Sarcouncil Journal of Multidisciplinary

ISSN(Online): 2945-3445

Volume- 05| Issue- 04| 2025

Research Article **Received:** 02-04-2025 | **Accepted:** 15-04-2025 | **Published:** 29-04-2025

Effects of Numbered Heads Together Strategy (NHTS) on Students' Conceptual Understanding in Mathematics

***Mariel P. Sajol*[1] *and Denis A. Tan*[2]**

[1]*Graduate Student, Science Education Department, Central Mindanao University, University Town, Musuan, Maramag Bukidnon, 8710 Philippines*

[2]*Faculty College of Education, Central Mindanao University, University Town, Musuan Maramag Bukidnon 8710 Philippines*

Abstract: The study investigated the impact of Numbered Heads Together Strategy on students' conceptual understanding of Grade 8 students in Bukidnon National School of Home Industries. It sought to: determine the conceptual understanding level of students in pretest and post-test and; to find out any significant difference on the students' conceptual understanding between pretest (before exposure) and posttest (after exposure). The study used a quasiexperimental design, with pretest and posttest assessments. In the pretest, both NHTS and non-NHTS student groups demonstrated a very low level of conceptual understanding, categorized as "Did not meet expectation," with the non-NHTS group having a slightly higher mean percentage score of 0.17 compared to the NHTS group. However, in the posttest, both groups showed minimal improvement; only one student in each group achieved a "fairly satisfactory" level of understanding, while the rest remained in the "Did not meet expectation" category. Significantly, the NHTS group's mean percentage score was 5.14 higher than the non-NHTS group in the posttest, indicating a slight shift in performance, though overall conceptual understanding remained low for the majority of students in both groups. The F-value between the groups is 5.839, with a probability of .019 ($p<0.05$), indicating a significant difference. The NHTS significantly improve the students' conceptual understanding from pretest to posttest.

Keywords: Numbered heads together strategy, conceptual understanding.

INTRODUCTION

Conceptual understanding skills is very important for the student because it serves as a foundation in learning to solve problem and to develop knowledge from their experiences and prior understanding. According to the National Council for Teachers of Mathematics (NCTM) the twenty-first century learner needs to have a conceptual understanding in mathematics because it will help them develop and enhance their ability to solve mathematical problems.

However, the International Large-Scale Assessments (ILSA) such as TIMSS 2019 have shown that Philippines ranked last out of 58 countries in mathematics and science. Moreover, In PISA 2022, Filipino students achieved an average score of 355 points in mathematics, which is considerably lower than the OECD average of 472 points. The findings indicated that there was no improvement compared to the 2018 PISA results, where the Philippines ranked second to last in mathematics among the countries that participated.

The emergence of this event challenges Mathematics educators to find alternative intervention and ways to engage learners that will aid them in learning mathematics effectively, help them boast their conceptual understanding towards the subject. In a Numbered Heads Together strategy students work in small groups to discuss and solve a problem. Each group member is responsible for understanding the solution and being able to explain it to the rest of the group. This strategy can promote conceptual understanding by encouraging students to engage in meaningful discussions, explain their thinking, and learn from their peers. NHT emphasizes members' responsibility to do their tasks based on their number. Students are to show their capability and use any strategies to reveal their responsibility. Students are also trained to understand every task comprehensively. Hence, the students' responsibility is not merely on the individual project, but also as a member of a particular group. This process encourages students' ability to solve problems and students comprehensiveness (Leasa & Coribema, 2017).

With this, the study intended to contribute to the existing knowledge on the effect of numbered heads together strategy on students' conceptual understanding in mathematics. The study investigated the effects of numbered heads together strategy on Grade 8 junior high school students' conceptual understanding in mathematics.

In the Philippines, the science curriculum aims to help students learn about mathematics so they can solve problems in their communities and make good choices. However, the country did poorly in

Copyright © 2021 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

***Corresponding Author:** Mariel P. Sajol

DOI- tps://doi.org/10.5281/zenodo.15328164

the 2018 Program for International Student Assessment (PISA) for mathematics, with students scoring lower than most other countries. This showed that changes were needed to improve education. The Department of Education is now working hard to make these changes and help students do better (De La Cruz, 2022).

Statement of the Problem

1. What is the level of student's conceptual understanding in
Mathematics when exposed to numbered heads together (NHTS) and to those not exposed to NHTS in terms of the following: a) Pretest;
b) Posttest

2. Is there a significant difference between the conceptual understanding in Mathematics of the students exposed to NHTS and to those not exposed to NHTS in post-test?

METHODS

The study utilized the quasi-experimental design, which seeks to find out and compare the student's conceptual understanding of 2 intact sections of grade 8 students of Bukidnon National School of Home Industries, Maramag Bukidnon and when exposed to Numbered Heads Together Strategy (NHTS) and to those not exposed to Numbered Heads Together Strategy. The two groups took a standardized mathematics test that served as a pretest of the study. The same test was used as the posttest at the end of the intervention for NHTS and those not exposed to NHTS.

The researcher utilized descriptive statistics such as frequency, mean, and standard deviation to determine the level of the student's conceptual understanding in mathematics.

Analysis of covariance (ANCOVA) was used to check if a significant difference exists in the conceptual understanding of the students who were exposed to the Numbered Heads Together Strategy (NHTS) and those not exposed to Numbered Heads Together Strategy.

RESULTS AND DISCUSSION

Data gathered for this study is presented in this section. The order of presentation is based on the order of specific problems in the statement of the problem. The data gathered from the respondents, which are important for testing the study's hypotheses, are analyzed and interpreted in this section. The tables and other figures are also shown in this chapter to give a convenient for the data.

Table 1: Level of students' conceptual understanding in the pre-test

GROUP						
Percent Equivalent	**Descriptive Rating**		**NHTS n=32**		**Non-NHTS n=31**	**Qualitative Interpretation**
		f	%	f	%	
90-100	Very High	0	0%	0	0%	Outstanding
85-89	High	0	0%	0	0%	Very Satisfactory
80-84	Average	0	0%	0	0%	Satisfactory
75-79	Low	0	0%	0	0%	Fairly Satisfactory
Below 75	Very Low	32	100%	31	100%	Did not meet the expectations
MPS		37.13%			37.29%	

As shown on the table 1, all students of NHTS group have very low level of conceptual understanding and also all students of non-NHTS group have a very low level of conceptual understanding. The group exposed to NHTS has a mean percentage score of 37.125%, indicating that the students' scores are at very low level of conceptual understanding. At the same time the non- NHTS group has a mean percentage score of 37.29, which also has a very low level of conceptual understanding.

Based on the results, both groups demonstrated a very low level of conceptual understanding. This could be attributed that the students need to learn some basic concepts of mathematics. Many students struggle with understanding math concepts. This happens because students often focus on using formulas and shortcuts rather than truly understanding the material (Molina, 2014). The NCTM (2000) Learning Principle emphasizes that students should learn math by connecting new concepts to their existing experiences and knowledge. However, many math assessment tools primarily focus on understanding, often neglecting the important aspect of the learning process itself.

Copyright © 2021 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

Table 2: Level of students' conceptual understanding in the posttest

				GROUP		
Percent Equivalent	**Descriptive Rating**		**NHTS n=32**		**Non-NHTS n=31**	**Qualitative Interpretation**
		f	%	f	%	
90-100	Very High	0	0%	0	0%	Outstanding
85-89	High	0	0%	0	0%	Very Satisfactory
80-84	Average	0	0%	0	67.74%	Satisfactory
75-79	Low	1	3.13%	1	3.23%	Fairly Satisfactory
Below 75	Very Low	31	96.88%	30	96.77%	Did not meet the expectations
MPS		46.69%			41.55%	

As shown on the table 2, the NHTS group had the following conceptual understanding: one (1), or 3.125% of the student, had reached the low level of conceptual understanding; thirty-one (31) or 96.875% of the students had a very low level of conceptual understanding. On the other hand, in the Non-NHTS group, one (1) or 3.23% of the students had reached the low level of conceptual understanding: and the other thirty (30) or 96.77% had a very low conceptual level in the posttest.

The NHTS group obtained a mean percentage score of 46.69% indicating a "Did not meet the expectation" result, while the Non-NHTS group had a mean percentage score of 41.55, indicating a "Did not meet the expectation" result. In the NHTS group, one student belong to the low level indicating a "fairly satisfactory" level of conceptual understanding and 31 students belong to the very low level indicating a "Dis not meet the expectation" level of conceptual understanding. In the Non-NHTS group, 1 student belong to the low level indicating a " Fairly satisfactory" level of conceptual understanding, and the other 30 students had a very low level indicating a "Did not meet the expectation" level of conceptual understanding.

In the pretest, both NHTS and non-NHTS all students had a very low level indicating a "Did not meet the expectation" level of conceptual understanding. The mean percentage score of non-NHTS group is 0.17 higher than the NHTS group. But in the posttest, both groups had 1 student with a fairly satisfactory level of conceptual understanding and the rest of the students from both groups falls to the "did not meet the expectation" level of conceptual understanding. The mean percentage score of NHTS group is 5.14 higher than the nonNHTS group.

The result implies that NHTS is one of the effective strategies in developing/enhancing the students' conceptual understanding. NHTS is a cooperative learning strategy designed to enhance student engagement and accountability in the classroom. It operates through a structured process that encourages collaboration among students while ensuring that each member of a group is prepared to contribute. Nursyamsi and Corebima (2016) states that NHTS learning gives students the opportunity to share ideas and consideration of the most appropriate answer. Veronika M.W. *et al*, 2017, examined 57 students improvement through the use of NHTS way to deal with essential subjects of professional Secondary school in the city of Indonesia Surakarta, the discoveries of the review uncovered that NHS learning model further develops commitment inside the learning exercises as well as the degree of students accomplishment. Ellena et. al. (2018) found out that cooperative learning technique numbered heads together is effective in improving social skill at kindergarten students. The effectiveness of NHT is seen with the improvement of social skills in all aspects of communication, cooperation, assertiveness, responsibility, empathy, self-involvement and self-control.

Table 3: Comparison of Students' conceptual understanding on the posttest

GROUP		**N**	**MEAN**	**SD**		
NHTS		32	23.34	3.42		
Non-NHTS		31	20.77	4.85		
TOTAL		63	22.055	4.135		

Copyright © 2021 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

*Corresponding Author: Mariel P. Sajol

DOI- tps://doi.org/10.5281/zenodo.15328164

Source	SS	df	MS	F-value	Sig.	Partial Eta Squared
Group	103.987	1	103.987	5.839	0.019**	0.089
Pre-test (Covariate)	0.023	1	0.023	0.001	0.971	0.000
Error	1068.615	60	17.81			
Total	31885	63				

Note: * significant at 0.05 level

In Table 3 presents the analysis of covariance (ANCOVA) of posttest results between interventions.

As can be observed in the table, the pretest was used as a covariate to statistically equate different prognostic variables, which may affect the analysis. The result shows that the students, though of two other groups, have a comparable performance before intervention. The F-value between the groups is 5.839, with a probability of .019 ($p<0.05$), indicating a significant difference. Thus the null hypothesis that there is no significant difference on the level of students' Conceptual Understanding between the NHTS and the non-NHTS group in post-test is rejected.

This implies that the NHTS group, with a mean of 23.34, performed statistically higher than the Non-NHTS group, with a mean of 20.77; thus, there is a significant difference in their conceptual understanding. This means that the numbered heads together strategy helps the students improve their conceptual understanding of mathematics. Awal (2020) looked into how the NHTS learning model was used to make it easier for students in class VII public middle school 5 Ternate city to learn about Indonesia's natural resources. The findings showed that the number-heads-together learning model helped students learn more effectively. It was also demonstrated that the NHS model can encourage students to be brave in asking questions, responding to questions, and participating in group discussions and collaboration. Additionally, NHS has the ability to create a fun, creative, and active learning environment. Nasrun (2016) investigated how the NHTS model and cooperative learning could help students learn mathematics better. It was decided that the application learning model NHTS contributes to better LO for students. In the Philippines, De Vera S. (2021) concluded that the application of numbered heads together improves the academic performance of the learners in Livelihood Education

CONCLUSION

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

Students' conceptual understanding in pretest and posttest is very low however there is a slight shift of performance as the students were exposed to NHTS based on the mean percentage score on the posttest and also the .019 significant difference. Based from the summary of findings and conclusion of the study, the following recommendations are put forward:

To address the students' low level of conceptual understanding in mathematics the teacher must use highly engaging strategies like numbered heads together strategy where the students are being held responsible for the group's performance that will enhance their understanding about the topic. However, the author suggest further research about the strategy.

REFERENCES

1. Awal, S. N. "Execution of numbered-heads-together learning model to further develop understudy learning results of class VII-I public center school 5 Ternary City on nature material of Indonesia." *Geographica: Science and Schooling Journal* 1.1 (2020): 40.
2. De Vera, S. M. "Improving the performance of Grade V learners using Numbered Heads Together (NHT) in livelihood education: An action research paper." *Galaxy International Interdisciplinary Research Journal (GIIRJ)* 9.6 (2021): 43.
3. Ellena, R. C. and Suminar, D. R. "Effectiveness of cooperative learning Numbered Heads Together to improve the social skills of kindergarten students." *The International Journal of Social Sciences and Humanities Invention* 5.1 (2018): 4344–4349.
4. Leasa, M. and Aloysius, D.C. "Effectiveness of cooperative learning on science learning outcomes of elementary school students: A study using Numbered Heads Together." *Journal of Physics: Conference Series* 795 (2017): 012071.
5. Molina, S. L. "Conceptual understanding and academic performance of students in mathematics." *Psych Educ: A Multidisciplinary Journal* 5 (2022): 736.

Copyright © 2021 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

6. National Council of Teachers of Mathematics, 2000. Principles and standards for school mathematics. Reston, VA: Author.
7. Nasrun. "The utilization of helpful learning with numbered heads together model to further develop the students' mathematics subject." *IOSR Journal of Mathematics* 12.5 (2016): 113–117.
8. Nursyamsi, S. Y. and Corebima, A. D. "The effect of numbered heads together (NHT) learning strategy on the retention of senior high school students in Muara Badak, East Kalimantan, Indonesia." *European Journal of Education Studies* (2016).
9. OECD. (2023). PISA 2022 results (Volume I): What students know and can do. OECD Publishing.
10. Ompad Jr, V., Kilag, O. K., Luzares, A., Tipontipon, J., dela Cruz, G. and Velasquez, B. "Mathematics leadership in schools: A deep dive into aspirations and hurdles." International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence (IMJRISE) 1.1 (2024): 115–122.
11. Veronika, M. W, *et al*. "Understudy improvement by applying the numbered heads together way to deal with essential subjects of professional secondary schools in Indonesia." Maintainable Training 8.2 (2017): 94–102.

Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:
Sajol, M.P. and Tan, D.A. "Effects of Numbered Heads Together Strategy (NHTS) on Students' Conceptual Understanding in Mathematics." *Sarcouncil Journal of Multidisciplinary 5.4* (2025): pp 1-5

Copyright © 2021 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher