-wide Discussion method. Eleven students have partial understanding with specific misconceptions, three students have partial understanding, two students

have specific misconceptions and eight students have sound understanding. A grand mean of 2.5 is solved which is interpreted as partial understanding. This means that most of the students understood the concepts of right triangle after exposure to Class-wide Discussion method.

Levels of Conception of Right Triangle of Students Before and After the Use of Class-wide Discussion method

Table 8

Frequency and Percentage Distribution of Students' Level of Conception on Pythagorean Theorem

Item 3: What is the measure of side **b** of a right triangle if $\sin A = 8/17$?

	a) 75		b) 55		c) 25	d) 15
	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	10	41.7	10	Increase
PU	0	0	2	8.3	2	Increase
PM	2	8.3	4	16.7	2	Increase
SM	22	91.7	8	33.3	-14	Decrease
Total	24	100	24	100		

Table 8 reveals result of the pretest and posttest of students' level of conception in item number 3. In the pretest, only 2 students have partial understanding with specific misconceptions, and 22 students have specific misconceptions. In the posttest there is an increase of 10 in the number of students who have sound understanding and a decrease from 22 to 8 students who have specific misconceptions. However, there is an apparent increase of 2 students who have partial understanding.

This means that the integration of the Class-wide Discussion method in the lesson contributed to the students' understanding on Pythagorean Theorem.

Table 9

*Frequency and Percentage Distribution of Students' Level of Conception on Pythagorean Theorem*Item 5: Given $\tan \theta = \frac{3}{4}$, what is the value of cosine θ ?

	a) $-\frac{4}{3}$		b) $\frac{4}{3}$		c) $-\frac{4}{5}$	d) $\frac{4}{5}$
	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	9	37.5	9	Increase
PU	0	0	0	0	0	
PM	5	20.8	5	20.8	0	
SM	19	79.2	10	41.7	-9	Decrease
Total	24	100	24	100		

Frequency and Percentage Distribution of Students' Level of Conception on Pythagorean Theorem

Table 9

*Frequency and Percentage Distribution of Students' Level of Conception on Pythagorean Theorem*Item 5: Given $\tan \theta = \frac{3}{4}$, what is the value of cosine θ ?

	a) $-\frac{4}{3}$		b) $\frac{4}{3}$		c) $-\frac{4}{5}$	d) $\frac{4}{5}$
	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	9	37.5	9	Increase
PU	0	0	0	0	0	
PM	5	20.8	5	20.8	0	
SM	19	79.2	10	41.7	-9	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;

PU-Partial Understanding; SM-Specific Misconceptions.

Table 9 presents students' level of conception in item number 5. In the pretest, 5 students have partial understanding with specific misconceptions, and 19 students have specific misconceptions of item number 5. In the posttest there is an increase of 9 students who have sound understanding and a decrease from 19 to 10 students who have specific misconceptions. Moreover, there are the same number of students who have partial understanding with specific misconceptions in the pretest and in the posttest.

This is a manifestation that students understood the concept on Pythagorean Theorem better after the use of Class-wide Discussion method.

Table 10

Frequency and Percentage Distribution of Students' Level of Conception on Pythagorean Theorem

Item 7: If the legs of a right triangle measure 8 cm and 13 cm, then the adjacent side is:

a) 10.25 cm

b) 13.25 cm

c) 16.25 cm

d) 18.25 cm

	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	10	41.7	10	Increase
PU	0	0	2	8.3	2	Increase
PM	8	33.3	5	20.8	-3	Decrease
SM	16	66.7	7	29.2	-9	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;

PU - Partial Understanding; SM-Specific Misconceptions.

Table 10 describes students' level of conception in the pretest and posttest in item number 7. In the pretest, 8 students have partial understanding with specific misconceptions, and 16 students have specific misconceptions of item number 7. In the posttest there is an increase of 10 students who have sound understanding and an increase of 2 students in the partial understanding. There is a decrease from 16 to 7 students who have specific misconceptions, and a decrease from 8 to 5 students with partial understanding with specific misconceptions.

This means that most of the students understand the concepts in Pythagorean Theorem after exposure to Class-wide Discussion method.

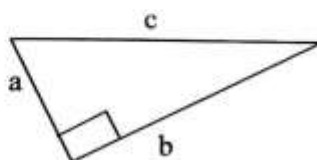
Table 11

Frequency and Percentage Distribution of Students' Level of Conception on Pythagorean Theorem

Table 11

Frequency and Percentage Distribution of Students' Level of Conception on Pythagorean Theorem

Item 8: Refer to the triangle below. Which of the following is a correct relation of its sides?



a) $a^2 = c^2 + b^2$

c) $c^2 = a^2 + b^2$

b) $b^2 = a^2 - c^2$

d) $c^2 = a^2 - b^2$

	Pretest		Posttest		Difference	Remarks
	f	%	f	%		
SU	0	0	8	33.3	8	Increase
PU	0	0	2	8.3	2	Increase
PM	12	50	9	37.5	-3	Decrease
SM	12	50	5	20.8	-7	Decrease
Total	24	100	24	100		

Note:

SU-Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU-Partial Understanding; SM-Specific Misconceptions.

As shown in Table 11, result in the pretest and posttest of the students' level of conception in item number 8. In the pretest, 12 students have partial understanding with specific misconceptions, and 12 students have specific misconceptions. In the posttest there is an increase of 8 students who have sound understanding, and an increase of 2 students in the partial understanding. There is a decrease from 12 to 5 students who have specific misconceptions, and a decrease in the number of students who have partial understanding with specific misconceptions from 12 to 9.

This implies that combining Class-wide Discussion method in the lesson is effective in understanding Pythagorean Theorem.

Table 12

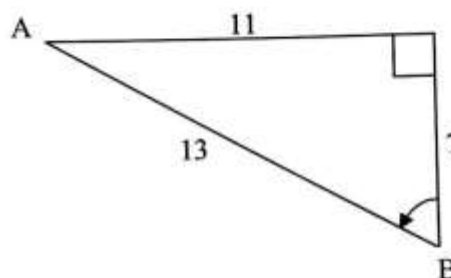
Frequency and Percentage Distribution of Students' Level of Conception on Six Trigonometric Functions

Table 12

Frequency and Percentage Distribution of Students' Level of Conception on Six Trigonometric Functions

Item 1: From the figure below, which of the following functions has the correct value?

- a) $\cot B = 7/11$
- b) $\cos B = 13/11$
- c) $\csc A = 7/13$
- d) $\sin A = 11/13$



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	6	25	6	Increase
PU	0	0	1	4.2	1	Increase
PM	6	25	2	8.3	-4	Decrease
SM	18	75	15	62.5	-3	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU - Partial Understanding; SM-Specific Misconceptions.

Table 12 shows students' level of conception in item number 1 in the pretest and the posttest. There is an increase of 6 students who have sound understanding and a slight increase of 1 student who have partial understanding. Moreover, there is a decrease in the number of students with specific misconceptions from 18 to 15 and a decrease in the number of students who have partial understanding with specific misconceptions from 6 to 2.

This is evidence that the student understand more the six trigonometric functions using the Class-wide Discussion method.

Table 13 Frequency and Percentage Distribution of Students' Level of Conception on Six Trigonometric Functions

Table 13

*Frequency and Percentage Distribution of Students' Level of Conception on Six Trigonometric Functions*Item 2: If $\tan \theta = 2.3183$, then the value of θ is

	a) $66^{\circ} 4' 1''$		b) $66^{\circ} 40' 1''$		c) $68^{\circ} 4' 1''$	d) $68^{\circ} 40' 1''$
	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	12	50	12	Increase
PU	0	0	2	8.3	2	Increase
PM	15	62.5	8	33.3	-7	Decrease
SM	9	37.5	2	8.3	-7	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
 PU-Partial Understanding; SM-Specific Misconceptions.

Table 13 reflects students' level of conception in item number 2. There is a large increase of 12 students who have sound understanding, and a slight increase of 2 students who have partial understanding on the six trigonometric functions in the pretest and the posttest. On the other hand, there is a decrease in the number of students from 9 to 2 who have specific misconceptions of item number 2 as well as the number of students with partial understanding with specific misconceptions from 15 to 8.

This shows that there is an increase in the students' level of conception on six trigonometric functions after the Class-wide Discussion method.

Table 14 Frequency and Percentage Distribution of Students' Level of Conception on Six Trigonometric Functions

Table 14

Frequency and Percentage Distribution of Students' Level of Conception on Six Trigonometric Functions

Item 4: One angle in a triangle measures 90° . Which of the following is true about the remaining angles?

- a) The two angles are right.
- b) The two angles are acute.
- c) One of the angles is obtuse the other is acute.
- d) One of the angles is acute and the other is reflex.

	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	4	16.7	4	Increase
PU	0	0	2	8.3	2	Increase
PM	8	33.3	3	12.5	-5	Decrease
SM	16	66.7	15	62.5	-1	Decrease
Total	24	100	24	100		

Note:

SU-Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU-Partial Understanding; SM-Specific Misconceptions.

Table 14 reveals students' level of conception in item number 4. There is an increase of 4 students in the pretest and posttest who have sound understanding and an increase of 2 students who have partial understanding. Moreover, there is a decrease in the number of students with specific misconceptions from 16 to 15 and a decrease from 8 to 3 students who have partial understanding with specific misconceptions on the six trigonometric functions.

This is evidence that the students understand more the concepts of the six trigonometric functions using the Class-wide Discussion method.

Table 15 Frequency and Percentage Distribution of Students' Level of Conception on Solution of Right Triangles

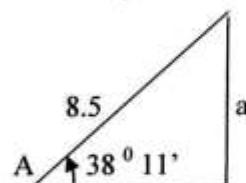
Table 15

Frequency and Percentage Distribution of Students' Level of Conception on Solution of Right Triangles

Item 6: Given a right triangle with $A = 38^{\circ} 11'$ and $c = 38.5$, what is the measure of side a ?

a) 29 c) 24

b) 26 d) 20



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	10	41.7	10	Increase
PU	0	0	1	4.2	1	Increase
PM	6	25	6	25	0	
SM	18	75	7	29.2	-11	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU-Partial Understanding; SM-Specific Misconceptions.

Table 15 reveals students' level of conception in item number 6. There is an increase of 10 students who have sound understanding and an increase of 1 student who have partial understanding in the pretest and posttest. However, there is a large decrease in the number of students who have specific misconceptions from 18 to 7 and same number of students who have partial understanding with specific misconceptions on solution of right triangles.

This is an indication that after the implementation of the Class-wide Discussion method, students earned more on solution of right triangles.

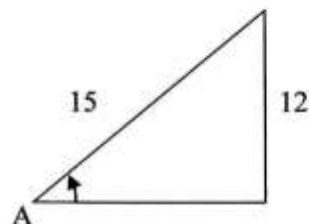
Table 16 Frequency and Percentage Distribution of Students' Level of Conception on Solution of Right Triangles

Table 16

Frequency and Percentage Distribution of Students' Level of Conception on Solution of Right Triangles

Item 15: Given the right triangle below, solve for angle A.

- a) $53^{\circ} 07' 48''$
- b) $53^{\circ} 17' 48''$
- c) $53^{\circ} 27' 48''$
- d) $53^{\circ} 77' 48''$



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	9	37.5	9	Increase
PU	0	0	1	4.2	1	Increase
PM	7	29.2	7	29.2	0	
SM	17	70.8	7	29.2	-10	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU - Partial Understanding; SM-Specific Misconceptions.

Presented in Table 16 is the students' level of conception of item number 15 in the pretest and the posttest. In the posttest, there is an increase in the number of 9 students who have sound understanding and an increase of one student who has partial understanding. However, there is a large decrease in the number of students who have specific misconceptions from 17 to 7 and same number of students who have partial understanding with specific misconceptions on solution of right triangles.

This shows that the students understood the topic on solution of right triangles better after the use of Class-wide Discussion method in the class discussion.

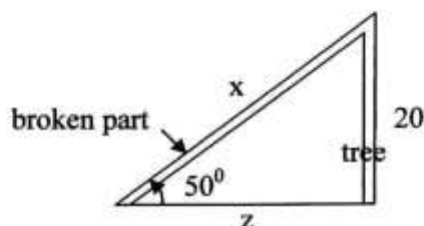
Table 17 Frequency and Percentage Distribution of Students' Level of Conception on Verbal Problems

Table 17

Frequency and Percentage Distribution of Students' Level of Conception on Verbal Problems

Item 9: A tree broken over by storm forms a right triangle with the ground. If the broken part makes an angle of 50° with the ground and if the top of the tree is now 20 cm from its base, how tall was the tree?

- a) 41.16 cm b) 41.61 cm c) 46.11 cm d) 46.91 cm



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	7	29.2	7	Increase
PU	0	0	2	8.3	2	Increase
PM	8	33.3	9	37.5	1	Increase
SM	16	66.7	6	25	-10	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU - Partial Understanding; SM - Specific Misconceptions.

Shown in Table 17 is the students' level of conception in item number 9. There is an increase of seven students in the posttest who have sound understanding, an increase of one student who have partial understanding with specific misconceptions and an increase of two students who have partial understanding. However, a remarkable decrease in the number of students who have specific misconceptions from 16 to 6 on verbal problems is noted.

This means that the Class-wide Discussion method when applied in teaching contributes more to the student's conception of the lesson on verbal problems.

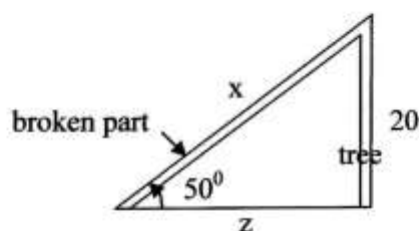
Table 18 Frequency and Percentage Distribution of Students' Level of Conception on Verbal Problems

Table 18

Frequency and Percentage Distribution of Students' Level of Conception on Verbal Problems

Item 10: A tree broken over by storm forms a right triangle with the ground. If the broken part makes an angle of 50° with the ground and if the top of the tree is now 20 cm from its base, how long was the broken part?

- a) 26.11 m b) 25.11 m c) 24.11 m d) 22.11 m



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	10	41.7	10	Increase
PU	0	0	1	4.2	1	Increase
PM	5	20.8	5	20.8	0	
SM	19	79.2	8	33.3	-11	Decrease
Total	24	100	24	100		

Note:

SU-Sound Understanding; PM-Partial Understanding with Specific Misconceptions;
PU-Partial Understanding; SM-Specific Misconceptions.

As presented in Table 18, students' level of conception in item number 10 in the pretest and posttest shows an increase of 10 in the number of students who have sound understanding, an increase of one who have partial understanding and a decrease in the number of students from 19 to 8 who have specific misconceptions on verbal problems.

This shows that there is an improvement in the students' conception on verbal problems after the Class-wide Discussion method.

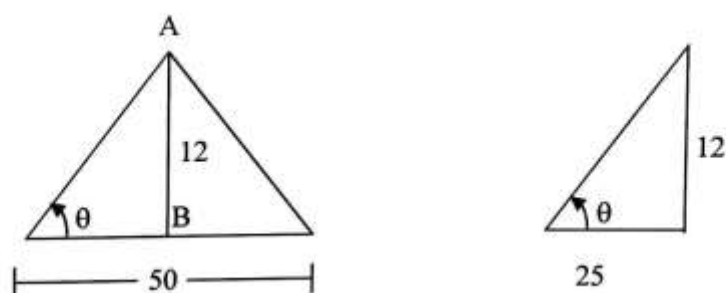
Table 19 Frequency and Percentage Distribution of Students' Level of Conception on Verbal Problems

Table 19

Frequency and Percentage Distribution of Students' Level of Conception on Verbal Problems

Item 16: A rafter is in the form of an isosceles triangle. The line AB that runs from the vertex and perpendicular to the base bisects the triangle into two equal parts. From the illustration, find the value of θ with the given dimensions.

- a) $25^{\circ} 28' 38''$ b) $25^{\circ} 28' 58''$ c) $25^{\circ} 38' 28''$ d) $25^{\circ} 38' 58''$



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	10	41.7	10	Increase
PU	0	0	1	4.2	1	Increase
PM	8	33.3	6	25	-2	Decrease
SM	16	66.7	7	29.2	-9	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU-Partial Understanding; SM - Specific Misconceptions.

As seen in Table 19, students' level of conception in item number 16 in the pretest and posttest shows an increase of 10 in the number of students who have sound understanding and an increase of one who has partial understanding on verbal problems. A minimal decrease in the number of students who have partial understanding with specific misconceptions from 8 to 6 and a large decrease in the number of students with specific misconceptions from 16 to 7 on verbal problems are observed.

This is an indication that after the implementation of the Class-wide Discussion method in the class, students learned more on verbal problems.

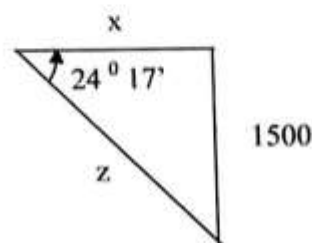
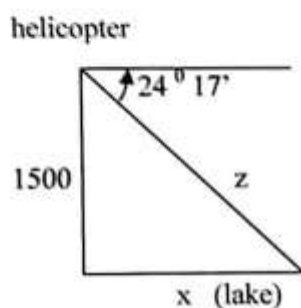
Table 20 Frequency and Percentage Distribution of Students' Level of Conception on Angle of Depression

Table 20

Frequency and Percentage Distribution of Students' Level of Conception on Angle of Depression

Item 11: A helicopter is 1500 m directly over the end of a lake. If the angle of depression to the other end is $24^{\circ} 17'$, how long is the lake?

- a) 3,174.21 m b) 3,324.71 m c) 3,423.71 m d) 3,724.31 m



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	9	37.5	9	Increase
PU	0	0	1	4.2	1	Increase
PM	10	41.7	6	25	-4	Decrease
SM	14	58.3	8	33.3	-6	Decrease
Total	24	100	24	100		

As shown in Table 20, students' level of conception in item number 11 in the pretest and posttest shows an increase of nine in the number of students who have sound understanding and an increase of one who have partial understanding on verbal problems. The number of students who have partial understanding with specific misconceptions decreases from 10 to 6 and those with specific misconceptions also decreases from 14 to 8 on angle of depression.

This implies that there is learning that took place when Class-wide Discussion method is incorporated in the teaching of angle of depression.

Table 21 Frequency and Percentage Distribution of Students' Level of Conception on Angle of Depression

Table 21

Frequency and Percentage Distribution of Students' Level of Conception on Angle of Depression

Item 12: A helicopter is 1500 m directly over the end of a lake. If the angle of depression to the other end is $24^{\circ} 17'$, what is the slant distance from the helicopter to the other end of the lake? (See problem 11).

	a) 3,647.42 ft		b) 3,627.44 ft		c) 3,674.42 ft		d) 3,746.42 ft	
	Pretest		Posttest		Difference		Remarks	
	f	%	f	%	Δf			
SU	0	0	7	29.2	7		Increase	
PU	0	0	0	0	0			
PM	7	29.2	9	37.5	2		Increase	
SM	17	70.8	8	33.3	-9		Decrease	
Total	24	100	24	100				

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;

PU - Partial Understanding; SM - Specific Misconceptions.

Table 21 shows students' level of conception in item number 12 in the pretest and posttest where there is an increase in the number of students of 7 who have sound understanding and an increase of 2 with partial understanding with specific misconceptions. There is a decrease of 9 from 17 to 8 in the number of students who have specific misconceptions on angle of depression.

This presents that the students understood the topic on angle of depression after using Class-wide Discussion method in the discussion.

Table 22 Frequency and Percentage Distribution of Students' Level of Conception on Angle of Depression

Table 22

Frequency and Percentage Distribution of Students' Level of Conception on Angle of Depression

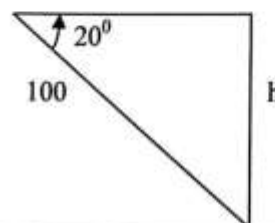
Item 17: The angle of depression from the top of a volcano to its foot is 20° . If the distance from the foot to the top measure along the slope of the mountain is 100 m, how high is the mountain?

a) 35.2 m

b) 34.2 m

c) 32.2 m

d) 31.2 m



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	12	50	12	Increase
PU	0	0	1	4.2	1	Increase
PM	5	20.8	7	29.2	2	Increase
SM	19	79.2	4	16.7	-15	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU-Partial Understanding; SM-Specific Misconceptions.

Table 22 reflects students' level of conception in the pretest and the posttest in item number 17 where a large increase of 12 on the number of students who have sound understanding, an increase of one student who has partial understanding and a small increase of two students who have partial understanding with specific misconceptions. A large decrease from 19 to 4 students who have specific misconceptions is observed.

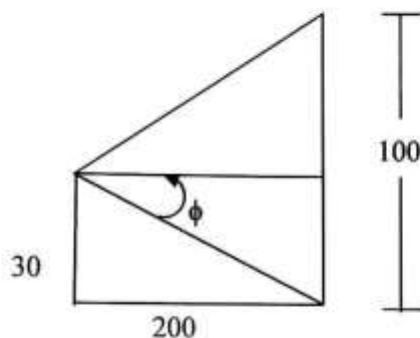
This is evidence that the students understand angle of depression using the Class-wide Discussion method.

Table 23 Frequency and Percentage Distribution of Students' Level of Conception on Angle of Depression

Table 23

Frequency and Percentage Distribution of Students' Level of Conception on Angle of Depression

Item 19: From a window 30 m above the level ground, a building 100 m high, and at a distance of 200 m, is observed. Find the angle of depression of its base.

a) $8^{\circ} 31' 51''$ b) $8^{\circ} 31' 15''$ c) $8^{\circ} 13' 51''$ d) $8^{\circ} 13' 15''$ 

	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	7	29.2	7	Increase
PU	0	0	1	4.2	1	Increase
PM	4	16.7	1	4.2	-3	Decrease
SM	20	83.3	15	62.5	-5	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU-Partial Understanding; SM-Specific Misconceptions.

Table 23 presents students' level of conception in item number 19 in the pretest and posttest where seven students have sound understanding in the posttest, an increase of one student who have partial understanding. A decrease from four to one student who has partial understanding with specific misconceptions and from 20 to 15 students who have specific misconceptions is seen.

This means that the students appreciate the use of Class-wide Discussion method in learning angle of depression.

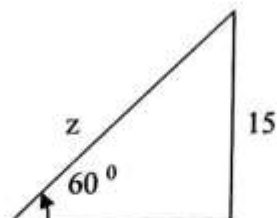
Table 24 Frequency and Percentage Distribution of Students' Level of Conception on Angle of Elevation

Table 24

Frequency and Percentage Distribution of Students' Level of Conception on Angle of Elevation

Item 13: The window of a house is 15 m above the ground. How long must a ladder be in order to reach the window if the angle of elevation is 60° .

- a) 7.32 m b) 17.32 m c) 27.32 m d) 47.032 m



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	11	45.8	11	Increase
PU	0	0	0	0	0	
PM	5	20.8	7	29.2	2	Increase
SM	19	79.2	6	25	-13	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU - Partial Understanding; SM-Specific Misconceptions.

Table 24 reveals students' level of conception in item number 13 in the pretest and the posttest. A large increase of 11 students have sound understanding, a slight increase from 5 to 7 students who have partial understanding with specific misconceptions, and a large decrease of 13 students from 19 to 6 students who have specific misconceptions.

This means that most of the students understood the concepts in angle of depression after exposure to Class-wide Discussion method.

Table 25 Frequency and Percentage Distribution of Students' Level of Conception on Angle of Elevation

Table 25

Frequency and Percentage Distribution of Students' Level of Conception on Angle of Elevation

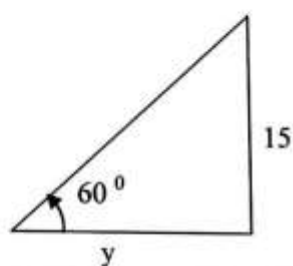
Item 14: The window of a house is 15 m above the ground. y is what side of the 60° angle?

a) altitude

b) hypotenuse

c) opposite

d) adjacent



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	8	33.3	8	Increase
PU	0	0	3	12.5	3	Increase
PM	7	29.2	4	16.7	-3	Decrease
SM	17	70.8	9	37.5	-8	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;

PU - Partial Understanding; SM-Specific Misconceptions.

Table 25 presents students' level of conception in the pretest and the posttest in item number 14 where there is an increase of 8 students who have sound understanding and a slight increase of 3 students who have partial understanding. A decrease in the number of students who have partial understanding with specific misconceptions from 7 to 4 and those who have specific misconceptions from 17 to 9 students is seen.

This implies that most of the students understood the concepts in angle of elevation after exposure to Class-wide Discussion method.

Table 26 Frequency and Percentage Distribution of Students' Level of Conception on Angle of Elevation

Table 26

Frequency and Percentage Distribution of Students' Level of Conception on Angle of Elevation

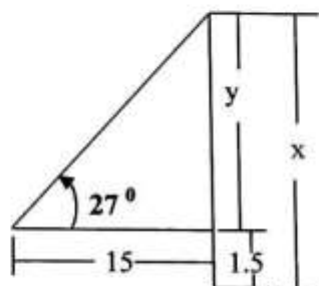
Item 18: Ana stands 15 m away from a flagpole. The angle of elevation from where she stands to the top of the flagpole is 27° . How high is the flagpole if Ana is 1.5 m tall?

a) 6.14 m

b) 7.14 m

c) 8.14 m

d) 9.14 m



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	11	45.8	11	Increase
PU	0	0	1	4.2	1	Increase
PM	2	8.3	1	4.2	-1	Decrease
SM	22	91.7	11	45.8	-11	Decrease
Total	24	100	24	100		

Note:

SU - Sound Understanding; PM - Partial Understanding with Specific Misconceptions;
PU - Partial Understanding; SM-Specific Misconceptions.

Reflected in Table 26 is the result of students' level of conception in item number 18 on angle of elevation before and after the implementation of class-wide discussion. It is observed that the number of students who have sound understanding increases by 11 and those who have partial understanding increases by one in the posttest. A slight decrease from 2 to 1 is also observed for those who have partial understanding with specific misconceptions and a large decrease of 11 for those who have specific misconceptions.

This is a manifestation that Class-wide Discussion method is of great help in understanding angle of elevation.

Table 27 Frequency and Percentage Distribution of Students' Level of Conception on Angle of Elevation

Table 27

Frequency and Percentage Distribution of Students' Level of Conception on Angle of Elevation

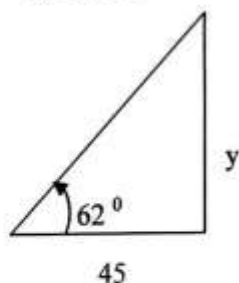
Item 20: A passenger in a helicopter shines a light on a car stranded 45 ft from a point just below the helicopter. If the angle of elevation from the car is 62° , how high is the helicopter hovering?

a) 34.68 ft

b) 46.83 ft

c) 84.63 ft

d) 86.43 ft



	Pretest		Posttest		Difference	Remarks
	f	%	f	%	Δf	
SU	0	0	12	50	12	Increase
PU	0	0	0	0	0	
PM	2	8.3	7	29.2	5	Increase
SM	22	91.7	5	20.8	-17	Decrease
Total	24	100	24	100		

Table 27 shows students' level of conception of item number 20 where an increase of 12 for students who have sound understanding and an increase from 2 to 7 students who have partial understanding with specific misconceptions. A very large decrease from 22 to 5 students who have specific misconceptions is seen.

This indicates that the student had clear conception on angle of elevation after the use of Class-wide Discussion method.

Table 7 Students' Level of Conception Before and After Class-wide Discussion

Table 7

Students' Level of Conception Before and After Class-wide Discussion

Student No.	Pretest Mean	Interpretation	Posttest Mean	Interpretation	Difference	Interpretation
1	1.6	PM	1.8	PM	0.2	Retain
2	1.2	SM	3.2	PU	2.0	Improve
3	1.3	SM	1.8	PM	0.5	Improve
4	1.2	SM	1.5	PM	0.3	Improve
5	1.2	SM	1.6	PM	0.4	Improve
6	1.4	SM	1.7	PM	0.3	Improve
7	1.2	SM	1.4	SM	0.2	Retain
8	1.2	SM	1.8	PM	0.6	Improve
9	1.3	SM	3.9	SU	2.6	Improve
10	1.3	SM	3.9	SU	2.6	Improve
11	1.0	SM	1.5	PM	0.5	Improve
12	1.4	SM	3.6	SU	2.2	Improve
13	1.2	SM	1.5	PM	0.3	Improve
14	1.5	PM	1.5	PM	0.0	Retain
15	1.3	SM	1.3	SM	0.0	Retain
16	1.4	SM	3.5	SU	2.1	Improve
17	1.4	SM	2.2	PM	0.8	Improve
18	1.3	SM	3.9	SU	2.6	Improve
19	1.2	SM	3.9	SU	2.7	Improve
20	1.2	SM	1.5	PM	0.3	Improve
21	1.2	SM	2.4	PM	1.2	Improve
22	1.5	PM	3.9	SU	2.4	Improve
23	1.2	SM	3.0	PU	1.8	Improve
24	1.4	SM	3.6	SU	2.2	Improve
Grand Mean	1.3	SM	2.5	PU	1.2	Improve

Note:

SU - Sound Understanding;

PU- Partial Understanding;

PM-Partial Understanding with Specific Misconceptions SM-Specific Misconceptions

Table 7 reveals the students' level of conception of right triangles before and after the implementation of Class-wide Discussion method. Two students have the same conception of specific misconceptions while two students have the same conception of partial understanding with specific misconceptions in the posttest. However, twenty students shows improvement in their conception, two from specific misconceptions to partial understanding, ten from specific misconceptions to partial

understanding with specific misconceptions, seven from specific misconceptions to sound understanding, and one from partial understanding with specific misconception to sound understanding.

This means that the integration of Class-wide Discussion method in the lesson contributed to the students' conception of right triangles.

Table 28 Prevailing Students' Level of Conception in each Item Category Before and After the Class-wide Discussion Method

Topic	Item No.	f	Level of Conception in the Pretest	f	Level of Conception in the Posttest
A tree broken over by storm forms a right triangle with the ground. If the broken part makes an angle of 50° with the ground and if the top of the tree is now 20 cm from its base, how long was the broken part?	10	19	SM	10	SU
A rafter is in the form of an isosceles triangle. The line AB that runs from the vertex and perpendicular to the base bisects the triangle into two equal parts. From the illustration, find the value of θ with the given dimensions.	16	16	SM	10	SU
Angle of Depression					
A helicopter is 1500 m directly over the end of a lake. If the angle of depression to the other end is $24^{\circ} 17'$, how long is the lake?	11	14	SM	9	SU
A helicopter is 1500 m directly over the end of a lake. If the angle of depression to the other end is $24^{\circ} 17'$, what is the slant distance from the helicopter to the other end of the lake?	12	17	SM	9	PM
The angle of depression from the top of a volcano to its foot is 20° . If the distance from the foot to the top measure along the slope of the mountain is 100 m, how high is the mountain?	17	19	SM	12	SU

Table 28

Prevailing Students' Level of Conception in each Item Category Before and After the Class-wide Discussion Method

Topic	Item No.	f	Level of Conception in the Pretest	f	Level of Conception in the Posttest
Pythagorean Theorem					
What is the measure of side b of a right triangle if $\sin A = 8/17$?	3	22	SM	10	SU
Given $\tan \theta = \frac{3}{4}$, what is the value of $\cos \theta$?	5	19	SM	10	SM
If the legs of a right triangle measures 8 cm and 13 cm, then the adjacent side is:	7	16	SM	10	SU
Refer to the triangle below. Which of the following is a correct relation of its sides?	8	12	SM	9	PM

Topic	Item No.	f	Level of Conception in the Pretest	f	Level of Conception in the Posttest
Six Trigonometric Functions					
From the figure below, which of the following functions has the correct value?	1	18	SM	15	SM
If $\tan \theta = 2.3183$, then the value of θ is	2	15	PM	12	SU
One angle in a triangle measures 90° . Which of the following is true about the remaining angles?	4	16	SM	15	SM
Solution of Right Triangle					
Given a right triangle with $A = 38^\circ 11'$ and $c = 38.5$, what is the measure of side a.	6	18	SM	10	SU
Given the right triangle below, solve for angle A.	15	17	SM	9	SU
Verbal Problems					
A tree broken over by storm forms a right triangle with the ground. If the broken part makes an angle of 50° with the ground and if the top of the tree is now 20 cm from its base, how tall was the tree?	9	16	SM	9	PM

Note: f - frequency

Table 28 summarizes the changes in the level of students' conception from the result of the pretest and posttest. This shows that in Pythagorean Theorem more than two-thirds of the class had specific misconception in item numbers 3 and 7, but after the Class-wide Discussion method most of the students changed their level of conception to sound understanding.

On the topic of six trigonometric functions, more than three-fifths of the class had partial understanding with specific misconceptions in item number 2 but after integrating the class discussion with Class-wide Discussion method half of the students in the class changed their level of conceptions to sound understanding. But, in item numbers 16 and 18 the students had specific misconceptions before and after the implementation of class-wide discussion due to some confusion in the definition of the trigonometric functions and analysis of the sides and angles of a right triangle.

In solution of right triangles, most of the students who had specific misconceptions in item numbers 6 and 15 changed to sound understanding in the posttest.

About verbal problems, two thirds of the respondents in item numbers 10 and 16 had specific misconceptions but more than half of them changed to sound understanding after implementing the Class-wide Discussion method.

Three-fifths of the respondents on the topic of angle of depression had specific misconceptions in the pretest but most of them had sound understanding in the posttest.

In angle of elevation, half of those who had specific misconceptions improved to sound understanding in item numbers 13, 18 and 20. Also, in item number 14 the number of students who had specific misconceptions decreases.

Of the twenty item-concept test in right triangle after the class-wide discussion, a five- item number is observed wherein the students had a poor response. The students had better conception on three-fifths of the problem.

This implies that the students learned the concept of right triangle thoroughly using Class-wide Discussion method.

Problem 2: What is the level of conception in each category of right triangle before and after the use of Class-wide Discussion method? 1) Pythagorean Theorem 2) Six Trigonometric Functions 3) Solution of Right Triangles 4) Verbal Problems 5) Angle of Depression 6) Angle of Elevation.

Table 29 Level of Conception in Each Category Before and After Class-wide Discussion

Table 29

Level of Conception in Each Category Before and After Class-wide Discussion

Category		Item No.	Student Number											Mean	Interpretation
			1	2	3	4	5	20	21	22	23	24			
Pythagorean Theorem	Pretest	3	1	1	1	1	1	1	1	1	1	1	1	1.1	SM PU
	Posttest		2	4	2	1	4	1	4	4	4	3	2.6		
	Pretest	5	2	1	1	1	1	1	1	2	1	1	1.2	SM PM	
	Posttest		1	4	2	2	2	1	4	4	4	1	2.3		
	Pretest	7	2	1	2	1	1	1	1	2	1	1	1.3	SM PU	
	Posttest		1	4	3	1	2	1	2	4	4	3	2.6		
	Pretest	8	2	2	1	1	1	1	2	2	2	1	1.5	PM PU	
	Posttest		2	2	1	1	1	1	4	4	2	3	2.5		
Six Trigonometric Functions	Pretest	1	2	2	1	1	1	2	1	1	1	2	1.3	SM PM	
	Posttest		1	1	1	1	2	1	4	4	1	4	2.0		
	Pretest	2	2	1	2	2	2	2	1	1	2	2	1.6	PM PU	
	Posttest		1	4	2	2	2	2	4	3	4	4	3.0		

Category		Item No.	Student Number										Mean	Interpretation
			1	2	3	4	5	20	21	22	23	24		
Six Trigo Functions	Pretest	4	1	1	2	1	1	1	2	2	2	1	1.3	SM
	Posttest		1	1	1	1	1	2	1	4	1	3	1.8	PM
Solution of Right Triangle	Pretest	6	1	1	1	1	1	1	1	2	2	1	1.3	SM
	Posttest		1	4	2	2	2	2	2	4	4	4	2.6	PU
	Pretest	15	1	1	2	2	1	1	2	1	1	2	1.3	SM
	Posttest		2	3	1	2	1	2	1	4	4	4	2.5	PU
Verbal Problems	Pretest	9	2	1	2	2	1	1	1	1	1	1	1.3	SM
	Posttest		2	2	2	1	1	1	2	4	2	4	2.4	PM
	Pretest	10	1	1	1	1	2	1	1	1	1	2	1.2	SM
	Posttest		4	4	2	1	1	2	2	4	1	4	2.5	PU
Angle of Depression	Pretest	16	2	1	1	1	1	2	1	1	1	2	1.3	SM
	Posttest		1	3	2	2	1	1	2	4	4	4	2.6	PU
	Pretest	11	1	1	2	1	2	1	1	2	1	2	1.4	SM
	Posttest		1	4	2	1	1	2	1	4	4	4	2.5	PU
	Pretest	12	2	2	1	1	1	1	1	2	1	2	1.3	SM
	Posttest		1	4	2	2	1	1	1	2	2	4	2.3	PM
	Pretest	17	2	1	1	2	1	1	1	2	1	1	1.2	SM
	Posttest		1	4	2	2	2	2	4	4	4	4	2.8	PU
Angle of Elevation	Pretest	19	1	2	1	1	1	1	1	2	1	1	1.2	SM
	Posttest		1	2	1	1	1	1	1	4	4	3	2.0	PM
	Pretest	13	1	1	1	1	1	2	2	1	1	1	1.2	SM
	Posttest		4	2	2	2	1	2	2	4	4	4	2.7	PU
	Pretest	14	2	1	1	1	1	1	1	1	1	2	1.3	SM
	Posttest		1	4	1	1	2	2	4	4	1	4	2.4	PM
	Pretest	18	2	1	1	1	1	1	1	1	1	1	1.1	SM
	Posttest		4	4	3	1	1	1	1	4	1	4	2.5	PU
	Pretest	20	1	1	1	1	1	1	1	1	1	1	1.1	SM
	Posttest		4	4	1	2	2	2	2	4	4	4	2.8	PU

Table 29 shows students' level of conception per category before and after the Class-wide Discussion method. In Pythagorean Theorem there is improvement in the conception, from specific misconceptions and partial understanding with specific misconceptions in the pretest to partial understanding with specific misconceptions and partial understanding in the posttest. and Six Trigonometric Functions, there is improvement in the conception, from specific misconceptions and partial understanding with specific misconceptions in the pretest to partial understanding in the posttest. In Solution of Right Triangles, Verbal Problems, Angle of Depression and Angle of Elevation there is improvement in the conception of the students, from specific misconceptions in the pretest to partial understanding in the posttest. This indicates that the students understood the concept of right triangle thoroughly using Class-wide Discussion method.

Problem 3: Is there a difference on the level of conception of right triangles before and after the class is taught using the Class-wide Discussion method?

Table 30 Paired t-test Between Students' Pretest and Posttest Mean Scores (n=24; $p < 0.05$)

Table 30

Paired t-test Between Students' Pretest and Posttest Mean Scores (n=24; $p < 0.05$)

Test	Mean	Standard Deviation	p-value	Remarks
Pretest	25.5000	2.46718	0.000	Significant
Posttest	49.3333	20.71267		

Table 30 reflects the difference between the mean scores of the pretest and posttest. Since the p-value associated with the computed t-value is less than the adapted level of significance ($p < 0.05$) this indicates that students after having been exposed to the Class-wide Discussion method had significantly higher test scores in the posttest as compared to the pretest. This implies that there is an improvement of conception among the students when Class-wide Discussion method was applied in the lesson proper. See Appendix J for the sample SPSS printout.

Interview Responses on the Class-wide Discussion Method

After checking the posttest, 10 students were purposively selected and interviewed to give clarity on the results in the level of conception. The following are the transcribed conversations with the students.

Teacher: Is learning through Class-wide Discussion satisfying and enjoyable?

Student 1: Oo, kasiya-siya iyon dahil sa pamamagitan ng "Class-wide Discussion" matututo kang maigi dahil napag uusapan nyo ang sagot at naipapaliwanag ng inyong mga kagrupo. Hindi lang isa ang matututo ngunit lahat ng iyong kagrupo.

Student 2: Opo, kasiya siya ang class-wide discussion kasi mas lumalawak ang kaalaman ng estudyante.

Student 4: It is, class-wide discussion is new to me and it is satisfying.

Student 9: Yes, it is fun and it is not boring which is good.

Student 10: Yes, kasi po mas matututo ka at nagkakaroon ka pa ng pagkakataong makilala ang mga kagrupo mo.

—

Teacher: Does Class-wide Discussion method help you gain a clear understanding of the lesson?

Student 2: Opo naman po, mas lalo na sa katulad ko pong medyo mahina sa Math pero mas gusto ko pong mag-aral mag-isa kesa grupo.

Student 4: Yes, interacting and discussing with other classmates helps me understand our lessons better.

Student 8: Yes, because we have time to discuss the lesson on the group and it brought us clear understanding on the topic.

Student 7: Opo, sapagkat pag meron akong hindi naiintindihan ito ay aking nalalaman sa aking mga kaklase habang nagdidiscuss

Student 6: Yes! Malaking tulong sa kin dahil tulong tulong kami.

—

Teacher: Does it encourage you to actively participate in the activities?

Student 6: Yes! Dahil mas challenging pos a kin ung group discussion kaysa ikaw lang mag-isa.

Student 4: It does, I feel confident knowing that my group support in answering questions.

Student 9: Yes, makes the class more active and gives obligation to students to participate.

Student 5: Yes, dahil gusting gusto kong madagdagan pa ang aking kaalaman.

Student 10: Yes, kasi bawat isa naman binibigyan ng pagkakataong sumagot at makipagdiskusyon kung sa tingin e mali ang binibigay na sagot.

—

Teacher: Does it allow you to boost your self-confidence, and develop your critical thinking?

Student 1: Oo, dahil sa mga nakakenjoy na activity na ginagawa ng aming professor at tinutulungan kaming matututo.

Student 8: Yes, because it bring acknowledgement of me on my class.

Student 4: Yes, a group work broadens my knowledge because other members give an opinion about a certain topic.

Student 2: Medyo po kasi napag alaman ko po na may kakayahan din po pala ako na makasagot.

Student 10: Yes, kasi nagkaroon na ako ng kumpyansa sa sarili na masasagutan ko ang question.

—

Teacher: Does it make you more mentally active in the learning process when it is based on

Class-wide Discussion?

Student 2: Medyo lang po kasi nga po minsan nauuwi sa pagkalito.

Student 9: Yes, not sleepy.

Student 1: Oo, naging masigla ako dahil masaya talaga kapag "class-wide discussion".

Student 8: Not really, because I have to answer a lot of questions for my classmates but also it is a lot of fun, sometimes.

Student 5: Yes, dahil sa class-wide discussion nagkaroon ako ng idea at natutunan ko ang hindi ko pa nalalaman.

—

Teacher: Does it make you responsible for finding and checking your own ideas?

Student 1: Oo, dahil ang pagsagot ay dapat pag usapan maigi ng mga kagrupong ngayon mas lumawak ang aking mga ideya.

Student 9: Yes, because group sharing is involved.

Student 5: Hindi, sapagkat lagi akong puyat at pagod sa work pero pinipilit ko ang sarili ko na matutunan ito.

Student 6: Yes, kasi po minsan dip o ako sure sa sagot ko kaya nagtatanong po ako sa mga ka groupmates ko kung tama or mali.

Student 7: Yes, lalo po akong nagiging responsable sa aking sarili sa pagtuklas ng idea.

—

Teacher: Do the lessons, activities, and discussions in Class-wide Discussion well organized?

Student 4: Most of the time. But sometimes, during groupings, activities and lessons become unorganized.

Student 8: Sometimes, but most frequently yes, because our professor organized it well.

Student 2: Opo, kasi po lagi pong handa si Mam.

Student 5: Yes, dahil lahat ng mag-aaral ay nagkakaisa sa pagpapalitan ng idea.

Student 9: Yes, because topics are correlated to each other.

—

Teacher: Did you fully understand the concepts of right triangles during the activity which uses Class-wide Discussion method?

Student 6: Yes, kasi po yong idea naming lahat isinshare naming kaya nauunawaan ko po.

Student 7: Oo, kasi hindi ko masyado maintindihan nang sa sarili ko lang pero pag by group

I understand it.

Student 9: Yes, because it was properly and thoroughly discussed among groupmates.

Student 10: Hindi gaano, kasi minsan nalilito pa rin ako, so kailangan ko pang magtanong sa kagrupo ko.

Student 1: Medyo, kasi mahina talaga ako sa Trigo.

Teacher: Are there any concepts which remain unclear in right triangles after exposure to Class-wide Discussion?

Student 8: No, I fully understand everything.

Student 10: Minsan, kasi kapag marami ka nang kailangang hanapin nalilito na ako.

Student 6: Wala po! Malinaw pos a akin ang right triangle sa pamamagitan ng class-wide

discussion.

Student 2: Yung iba po di malinaw sa kin pero sa kin lang naman po kasi minsan nga po naguguluhan or nalilito ako.

Student 5: Wala po, okey po ang lahat sapagkat malinaw naman ang pagtatalakay ng leksyon sa pamamagitan ng class-wide discussion.

Teacher: Can you give comments/suggestions to enhance the Class-wide Discussion method?

Student 5: Ang class-wide discussion method ay may magandang naidudulot sa mga estudyante dahil dito nagkakaroon ng lakas ng loob ang bawat mag-aaral sa pagtatanong at papalitan ng idea.

Student 8: More group activities, more chances of group winnings.

Student 10: For me, "class-wide discussion" is a unique way for us to learn more especially in Trigo. Kasi mas naijenjoy namin yung lesson at mas natututo kami.

Student 4: A class-wide discussion must be done to those who prefer a group. Some student does not do well during this kind of discussion.

Student 9: Honestly, it's not only with the class-wide discussion it also comes on how the teacher teach. Thank you mam.

Based on the interview conducted, the students enjoyed the class. They learned from each other although some of them really dislike learning with others, meaning they learn more if they are alone. The students gained self-confidence and understood the topic discussed.

Students' responses in the interview further validate the result of the paired t-test.

Problem 4: What is the students' perception on the use of the class-wide discussion method in learning right triangles?

Table 31 Students' Mean Perceptions on Class-wide Discussion Method

Table 31

Students' Mean Perceptions on Class-wide Discussion Method

Statements	Mean Score	Interpretations
1. The activities helped me develop positive attitudes towards mathematics.	4.7	Strongly Agree
2. The teacher was in control of the class.	4.6	Strongly Agree
3. Hearing the students explain problems in their own words when working in our small group helps me to learn.	4.7	Strongly Agree
4. I find the teaching strategy, Class-wide Discussion method, student-centered rather than teacher oriented.	4.2	Agree
5. Learning from class-wide Discussion method was satisfying and interesting.	4.5	Strongly Agree
6. Class-wide Discussion method encouraged students to participate in the classroom activities.	4.5	Strongly Agree
7. I had more input and involvement in the classroom activities.	4.6	Strongly Agree
8. The lesson on Class-wide Discussion method was time consuming.	4.0	Agree
9. I appreciate the teachers' role as a facilitator rather than the source of all knowledge.	4.4	Agree
10. I learned better in right triangles with the use of Class-wide Discussion method.	4.1	Agree

Statements	Mean Score	Interpretations
11. I learned to accept mistakes and listen to the explanation of the other members.	4.6	Strongly Agree
12. Everyone has an opportunity to express their opinion on the question being discussed.	4.8	Strongly Agree
13. Some students always dominate the discussion in small groups.	4.2	Agree
14. Having a number of different viewpoints in the small groups often leads to confusion.	3.8	Agree
15. It is important that the teacher clearly explains which is the right answer and why after a Class-wide Discussion.	4.8	Strongly Agree
Grand Mean	4.4	Agree

*5-4.5 Strongly Agree, 4.4 – 3.5 Agree, 3.4 – 2.5 Undecided, 2.4 – 1.5 Disagree, 1.4 – 0.5 Strongly Disagree

Interpretation Guide for the Perception Questionnaire

4.5-above	Strongly Agree
3.5-4.4	Agree
2.5-3.4	Uncertain
1.5-2.4	Disagree
Below 1.5	Strongly Disagree

Table 31 shows that students strongly agreed on 9 out of 15 items: that "the activities helped me develop positive attitudes towards mathematics" with a mean of 4.7, "the teacher was in control of the class" with a mean of 4.6, "hearing the students explain problems in their own words when working in our small group helps me to learn" with a mean of 4.7, "learning from Class-wide Discussion method was satisfying and interesting" with a mean of 4.5, "class-wide discussion method encouraged students to participate in the classroom activities" with a mean of 4.5, "I had more input and involvement in the classroom activities" with a mean of 4.6, "I learned to accept mistakes and listen to the explanation of the other members" with a mean of 4.6, "everyone has an opportunity to express their opinion on the question being discussed" with a mean of 4.8, and that "it is important that the teacher clearly explains which is the right answer and why after a Class-wide Discussion" with a mean of 4.8.

However, students agreed in 6 out of 15 items: that "I find the teaching strategy, class-wide discussion method, student-centered rather than teacher oriented" with a mean of 4.2, "the lesson on class-wide discussion method was time

consuming" with a mean of 4, "I appreciate the teachers' role as a facilitator rather than the source of all knowledge" with a mean of 4.4, "I learned better in right triangles with the use of class-wide discussion method" with a mean of 4.1, "some students always dominate the discussion in small groups" with a mean of 4.2, "having a number of different viewpoints in the small groups often leads to confusion" with a mean of 3.8.

A grand mean of 4.4 which is interpreted as "agree" implies that students perceived Class-wide Discussion method makes learning of right triangle easy.

CONCLUSIONS

Based on the findings of the study, the following conclusions were drawn:

1. The use of Class-wide Discussion Method as a teaching strategy improved student's conception on right triangles.
2. The students perceived the use of Class-wide Discussion method as enjoyable, helped them develop positive attitude towards mathematics, understand the concept better, and gain a clear understanding of the concept of right triangle.

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