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Research Artide

The Influence of the Discovery Learning and Numbered Heads Together Models on Student Learning Outcomes.

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ABSTRAK: Penelitian ini bertujuan untuk mengkaji pengaruh model pembelajaran *discovery learning* dan *numbered heads together* terhadap hasil belajar peserta didik pada mata pelajaran Pendidikan Agama Islam dan Budi Pekerti kelas XI di SMK Negeri 2 Padang. Jenis penelitian yang digunakan adalah eksperimen-semu (*Quasi eksperimen*) dengan desain Randomized Control Group Only Design. Populasi dalam penelitian ini adalah seluruh peserta didik kelas XI SMK Negeri 2 Padang 2024/2025, untuk mendapatkan kelas sampel maka digunakan teknik pengambilan sampel secara acak (*random sampling)*. Kelas eksperimen I menggunakan model *discovery learning*, kelas eksperimen II menggunakan model *numbered heads together* dan kelas kontrol menggunakan pembelajaran konvensional. Data hasil belajar diperoleh melalui instrumen tes dan dianalisis menggunakan uji t. Hasil penelitian menunjukkan bahwa rata-rata nilai post-test kelas eksperimen I adalah 85,88, kelas eksperimen II 80,47, dan kelas kontrol 74,47. Uji hipotesis dengan uji t menunjukkan bahwa hasil belajar peserta didik yang menggunakan model *discovery learning* dan *numbered heads together* tinggi secara signifikan dibandingkan dengan kelas kontrol. Selain itu, terdapat perbedaan signifikan antara hasil belajar peserta didik yang menggunakan model pembelajaran model *discovery learning* dan *numbered heads together*.

ABSTRACT: This study aimed to examine the effect of the Discovery Learning (DL) and Numbered Heads Together (NHT) learning models on student learning outcomes in the subject of Islamic Religious Education and Character for grade XI at SMK Negeri 2 Padang. The research employed a quasi-experimental method with a Randomized Control Group Only Design. The population consisted of all grade XI students at SMK Negeri 2 Padang for the 2024/2025 academic year, with sample classes selected using random sampling technique. Experimental Class I was taught using the DL model, Experimental Class II using the NHT model, and the Control Class using conventional learning. Learning outcomes data were collected through a test instrument and analyzed using a t-test. The results showed that the average post-test scores for Experimental Class I, Experimental Class II, and the Control Class were 85.88, 80.47, and 74.47, respectively. Hypothesis testing with the t-test indicated that the learning outcomes of students taught using both the DL and NHT models were significantly higher than those in the control class. Furthermore, a significant difference was found between the learning outcomes of students taught using the DL model and those taught using the NHT model.

INTRODUCTION

Islamic Religious Education (PAI) is a process of imparting Islamic knowledge and values to students through teaching, habituation, and the development of their potential. Its objective is to achieve balance and perfection in life, both in this world and in the hereafter [1]. In the 2013 Curriculum, the term Islamic Religious Education (PAI) is supplemented with "and Character" (Budi Pekerti), thus becoming Islamic Religious Education and Character (PAI dan BP). This refers to an education that not only provides knowledge but also shapes students' attitudes, personalities, and skills in consciously and deliberately practicing the values of Islamic teachings. The goal is to achieve salvation in this world and the hereafter through subjects taught at every educational unit [2]

Instruction is a term closely and inseparably linked to the educational process. It encompasses activities designed to create conditions or provide services that facilitate student learning [3]. The instruction of PAI and BP within national education holds significant urgency in realizing one of the national education objectives outlined in Law Number 20 of 2003 concerning the National Education System, Article 3: to develop students' inherent potentials so they may become human beings who have faith and piety towards God Almighty and possess noble character [4]. Therefore, to achieve these educational goals, it is crucial for educators to understand how students learn during the educational process. Ideally, an educator should master various competencies, one of which is professional competence. Professional competence refers to the ability to master learning materials broadly and deeply, including the professionalism of an educator in developing teaching methods, learning models, instructional strategies, and basic teaching skills to ensure effective instruction and optimal learning outcomes [5].

Learning outcomes are critically important in education and can be viewed as a measure of student success in school education [6]. Learning outcomes are an educational assessment of student progress in all aspects learned at school, concerning knowledge, proficiencies, or skills expressed after evaluation [7]. Generally, student learning outcomes are influenced by two interrelated factors: internal and external factors. One significant external factor is the selection of learning models. Hence, educators need to plan and implement learning models that can enhance student participation and learning outcomes [8].

In practice, however, the learning models applied by educators have not been able to improve learning outcomes in the PAI and BP subject. This was evident from observations conducted on Friday, October 13, 2023, at SMK Negeri 2 Padang during the instructional process. Several key findings from the observation included: 1) Students were less active in learning. This was apparent during class discussions, where only a few students actively participated in presentations, arguments, and answering questions, while the majority appeared bored, lacked concentration, did not pay attention to the teacher's explanations, worked on tasks irrelevant to the material, or talked with their desk mates; 2) Teachers tended to dominate the classroom learning process; 3) Student learning outcomes remained relatively low, with average scores ranging between 60-70, despite the Minimum Completeness Criteria (KKTP) for PAI and BP being set at 75 (Observation, October 2023).

Based on the problems outlined above, educators need to select and apply learning models that encourage students to participate actively in the learning process. This is important so that students not only acquire knowledge but can also develop their competencies maximally, ultimately contributing to the achievement of optimal learning outcomes. Among the various learning models that can enhance student activity and engagement, and have the potential to improve PAI and BP learning outcomes, are the Discovery Learning model and the Numbered Heads Together (NHT) cooperative learning model.

Discovery Learning is a model designed to foster active learning, where students can discover and investigate material independently. This approach leads to more meaningful, lasting, and memorable learning outcomes [9]. According to Dimyati and Mudjiono, the use of the Discovery Learning model serves several purposes, including increasing active student participation in acquiring and processing information, preparing them to be lifelong learners, reducing dependence on the teacher as the sole source of information, and training students to explore their environment as a source of information [10].

Previous research also indicates that the implementation of the Discovery Learning model in PAI and BP instruction is effective in improving student learning outcomes and critical thinking skills. For instance, a study by Titin showed that the application of the Discovery Learning model could improve the PAI and BP learning outcomes of second-grade students at SDN No. 51 Dumbo Raya, with learning completeness increasing from 68% to 92% after two cycles of implementation [11]. Furthermore, research by Nikmatul Rohmawati at SMK Negeri 1 Ponorogo found that the application of the Discovery Learning model significantly improved student learning outcomes, particularly when combined with a high level of learning activity [12].

Various previous studies reveal that the Discovery Learning model holds great potential for enhancing the quality of PAI and BP instruction. In the midst of the demands of the digital era, which emphasize the importance of critical thinking skills and learning independence, instructional approaches that stimulate student activity and exploration are needed. It is within this context that this research is conducted to examine more deeply the application of the Discovery Learning model in PAI and BP instruction, with a specific focus on the achievement of students' cognitive learning outcomes.

In addition to the Discovery Learning model, another model that can be used to activate students in achieving their learning outcomes is the Numbered Heads Together (NHT) cooperative learning model. The NHT model begins with a numbering stage, where the teacher divides students into groups and assigns a number to each individual within the group. Subsequently, the teacher poses questions, and each group consolidates their ideas through discussion in "Heads Together" to formulate an answer. Then, the teacher calls upon students with the same number from each group to present their answers, and the most appropriate answer is discussed. A distinctive feature of the NHT model is that the teacher randomly selects a student to represent their group without prior notice. This ensures the active involvement of all students [13]. Through the application of the NHT model, it is expected that students will become more active during the learning process, find it easier to understand the material taught, develop a greater sense of responsibility, and ultimately achieve better learning outcomes.

Based on these conditions, this research was conducted to examine the influence of two learning models, namely Discovery Learning and Numbered Heads Together (NHT), on student learning outcomes. These two models were selected because their approaches encourage student activity and engagement in the learning process. Through this research, it is hoped that a clearer picture of the effectiveness of each model in improving learning outcomes will be obtained. The findings of this study represent an important contribution to efforts aimed at enhancing instructional quality, particularly within the context of Islamic Religious Education.

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METHOD

This study falls under the category of quantitative research utilizing a quasi-experimental method. The research design employed was a randomized group only design. The study was conducted across three classes: two experimental classes and one control class. The treatment applied in Experimental Class I was the Discovery Learning model, in Experimental Class II the Numbered Heads Together (NHT) model was used, while the control class was taught using the conventional learning model.

The population of this research consisted of all Grade XI students in the odd semester of the 2024/2025 Academic Year at SMK Negeri 2 Padang. The study sample was selected using random sampling technique [14]. Data in this study were obtained using a test instrument in the form of a learning outcomes test for the Islamic Religious Education and Character (PAI dan BP) subject. The same test was administered to all three sample groups as a post-test, conducted at the end of the instructional topic based on the Learning Objective Flow (*Alur Tujuan Pembelajaran*). The test consisted of 25 multiple-choice items with options A through E. The data from this test were then analyzed quantitatively to determine the difference in the average improvement of student learning outcomes across Experimental Class I, Experimental Class II, and the control class.

In this study, before conducting hypothesis testing on the collected data, assumption tests were performed as prerequisites for inferential statistical analysis. The assumption tests consisted of two types: the normality test and the homogeneity of variance test. The normality test aimed to demonstrate that the sample data came from a normally distributed population. The normality test was conducted using the Kolmogorov-Smirnov test with the help of the SPSS program. The decision criterion was based on the significance value (Sig.): if Sig. > α (0.05), the data were considered normally distributed; conversely, if Sig. < α (0.05), the data were not normally distributed. The homogeneity of variance test was performed to determine whether the three sample groups came from populations with the same variance (homogeneous) or not. This test was also conducted using SPSS. The decision criterion was that if the significance level or probability was greater than 0.05, the sample classes could be considered homogeneous [15].

The research hypotheses were formulated to examine the effect of the Discovery Learning model and the Numbered Heads Together cooperative learning model on student learning outcomes:

1. The learning outcomes of students taught using the Discovery Learning model are higher than those of students taught using conventional learning in the PAI dan BP subject for Grade XI at SMK Negeri 2 Padang.
2. The learning outcomes of students taught using the Numbered Heads Together model are higher than those of students taught using conventional learning in the PAI dan BP subject for Grade XI at SMK Negeri 2 Padang.
3. There is a difference in the learning outcomes of students taught using the Discovery Learning model and the Numbered Heads Together model in the PAI dan BP subject for Grade XI at SMK Negeri 2 Padang.

RESULTS

The data in this study consist of student learning outcomes in the subject of Islamic Religious Education (PAI) and Moral Character (BP) from three groups: Experimental Class I, which employed the Discovery Learning model; Experimental Class II, which used the Cooperative Learning model of the Numbered Heads Together (NHT) type; and the Control Class, which implemented conventional teaching methods. The PAI and BP learning outcomes were obtained through a final test (post-test) administered to students in all three sample classes. The test comprised 25 multiple-choice items with five response options each, covering the topic "Branches of Faith: Fulfilling Promises, Expressing Gratitude for Blessings, Guarding One's Speech, and Concealing Others' Faults." Based on the test scores, the mean, standard deviation, highest score, and lowest score were calculated. The results of these calculations are presented in Table 1 below.

Table 1. Descriptive Statistics of Post-Test Learning Outcomes

Class	N	x_max	x_min	Mean	Std. Deviation
Experimental I	34	100	68	85.88	8.48
Experimental II	34	100	64	80.47	9.48
Control	34	96	52	74.47	10.23

As shown in Table 1, the PAI and BP learning outcomes in Experimental Class I were higher than those in the Control Class. Similarly, the outcomes in Experimental Class II also exceeded those of the Control Class, and Experimental Class I outperformed Experimental Class II. Specifically, Experimental Class I achieved a mean score of 85.88, with a maximum of 100 and a minimum of 68. Experimental Class II recorded a mean of 80.47, with a maximum of 100 and a minimum of 64. Meanwhile, the Control Class obtained a mean of 74.47, with a maximum of 96 and a minimum of 52.

Prior to conducting hypothesis testing on the collected data, the researcher first performed assumption tests as prerequisites for selecting the appropriate inferential statistical method. These assumption tests included normality and homogeneity of variance tests. The purpose of these tests was to determine whether the selected sample distributions originated from a normally distributed population. In other words, these tests were conducted to decide whether parametric or non-parametric statistical tests should be used for hypothesis testing. If the data were normally distributed, parametric statistics would be applied; otherwise, non-parametric methods would be employed. The normality test was conducted using the Kolmogorov–Smirnov test with the assistance of SPSS software version 22. The results of the normality test for PAI and BP learning outcomes are presented in Table 2 below.

Table 2. Normality Test of PAI and BP Learning Outcomes (Experimental Class I, Experimental Class II, and Control Class)

Variable	Class	Kolmogorov–Smirnov Statistic	df	Sig.
PAI and BP Outcomes	Experimental I	0.128	34	0.173
	Experimental II	0.145	34	0.067
	Control	0.117	34	0.2

As indicated in Table 2, the significance values for Experimental Class I, Experimental Class II, and the Control Class were 0.173, 0.067, and 0.200, respectively. All these values exceed the predetermined alpha level of α = 0.05. Therefore, it can be concluded that the learning outcome scores for PAI and BP in all three classes originate from a normally distributed population. The homogeneity of variances was assessed using Levene's Test, with results shown in Table 3.

Table 3. Homogeneity Test of PAI and BP Learning Outcomes (Experimental Class I, Experimental Class II, and Control Class)

Basis	Levene Statistic	df1	df2	Sig.
Based on Mean	0.509	2	99	0.603
Based on Median	0.567	2	99	0.569
Based on Median and adjusted df	0.567	2	96.837	0.569
Based on Trimmed Mean	0.515	2	99	0.599

Table 3 shows that the significance value based on the mean for the post-test learning outcomes across the three classes is 0.603. Since 0.603 > 0.05, it can be concluded that the variances of the learning outcomes among the three sample classes are homogeneous. Having confirmed that the data are both normally distributed and homogenous, the next step was to conduct hypothesis testing using a t-test (more precisely, a one-way ANOVA followed by post-hoc comparisons, given the three-group design). This hypothesis test was performed to determine whether the research hypotheses should be accepted or rejected.

First Hypothesis Test

The statistical hypotheses to be tested are: $H_0 : \mu_1 \leq \mu_3$ and $H_1 : \mu_1 > \mu_3$,where μ_1 represents the mean learning outcomes of students in Experimental Class I (Discovery Learning), and μ_3 denotes the mean learning outcomes of students in the Control Class (Conventional Instruction). The results of the independent samples t-test are presented in Table 4 below.

Table 4. Results of the First Hypothesis Test

Class	N	Mean	$t_{Calculated}$	$t_{critical}$	Decision
Eksperimental I	34	85,88	5,53	1,66	H1 diterima
Control	34	74, 47			

Table 4 shows that the calculated t-value is 5.53, while the critical t-value at degrees of freedom (df) = 66 and a 95% confidence level (α = 0.05) is 1.66. Since $t_{calculated} > t_{critical}$ (5.53 > 1.66), the null hypothesis(H_0) is rejected, and the alternative hypothesis (H_1) is accepted. Therefore, it can be concluded that the learning outcomes of students taught using the Discovery Learning model are significantly higher than those taught using conventional instruction in the Islamic Religious Education and Moral Character (PAI and BP) subject for Grade XI students at SMK Negeri 2 Padang.

The findings confirm that students exposed to the Discovery Learning model achieved higher learning outcomes compared to those taught through conventional methods. This result is attributable to the active involvement of students in the learning process, which aligns with Piaget's constructivist theory. According to this theory, effective learning occurs when learners actively construct knowledge through direct experience, social interaction, and problem-solving [13].

Discovery Learning is an instructional model that emphasizes students' independent discovery of conceptual knowledge. Jerome Bruner argued that discovery-based learning enables students to construct their own understanding in a more active and engaged manner. This process fosters deeper comprehension and enhances long-term retention of learned material [16]. Bruner's theory thus suggests that Discovery Learning not only strengthens conceptual understanding but also stimulates critical and creative thinking, as students are encouraged to seek solutions to encountered problems [17].

Hosnan [9] further defines Discovery Learning as a model that develops active learning strategies by enabling students to independently investigate and discover knowledge. The resulting understanding is more enduring and less prone to forgetting. In this model, learners are given opportunities—either independently or with minimal teacher guidance—to construct new concepts, leading to deeper and more meaningful learning. This contrasts sharply with conventional instruction, which is typically teacher-centered and passive, where students primarily receive information without active engagement [18].

This study also reveals that students actively involved in the learning process demonstrate higher motivation and a greater sense of responsibility for their own learning. These factors collectively contribute to more optimal learning outcomes compared to conventional methods, which tend to be passive and offer limited opportunities for exploration or knowledge construction. These findings are consistent with Rizkyna et al [19], whose study titled "The Effect of the Discovery Learning Model on PAI and BP Learning Outcomes of Grade VII Students at SMP Negeri 13 Malang" similarly concluded that Discovery Learning significantly improves student achievement compared to conventional teaching.

Supporting evidence also comes from Aliasmin, who found that the implementation of Discovery Learning enhances PAI learning outcomes [20]. Improved achievement, in turn, fosters sustained student curiosity and a desire for continuous learning. This model emphasizes experiential learning and the generation of new ideas, naturally promoting active student participation. Furthermore, Zaenal et al, demonstrated that Discovery Learning significantly improves students' understanding of PAI and BP content [21]. Through active engagement in concept discovery and self-constructed understanding, students more readily grasp the moral and religious messages embedded in the lessons. The model cultivates critical thinking by training students not only to receive information passively but also to analyze, synthesize, and relate it to their daily lives, thereby deepening their comprehension.

Second Hypothesis Test

The statistical hypotheses to be tested are: $H_0 : \mu_2 \leq \mu_3$ and $H_1 : \mu_2 > \mu_3$,where μ_2 represents the mean learning outcomes of students in Experimental Class II (Numbered Heads Together, NHT), and $\mu 3$ denotes the mean learning outcomes of students in the Control Class (Conventional Instruction). The results of the t-test are presented in Table 5 below.

Table 5. Results of the Second Hypothesis Test

Class	N	Mean	$t_{Calculated}$	$t_{Critical}$	Decision
Eksperimental II	34	80,47	2,77	1,66	H_1 Accepted
Kontrol	34	74,47			

Table 5 indicates that the calculated t-value is 2.77, while the critical t-value at df = 66 and α = 0.05 is 1.66. Since $t_{calculated} > t_{critical}$ (2.77 > 1.66), H_0 is rejected and H_1 is accepted. Thus, it can be concluded that the learning outcomes of students taught using the Numbered Heads Together (NHT) cooperative learning model are significantly higher than those taught using conventional instruction in PAI and BP for Grade XI students at SMK Negeri 2 Padang.

These results confirm that NHT yields superior learning outcomes compared to conventional methods. This is because the NHT model actively engages students in group discussions and mutual support in mastering the material. According to Trianto (as cited in Zativalen & Humairah, NHT is a structural cooperative learning model designed to shape specific interaction patterns among students, with the explicit goal of enhancing academic mastery through collaborative analysis of lesson content and deepening conceptual understanding [22].

Istarani explains that the NHT cooperative model involves presenting material through small groups, where students collectively construct shared understanding in response to teacher-posed questions. Each group member is assigned a number, and a randomly selected student (based on number) is held accountable for answering on behalf of the group. This structure ensures that all students remain engaged, as any member may be called upon to respond [23]. Consequently, NHT fosters peer communication, which plays a crucial role in deepening comprehension. Every student is given the opportunity to contribute, reducing passivity and promoting active cognitive processing [24].

This model cultivates individual accountability within group settings, as each member is responsible for ensuring that all teammates understand the material. It also develops students' communication skills, cooperation, and ability to articulate ideas clearly [25]. Students taught using NHT demonstrate greater enthusiasm, quicker comprehension, and improved retention of lesson content. Moreover, the model provides equitable opportunities for all students to speak and contribute, thereby reducing anxiety and boosting self-confidence in expressing opinions—factors that collectively enhance overall learning achievement [26].

These findings align with Ahmad and Mardiyah (2019), whose study "The Impact of Numbered Heads Together on Learning Outcomes in Islamic Education" found that students taught with NHT

achieved significantly better PAI outcomes than those taught conventionally. In NHT, active group discussion facilitates deeper conceptual understanding, whereas conventional lecture-based methods often render students passive recipients of information, limiting their engagement in meaningful cognitive processing [18].

This conclusion is further supported by Rohmanurmeta [27], who argued that NHT cooperative learning enables students to internalize Islamic religious values through discussion and collaboration, thereby reinforcing conceptual mastery. Additionally, Agustina and Mu'ammar (2018) observed that the *Implementation of The Nht Model in PAI Instruction for Grade VII A at Smp Muhammadiyah 7 Cerme*, Gresik, was highly effective, as evidenced by high student enthusiasm, active participation, and a conducive, dynamic classroom atmosphere.

Third Hypothesis Test

The statistical hypotheses to be tested are: $H_0 : \mu_1 = \mu_2$ and $H_1 : \mu_1 \neq \mu_2$ where μ_1 represents the mean learning outcomes of students in Experimental Class I (Discovery Learning), and μ_2 denotes the mean learning outcomes of students in Experimental Class II (Numbered Heads Together, NHT). The results of the independent samples t-test are presented in Table 6 below.

Table 6. Results of the Third Hypothesis Test

Kelas	N	Mean	$t_{Calculated}$	$t_{Critical}$	Decision
Eksperimental I	34	85,88	2,746	1,997	H_1 diterima
Eksperimental II	34	80,47			

As shown in Table 6, the calculated t-value is 2.746, while the critical t-value at α = 0.025 (two-tailed test) and a 95% confidence level is 1,997. According to the decision rule—reject H_0 if $t_{calculated} > t_{\left(\frac{\alpha}{2}\right)}$ or $t_{calculated} < -t_{\left(\frac{\alpha}{2}\right)}$ —the calculated t-value falls within the rejection region. Therefore, H_0 is rejected and H_1 is accepted. It can thus be concluded that there is a statistically significant difference in learning outcomes between students taught using the Discovery Learning model and those taught using the Numbered Heads Together (NHT) model in the Islamic Religious Education and Moral Character (PAI and BP) subject for Grade XI students at SMK Negeri 2 Padang.

This difference in learning outcomes can be attributed to the distinct pedagogical processes inherent in each instructional model. In Discovery Learning, students are actively engaged in the exploration and independent construction of knowledge. This model encourages critical and creative thinking through challenging activities such as experimentation, inquiry, and problem-solving. Such processes enable learners to build personal understanding based on direct experience, thereby enhancing both memory retention and depth of comprehension. Grounded in constructivist theory, Discovery Learning posits that knowledge discovered autonomously is more readily understood and retained because learners connect it to their real-life experiences, facilitating deeper internalization of information.

In contrast, the NHT cooperative learning model emphasizes collaborative problem-solving within small groups. In this approach, students work together to answer questions or solve tasks, with each group member assigned a number; one student is then randomly selected to present the group's answer to the class. While this structure promotes social interaction and develops communication skills, individual engagement in deep conceptual understanding may vary. Some students may adopt passive roles or rely heavily on more dominant peers, limiting their personal cognitive processing. Although NHT effectively fosters social skills and teamwork, its collaborative nature does not always provide sufficient space for individual learners to explore and internalize content at a deep, analytical level. Consequently, while NHT offers valuable interpersonal benefits, Discovery Learning proves superior in generating deeper understanding and higher learning outcomes due to its emphasis on independent exploration, critical analysis, and self-directed knowledge construction [28].

These findings align with the study by Amalia et al, titled "A Comparison of Discovery Learning and Numbered Heads Together Models Using Word Square Media on Students' Cognitive Learning Outcomes." Their analysis revealed that the average normalized gain (N-Gain) was significantly higher in the Discovery Learning group than in the NHT group, confirming a meaningful difference in learning achievement [29]. This outcome is attributed to the fact that Discovery Learning enables students to learn directly through hands-on experience rather than relying solely on teacher-delivered content.

Similarly, Sari et al, found that the Discovery Learning model encourages students to learn independently and apply existing knowledge to novel contexts. This active engagement makes the learning process more effective, as students personally construct concepts through inquiry and discovery [30]. As a result, learned concepts are more easily recalled and retained over time. Furthermore, learners are prompted to connect prior knowledge with new situations, strengthening conceptual clarity and coherence.

The advantages of Discovery Learning identified in this study are further supported by Nonalisa et al, who reported that implementing Discovery Learning enhances students' interest, enthusiasm, concentration, and classroom participation. Additionally, this approach leads to measurable improvements in learning outcomes, including increased class average scores and higher percentages of both individual and class-wide learning mastery [31].

In summary, the findings demonstrate a significant difference in learning outcomes between students exposed to Discovery Learning and those taught via the NHT cooperative model. Experimental Class I (Discovery Learning) achieved higher mean scores than Experimental Class II (NHT). This superiority stems from Discovery Learning's capacity to foster active exploration, independent discovery, and self-constructed understanding, which collectively enhance comprehension and retention. Although Experimental Class II (NHT) yielded lower scores than Discovery Learning, it still outperformed the Control Class (conventional instruction), confirming NHT's effectiveness in improving learning outcomes through structured peer interaction. Nevertheless, the depth of individual conceptual understanding in NHT remains comparatively limited relative to the autonomous, inquiry-driven process characteristic of Discovery Learning

CONCLUSION

Based on the findings and discussion presented above, the following conclusions can be drawn: *First*, students taught using the Discovery Learning model achieved significantly higher learning outcomes than those taught through conventional instruction, as evidenced by the mean scores of 85.88 in Experimental Class I and 74.47 in the Control Class, with a hypothesis test yielding a calculated t-value of 5.53 compared to a critical t-value of 1.66.

Second, students instructed using the Numbered Heads Together (NHT) cooperative learning model also demonstrated significantly higher learning outcomes than those in the conventional group, with mean scores of 80.47 in Experimental Class II and 74.47 in the Control Class, and a calculated t-value of 2.77 against a critical t-value of 1.66.

Third, there is a statistically significant difference in learning outcomes between students taught using the Discovery Learning model and those taught using the NHT cooperative model, as reflected in the mean scores of 85.88 (Experimental Class I) and 80.47 (Experimental Class II), with a calculated t-value of 2.746 exceeding the critical t-value of 1.997 at α = 0.05 (two-tailed test).

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