Meta-analysis : The Effect of Number Head Together Model on Critical Thinking Ability

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Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh model Number Head Together terhadap kemampuan berpikir kritis siswa. Jenis penelitian ini adalah meta-analisis. Sampel penelitian berasal dari 9 jurnal nasional dan internasional. Proses penelusuran sumber data melalui Google Scholar, Plos ONE, Eric, dan Wiley. Metode penyeleksian sumber data adalah metode Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). Teknik pengumpulan data adalah observasi dan dokumentasi. Kriteria inklusi yaitu jurnal nasional dan internasional yang terbit tahun 2015-2023; Jenis penelitian harus eksperimen atau kuasi eksperimen; Data memiliki keterkaitan dengan variabel penelitian; dan Penelitian memiliki nilai hasil uji t, F dan Standard deviasi. Analisis data yang digunakan analisis data statistik kuantitatif dengan menghitung nilai effect size dengan bantuan aplikasi Comprehensive meta-analysis (CMA). Hasil penelitian menyimpulkan bahwa nilai rata-rata effect size sebesar 0.863 kriteria tinggi dan nilai rata-rata kelas eksperimen 82.67 sedangkan kelas kontrol 70.52 Temuan ini menunjukan bahwa model pembelajaran Number Head Together (NHT) memberikan pengaruh positif terhadap kemampuan berpikir kritis siswa.

Kata Kunci: *Model pembelajaran, Number Head Together, Berpikir Kritis, Meta-analysis*

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Abstract

This study aims to determine the effect of Number Head Together model on students' critical thinking skills. This type of research is a meta-analysis. The research sample came from 9 national and international journals. The process of searching for data sources through Google Scholar, Plos ONE, Eric, and Wiley. The data source selection method is the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) method. Data collection techniques were observation and documentation. Inclusion criteria are national and international journals published in 2015-2023; The type of research must be experimental or quasi-experimental; Data has a relationship with research variables; and Research has the value of t, F and Standard deviation test results. Data analysis used quantitative statistical data analysis by calculating the effect size value with the help of the Comprehensive meta-analysis (CMA) application. The results concluded that the average effect size value of 0.863 was high criteria and the average value of the experimental class was 82.67 while the control class was 70.52 These findings indicate that the Number Head Together (NHT) learning model has a positive effect on students' critical thinking skills*

Keywords: *Learning model, Number Head Together, Critical Thinking, Meta-analysis*

Introduction

Panjang Critical thinking is an important skill for students to master in analysing a problem in the era of the industrial revolution 4.0 (Adnan et al., 2021; Jamaludin et al., 2022; Suryono et al., 2023; Rahman et al., 2023; Elfira et al., 2023; Boonsathirakul & Kerdsomboon, 2023). Sri et al., (2022) Critical thinking is an ability that a person has to analyse a problem in depth. Critical thinking skills help students evaluate and investigate a problem systematically and logically (Sutiani et al., 2021; Yousef, 2021; Snyder & Wiles, 2015; Pahruddin et al., 2019). Furthermore, students who have the ability to think critically can complete the learning content according to the facts learnt (Suhada, 2017; Nurtamam et al., 2023; Ichsan et at., 2023; Rahman et at., 2023).

Students' critical thinking skills in learning activities in Indonesia are still relatively low (Setijani, 2017; Suharyat et al., 2022; Luciana et al., 2023; Solihin et al., 2018). The low critical thinking skills of students are influenced by various factors. According to Kartika & Rakhmawati (2022) low critical thinking skills of students teachers tend to present material in class so that students are not actively involved. Students only memorise and understand learning materials and do not lead students to think critically (Oktarina et al., 2021; Zulkifli et al., 2022; Ichsan et al., 2022; Wijaya & Handayani, 2021). The selection of learning methods and models is not appropriate to demand students' critical thinking skills (Wahyuni et al., 2019; Rahman et al., 2023; Sofianora et al., 2023). Therefore, it is necessary to have the right learning model to encourage students' critical thinking skills.

The Numbered Heed Together learning model is a learning model that can improve students' critical thinking skills in learning (Rijal et al., 2021; Mustami et al., 2018; Lince, 2016). The Numbered Head Together (NHT) model is a cooperative learning model that can improve students' critical thinking skills and reasoning process (Wati & Fatimah, 2016). Research results Sari (2017) model pembelajaran *Numbered Head Together* (NHT) melatih siswa lebih mudah dalam bernalar sehingga merangsang siswa berpikir kritis . Selain itu, model pembelajaran *Numbered Head Together* (NHT) help students share ideas and consider the right answer (Bagas et al., 2021; Tia & Muliandari, 2019; Imam & Taufik, 2022).

Previous research by Putra *et al.,* (2017) The application of the Numbered Head Together (NHT) model can train students to increase students' knowledge competence in learning. Research results (Koyumah et al., 2016) Numbered Head Together (NHT) learning model has a positive effect on students' problem solving skills. Furthermore, the results of research by (Eka & Handayani, 2016) The application of the Numbered Head Together (NHT) model can improve student learning outcomes. However, in reality, many studies on the Numbered Head Together (NHT) model still do not describe the effect size of the influence of the Numbered Head Together learning model on students' critical thinking skills.

Methods

Research Design

This research is a type of meta-analysis research. Meta-analysis is a type of research that collects and analyses previous research that can be analysed with statistics (Polat, 2022; Rahman et al., 2023; Putra et al., 2023; Suhaimi et al. 2022; Santosa et al., 2021; Razak et al., 2021). The meta-analysis research serves to determine the effect of the Numbered Head Together (NHT) learning model on students' critical thinking skills.

Data Source Search

The process of searching for data sources in this study through google scholar, ScienceDirect, Eric and Wiley. The data source selection process uses the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) method which can be seen in Figure 1. The keywords for searching data sources are the Numbered Head Together (NHT) learning model and critical thinking skills.

Inclusion Criteria

The inclusion criteria in this study are 1) data sources must come from national and international journals published from 2020 = 2023; 2) Type of experimental or quasi-experimental research; 3) The research has a relationship with the Numbered Head Together (NHT) learning model and critical thinking skills; 4) The research has complete data sources of r values, f values, and f values. The research has a complete data source for the r value, f value and standard deviation.

Data Analysis

Data analysis in this study is quantitative data analysis by calculating the effect size value of each study with the help of the Comprehensive Meta-analysis (CMA) application. The effect size criteria in this study can be seen in Table 1.

Table 1. Kriteria *Effect Size*

Effect Size	Kriteria
$0 \leq ES \leq 0.20$	Low
$0.20 \leq ES \leq 0.80$	Medium
$ES \geq 0.80$	High

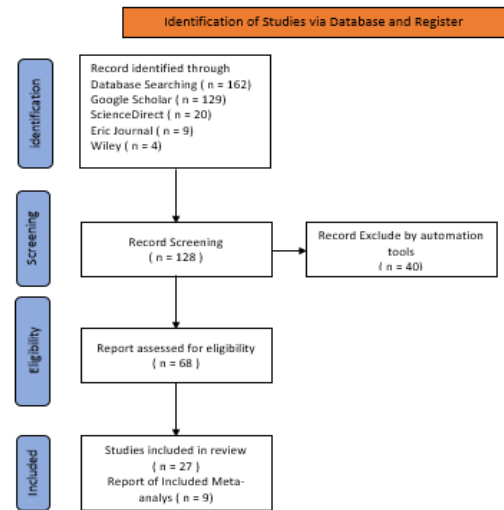Sumber: (Nastiti et al., 202 Ichsan et al., 2022; Rahman et al, 2023)

Figure 1. Data source selection process with PRISMA

Result and Discussion

From the analysis of 162 national and international journals on the effect of the Numbered Head Together (NHT) learning model on students' critical thinking skills, only 9 journals met the inclusion criteria. Journals that have met the inclusion criteria are calculated the effect size value of each study which can be seen in Table 2.

Table 2. Effect Size Value of Each Study

No	Author	Journal Type	Variabel	Effec Size	CKriteria
1	Zubaidah et al., (2018)	National	Critical Thinking	0.61	Medium
2	Putra et al, (2021)	National	Critical Thinking	1.10	High
3	Fadila et al., (2023)	National	Critical Thinking	0.80	Medium
4	Syafaren et al. , (2019)	National	Critical Thinking	0.97	High
5	Khuzaemah (2014)	National	Critical Thinking	0.75	Medium
6	Rohmawati et al., (2023)	National	Critical Thinking	0.82	High
7	(Rijal et al., 2021)	International	Critical Thinking	0.59	Medium

				g	
8	Dadri et al., (2019)	Internatio nal	Critical Thinkin g	1.20	High
9	Satira et al., (2023)	National	Critical Thinkin g	0.93	High
	Average Effect Size			**0.86 3**	**High**

Based on Table 2. Shows that the average effect size value of the entire study is 0.863 with high criteria. These results explain that the Numbered Head Together (NHT) learning model has a significant effect on students' critical thinking skills. This result is in line with (Andriyani et al., 2015) The application of the Numbered Head Together (NHT) model affects students' critical thinking skills and learning achievement. The Numbered Head Together (NHT) learning model can help students be more active in learning so that the learning process does not tend to be teacher-centred (Mustami et al., 2018; Elizabeth, 2019; Hidayat et al., 2021). Not only that, the learning process with the Numbered Head Together (NHT) model can train students' reasoning process to think critically in solving a problem (Hunter et al., 2016).

Furthermore, the application of the Numbered Head Together (NHT) model involves students in improving their congitive competence in learning (Kurniasari, 2012). Research results by (Ratna, 2014) stated that the Numbered Head Together (NHT) learning model can improve students' science process thinking knowledge so that it can foster students' critical thinking skills. The application of the Numbered Head Together (NHT) model helps students more easily understand the material and learning content that can

encourage students to think critically and creatively (Elendiana & Prasetyo, 2021). Critical thinking skills play an important role in facing 21st century competition (Doğru, 2023) and overcome the problems that occur in life. Furthermore, calculating the effect of the Numbered Head Together (NHT) learning model on students' critical thinking skills based on educational levels can be seen in Table 3.

Table 3. The magnitude of the influence of the Numbered Head Together Model on the level of pendidikan

Tingkatan	Effect Size	Kriteria
SD	0.71	Medium
SMP	0.83	High
SMA	0.97	High

Based on Table 3. It shows that the effect of the Numbered Head Together (NHT) learning model at the elementary level has an effect size value of 0.71 with moderate criteria, junior high school has an effect size value of 0.83 with high criteria and high school has an effect size value of 0.97 with high criteria. The level of education has a positive influence in the application of the Numbered Head Together (NHT) model on students' critical thinking skills. The application of the Numbered Head Together (NHT) model has a significant effect on the critical thinking skills of junior and senior high school students. According to Andesta in (Izzah, 2021) stated that at the age of 11-12 years experiencing the formal operational phase, a child is able to think about something that will happen that is abstract. So, the higher the level of education of a person, the more mature the way of thinking in solving a problem (Ma et al., 2022; Tokmak et al., 2022).

Furthermore, analysing the application of the Numbered Head Together (NHT) learning model in the experimental class and the conventional learning model in the control class. The results of the analysis of both experimental and control classes can be seen in Table 4.

Table 4. Comparison of Numbered Head Together and Conventional Models

Kelas	Mean	Persentase (%)
Eksperimen	82.67	85.20
Kontrol	70.52	60.34

Table 4. It shows that the average value of the application of the Numbered Head Together (NHT) learning model of 82.67 is higher than the conventional learning model in the control class of 70.52. These results explain that the application of the Numbered Head Together (NHT) learning model can increase the value of students' critical thinking skills in learning. These results are (Setiawan, 2022) Numbered Head Together (NHT) learning model can increase the value of students' critical thinking in learning. Furthermore (Habibi & Rizal, 2022) Numbered Head Together (NHT) learning model can increase student learning motivation so as to foster student knowledge to think critically. Knowledge is all information obtained by a person through various sources (Ferry et al., 2019). So, students who have extensive knowledge will find it easier to think critically in learning (Kizilhan, 2022; Fikriyatii et al., 2022). Therefore, the Numbered Head Together (NHT) model provides an alternative to develop critical thinking skills in the learning process.

Conclusion

From this study it can be concluded that the average effect size value is 0.863 high criteria and the average value of the experimental class is 82.67 while the control class is 70.52 These findings indicate that the Number Head Together (NHT) learning model has a positive influence on students' critical thinking skills. The Number Head Together (NHT) learning model really helps students in fostering students' critical thinking skills in learning.

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