# ANALYTICAL (C4) LEARNING OUTCOMES IN IRE: IMPLEMENTING THE TTW MODEL BASED ON RTE

**Dea Putry Apfrilia[1], Agus Pahrudin[2], Era Octafiona[3], Baharudin[4]**
[1,2,3,4] Departemen of Islamic Religious Education, Raden Intan State Islamic University of Lampung, Indonesia
[1]deapfrilia2904@gmail.com , [2]agus.pahrudin@radenintan.ac.id , [3]era@radenintan.ac.id , [4]baharudin@radenintan.ac.id

## ABSTRAK

Pembelajaran Pendidikan Agama Islam (PAI) di Sekolah Menengah Kejuruan (SMK) idealnya tidak hanya berorientasi pada penguasaan materi keagamaan, tetapi juga pada pengembangan kemampuan berpikir tingkat tinggi, khususnya kemampuan menganalisis pada level kognitif C4. Namun, kenyataan di SMK SMTI Bandar Lampung menunjukkan bahwa hasil belajar PAI masih rendah, terutama pada soal-soal yang menuntut kemampuan analitis, akibat pembelajaran yang cenderung konvensional dan kurang melibatkan siswa secara aktif. Penelitian ini bertujuan untuk menganalisis efektivitas model pembelajaran *Think Talk Write* (TTW) yang dipadukan dengan strategi *Rotating Trio Exchange* (RTE) dalam meningkatkan hasil belajar PAI dalam ranah kognitif C4. Penelitian menggunakan pendekatan kuantitatif dengan desain quasi eksperimen tipe *post-test only control group design*. Sampel penelitian terdiri atas dua kelas, yakni kelas eksperimen menerapkan model TTW berbasis RTE sedangkan kelas kontrol menerapkan pembelajaran konvensional. Instrumen pengumpulan data berupa tes pilihan ganda yang dirancang untuk mengukur kemampuan analisis siswa. Data dianalisis menggunakan uji normalitas, uji homogenitas, uji Independent Sample t-Test, serta uji Mann–Whitney. Hasil analisis menunjukkan bahwa data penelitian tidak memenuhi asumsi normalitas dan homogenitas, namun terdapat perbedaan hasil belajar yang signifikan antara kelompok eksperimen dan kelompok kontrol dengan nilai signifikansi < 0,05. Temuan ini menunjukkan bahwa penerapan model TTW berbasis RTE secara signifikan meningkatkan keahlian analitis siswa pada pembelajaran PAI. Dengan demikian, dapat disimpulkan bahwa model TTW berbasis RTE efektif digunakan sebagai alternatif strategi pembelajaran PAI berbasis HOTS, khususnya guna meningkatkan kemampuan berpikir analitis siswa SMK.
**Kata kunci:** *Think Talk Write; Kemampuan Analitis (C4), Pendidikan Agama Islam.*

## ABSTRACT

Islamic Religious Education (IRE) learning in Vocational High Schools (SMK) should not merely focus on the acquisition of religious knowledge, but also emphasize the development of higher-order thinking skills, particularly analytical thinking at the C4 cognitive level. However, learning outcomes in IRE at SMK SMTI Bandar Lampung remain relatively low, especially in tasks requiring analytical reasoning, largely due to conventional instructional practices that provide limited opportunities for active student engagement. This study aimed to examine the effectiveness of the Think Talk Write (TTW) learning model integrated with the Rotating Trio Exchange (RTE) strategy in improving students' learning outcomes in IRE at the C4 cognitive level. A quantitative approach was employed using a quasi-experimental method with a post-test only control group design. The research sample consisted of two classes: an experimental

class taught using the TTW model based on RTE and a control class receiving conventional instruction. Data were collected using a multiple-choice test designed to assess students' analytical skills (C4). Data analysis involved normality testing, homogeneity testing, the Independent Samples t-test, and the Mann–Whitney test. The analysis results indicate that the data did not meet the assumptions of normality and homogeneity; however, a statistically significant difference in learning outcomes was found between the experimental and control groups ($p < 0.05$). These results demonstrate that the TTW–RTE model significantly improves students' analytical thinking skills in IRE. Therefore, the TTW–RTE model can be considered an effective HOTS-oriented instructional alternative for improving analytical abilities among vocational high school students.

**Keywords:** *Think Talk Write; Analytical Thinking Skills (C4); Islamic Religious Education.*

## INTRODUCTION

Ideally, Islamic Religious Education (IRE) learning in Vocational High Schools (SMK) is not solely intended to provide students with an understanding of religious subject matter (Andrini et al., 2025; Destriani et al., 2023; Edy & Sumarta, 2025; Nasrullah et al., 2023), but also to foster the development of students' intermediate to higher-order thinking skills, including analytical ability at the C4 cognitive level (Faisal et al., 2024; Zumzianah & Wahab, 2023). Optimal learning outcomes are characterized by students' ability to deconstruct information, differentiate concepts, relate Islamic values to real-world issues, and draw accurate conclusions based on religious evidence (*dalil*) (Dalimunthe & Siregar, 2024; Hasbullah, 2023; Nuraini, 2025). Under ideal conditions, learning is conducted in an active, participatory, and contextual manner, enabling students to independently develop analytical thinking skills (Hidayati, 2024; Ramadansur et al., 2023; Ratnaningsih et al., 2025). Effective instruction also provides opportunities for discussion, idea exchange, and collaborative information processing (Dahl et al., 2025; Gillies, 2023). When such conditions are achieved, learning outcomes are reflected not only in examination scores but also in students' capacity to transform religious information into deeper and more meaningful understanding (Firmansyah et al., 2025; Nurhayati, 2024).

However, conditions at SMK SMTI indicate that students' learning outcomes in Islamic Religious Education have not yet reached these ideal standards. Instruction remains predominantly conventional, with teachers relying heavily on one-way explanations and offering limited variation in learning activities that stimulate students' analytical engagement. The monotonous classroom atmosphere results in low levels of active participation, thereby constraining students' ability to process information and analyze religious concepts. This situation has a direct impact on learning outcomes, particularly when students are confronted with tasks requiring C4-level cognitive skills, such as explaining the causes of moral phenomena or comparing values embedded in Islamic teachings. Many students experience difficulties in articulating reasoning, identifying conceptual distinctions, and constructing logical relationships between instructional content and real-life contexts. These conditions indicate that the instructional practices currently employed have not sufficiently stimulated analytical thinking skills, which constitute the core of the C4 cognitive level.

To address these challenges, an instructional model is required that can enhance student engagement while simultaneously stimulating analytical thinking skills. A relevant instructional approach involves integrating the Think Talk Write (TTW) learning model with the Rotating Trio Exchange (RTE) strategy (Mahmoud & Abdallah, 2023; Nuriah et al., 2023).

The TTW model encourages students to think independently (*think*), discuss ideas with peers (*talk*), and articulate their understanding in a structured written form (*write*) (Nasution, 2023; Roisah et al., 2023; Siwi et al., 2021). When combined with RTE, students do not engage solely in fixed-group discussions; instead, they rotate systematically among groups, allowing for a broader exchange of ideas and perspectives (Afridayanti & Rakhmawati, 2022; Aulia & Armiati, 2025). This integration fosters a more active and collaborative learning environment and requires students to process information more deeply, as they are expected to explain, compare, and synthesize ideas emerging from multiple group interactions (Gustavsen & Vennebo, 2025; Haryono et al., 2025). Through such processes, students' analytical abilities can be significantly enhanced, positioning the TTW–RTE model as a promising instructional strategy for improving learning outcomes in Islamic Religious Education at the C4 cognitive level.

A number of previous studies have demonstrated that the TTW model is effective in enhancing conceptual understanding, communication skills, and students' learning outcomes across various subject areas (Fatihatin et al., 2024; Khairani & Febriani, 2024; Margaretha et al., 2023; Shaffiyah & Kosmajadi, 2024; Silviana et al., 2024). Other studies have reported that the Rotating Trio Exchange strategy can improve student interaction, broaden perspectives, and encourage more active participation in expressing ideas. Nevertheless, most of these studies have been conducted in general subjects and have rarely been applied within the context of IRE at the SMK level. Moreover, prior research has predominantly focused on improving students' comprehension skills rather than analytical thinking skills (C4), which represent a crucial focus in IRE learning. This situation reveals a clear research gap that warrants further investigation. The novelty of the present study lies in the integration of the TTW model with the RTE strategy in the context of IRE for vocational high school students, specifically aimed at enhancing analytical thinking skills at the C4 cognitive level an area that has received limited attention in previous research.

This study is of high urgency, as Islamic Religious Education in vocational high schools seeks to equip students with critical and analytical thinking skills that enable them to apply Islamic teachings in daily life, including in professional and workplace environments they will encounter in the future. Students' inability to analyze moral issues may adversely affect their capacity to make sound decisions in both social and professional contexts. Therefore, instructional strategies are needed to address low learning outcomes, particularly in relation to analytical thinking skills. The TTW model integrated with the RTE strategy offers a practical solution for creating more dynamic, interactive, and deep information-processing–oriented learning environments. In addition to providing practical contributions for educators in selecting effective instructional strategies, this study also offers theoretical contributions by advancing innovative and adaptive approaches to Islamic Religious Education that respond to the needs of SMK students. Accordingly, this research is essential as an effort to significantly improve the quality of Islamic Religious Education learning at SMK SMTI.

## METHOD

The study was conducted at SMK SMTI Bandar Lampung during the odd semester of the 2025/2026 academic year, employing a quantitative quasi-experimental approach with a post-test-only control group design. In this design, the researchers compared learning outcomes between an experimental group instructed through the Think Talk Write (TTW) model integrated with the Rotating Trio Exchange (RTE) strategy and a control group taught using

conventional instructional methods. The participants were selected using a simple random sampling technique, resulting in Class XI APL 1 being assigned as the experimental group and Class XI TKI 6 as the control group. Although these classes originated from different vocational concentrations, an analysis of their previous semester's Islamic Religious Education grades indicated that both groups possessed equivalent initial academic capabilities, thereby satisfying the homogeneity requirement prior to the treatment. The study focused on indicators of higher-order cognitive ability at the analytical (C4) level, with data collected using a multiple-choice test as the measurement instrument.

The research stages commenced with a preparation phase, which involved developing instructional materials and validating the test instrument through subject-matter experts. Once the instrument was confirmed to be valid and reliable, the study proceeded to the implementation phase. In the experimental class, learning activities began with the formation of heterogeneous groups of 3-5 students. Students were instructed to read the learning materials, identify and record key ideas, and discuss them collaboratively. Subsequently, a group rotation was conducted using the Rotating Trio Exchange (RTE) strategy, allowing students to exchange ideas with members of other groups to broaden their understanding. Following the rotation, students listened to presentations from other groups, recorded key points, and finally articulated their consolidated understanding independently in written form, in accordance with the stages of the TTW model (Room & Syam, 2024).

Conversely, the learning process in the control class was conducted using conventional methods without specific treatment. Upon the completion of instructional activities in both groups, a learning outcomes test was administered as a post-test to measure students' achievement in Islamic Religious Education. The collected data were analyzed using statistical procedures, beginning with prerequisite tests for normality and homogeneity, followed by hypothesis testing using a pooled-variance t-test to compare the mean learning outcomes between the two classes. Through this sequence, the researchers sought to obtain an objective depiction of the effectiveness of the TTW model integrated with the RTE strategy in improving students' learning outcomes at the analytical (C4) cognitive level.

## RESULTS AND DISCUSSION
### Results
This study was conducted at SMK SMTI Bandar Lampung. Data were collected using several techniques, one of which involved administering a multiple-choice test developed based on learning outcome indicators. The collected data were subsequently analyzed using a series of statistical procedures, including tests of normality and homogeneity, the Independent Samples t-test, and the Mann–Whitney U test. The results obtained from the reliability analysis are presented below.

### A. Normality Test
A normality test was conducted to assess whether the collected data followed a normal distribution. The data were considered normally distributed when the significance value > 0.05. The results of the normality analysis in this study are presented below:

**Table l. Description of the Normality Test Results**

**Tests of Normality**

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| | .486 | 34 | .000 | .498 | 34 | .000 |
| | .261 | 33 | .000 | .734 | 33 | .000 |

a. Lilliefors Significance Correction

As shown in Table 1, the Shapiro–Wilk normality test produced a significance value of 0.000 for both the experimental and control groups. As all significance values < 0.05, it can be concluded that the data from both groups were not normally distributed.

## B. Homogeneity Test

The homogeneity test was conducted to determine whether the variance of the data across the populations involved in the study was equal (homogeneous) or unequal (heterogeneous). The data were deemed homogeneous when the significance (p-value) > 0.05. The results of the homogeneity test are presented below:

**Table 2. Description of the Homogeneity Test Results**
**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Data | Based on Mean | 9.257 | 1 | 65 | .003 |
| | Based on Median | 6.589 | 1 | 65 | .013 |
| | Based on Median and with adjusted df | 6.589 | 1 | 59.240 | .013 |
| | Based on trimmed mean | 11.365 | 1 | 65 | .001 |

As presented in Table 2, Levene's test for homogeneity of variance yielded a significance value of 0.003 ($p < 0.05$). This result indicates that the variances between groups were not homogeneous, suggesting that the assumption of homogeneity in this study was not satisfied.

## C. Mann-Whitney U Test

The Mann–Whitney U test was used to compare two independent samples to assess the presence of a statistically significant difference between groups, particularly when the data did not meet the assumption of normality or were measured on an ordinal scale.

**Table 3. Description of the Mann Whitney U Test Results**
**Test Statistics[a]**

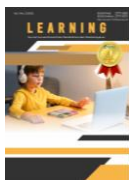| | Data |
|---|---|
| Mann-Whitney U | 346.500 |
| Wilcoxon W | 907.500 |
| Z | -3.159 |
| Asymp. Sig. (2-tailed) | .002 |

a. Grouping Variable: Kelompok

Based on table 3 the Mann–Whitney U test produced an Asymp. Sig. (2-tailed) value of 0.002 ($p < 0.05$), indicating a statistically significant difference between the two groups; thus, the null hypothesis was rejected.

## D. Independent Samples t-Test

The Independent Samples t-test in this study was employed to examine the final achievement of the sample. The testing procedure was conducted as follows. To test the research hypothesis, the analysis applied the pooled-variance t-test formula.

**Table 4. Description of the Independent Samples t-Test Results**
**Independent Samples Test**

| | Levene's Test for Equality of Variances | t-test for Equality of Means |
|---|---|---|

| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Lower | Upper |
| Data | Equal variances assumed | 9.257 | .003 | 3.326 | 65 | .001 | .46078 | .13854 | .18410 | .73747 |
| | Equal variances not assumed | | | 3.302 | 51.723 | .002 | .46078 | .13955 | .18072 | .74085 |

The t-test table 4 revealed a statistically significant difference in mean scores between the two groups, with p-values of 0.001 (equal variances assumed) and 0.002 (equal variances not assumed), both below the 0.05 significance level confirming a significant difference between the groups.

**Discussion**

The findings of this study indicate that the Think Talk Write learning model integrated with the Rotating Trio Exchange strategy is effective in improving students' learning outcomes, particularly at the C4 cognitive level, which encompasses analytical skills such as analyzing, elaborating, categorizing, and identifying relationships among concepts. The improvement in students' scores on C4-level items demonstrates their ability to critically examine religious issues, compare religious evidence (*dalil*), and identify essential elements within Islamic Religious Education (IRE) content. The TTW–RTE model structures the learning process into sequential stages of thinking, discussing, and writing, thereby preventing students from passively receiving information. Instead, learners are guided to process information progressively, resulting in more robust analytical understanding. This instructional mechanism provides a strong rationale for the acceptance of the alternative hypothesis ($H_1$).

At the *Think* stage, students are encouraged to engage in initial analytical processes, such as identifying key IRE concepts, comparing information, and predicting relationships among concepts—activities that lie at the core of C4 cognitive skills. The subsequent *Talk* stage allows students to validate and refine their analyses through peer discussion, which promotes the sharpening of arguments, correction of reasoning errors, and construction of more coherent and logical explanations. Finally, the *Write* stage supports students in systematically articulating their analytical outcomes, enabling information to become more structured, internalized, and meaningful. The integration of these three stages positions TTW as a highly effective instructional model for fostering higher-level analytical thinking skills (Kamaruddin et al., 2023; Mulyarti & Rajab, 2025; Susanti, 2024).

The integration of the Rotating Trio Exchange (RTE) strategy further strengthens students' C4 cognitive abilities because learners do not remain in fixed discussion groups but instead rotate partners within trio formations. This rotation broadens students' perspectives by exposing them to a wider range of viewpoints, arguments, and case examples from different peers. Such interactions strongly support analytical skills, as students are required to compare opinions, evaluate the validity of arguments, and synthesize information from multiple sources. In the context of Islamic Religious Education (IRE), this rotational discussion structure enables students to deconstruct religious issues more comprehensively, categorize relevant concepts, and infer causal relationships embedded in Islamic teachings and events (Manggala et al., 2025; Nurhusain, 2021). Therefore, RTE functions as a critical catalyst in optimizing C4-level analytical skills.

The findings of this study are consistent with those of Utami (2021), who reported that the TTW model enhances analytical ability by encouraging students to think independently before engaging in discussion and articulating their processed ideas in written form. Similarly, Fauziah and Yani (2022) demonstrated that the integration of rotational discussion strategies, such as RTE, promotes higher-order thinking skills by exposing students to more diverse information and cognitive challenges. In addition, Rahmawati (2020) found that TTW is particularly effective in subjects requiring conceptual analysis of religious content, as its staged structure aligns closely with analytical cognitive processes. Collectively, the present findings strengthen the empirical evidence that the combination of TTW and RTE represents an effective instructional innovation for achieving C4-level cognitive outcomes, especially in IRE and CE at the SMK level.

The effectiveness of the TTW–RTE model in this study is also influenced by the characteristics of students at SMK SMTI, who require learning environments that are active, collaborative, and application-oriented. Vocational high school students tend to develop a deeper understanding when they are provided with opportunities to engage in discussion, examine authentic cases, and connect theoretical concepts with real-life experiences. The TTW–RTE model offers structured space for students to analyze religious issues contextually and relate them to their everyday lives, including social interaction, responsibility, discipline, and workplace ethics. Furthermore, the dynamic nature of group rotation creates a more engaging classroom atmosphere, which increases students' motivation to participate in analytical processes. These factors make TTW–RTE highly compatible with the characteristics of Islamic Religious Education and Character Education (IRE–CE) learning in vocational high school settings such as SMK SMTI. This alignment facilitates the internalization of religious values by encouraging students to actively connect the subject matter with their personal experiences and daily practices (Ginanjar, 2020; Mulyana et al., 2023; Sholihah & Zaenurrosyid, 2025; Sinaga & Simbolon, 2025).

The novelty of this study lies in the integrated application of the Think Talk Write model with the Rotating Trio Exchange strategy in IRE–CE instruction to enhance C4-level cognitive skills, an approach that has rarely been implemented at the vocational high school level. Most previous studies have examined TTW or RTE independently, whereas the present study combines both to construct a collaborative learning model enriched by diverse perspectives. In addition, the explicit focus on C4 cognitive processes (analysis) represents a significant contribution to IRE research, which has predominantly emphasized lower cognitive levels such as understanding (C2) or application (C3). The findings demonstrate that this dynamic, collaboration-based instructional innovation is both effective and feasible for adoption as a HOTS-oriented learning strategy in IRE–CE classrooms. Therefore, this study offers substantial theoretical and practical contributions to the advancement of modern instructional practices in vocational high school education.

## CONCLUSION

The results of this study indicate that the integration of the Think Talk Write model with the Rotating Trio Exchange strategy effectively enhances students' analytical skills in Islamic Religious Education and Character Education (IRE–CE) at the vocational high school level, as reflected in statistically significant differences between the experimental and control groups across multiple statistical analyses. These results confirm that the integration of cognitive processes thinking (think), discussing (talk), and writing (write) with dynamic group rotation

strengthens students' information processing and analytical understanding. The study also contributes theoretically by introducing an innovative instructional strategy for IRE–CE that has rarely been applied at the C4 cognitive level (analysis). From a practical perspective, the TTW–RTE model offers an alternative instructional approach that is more collaborative, active, and aligned with the learning needs of vocational high school students. As such, it can serve as a valuable reference for teachers in designing Higher-Order Thinking Skills (HOTS)-oriented learning activities. Nevertheless, this study has certain limitations, including the use of a post-test-only design, which does not capture students' learning progression over time, and the limited research scope confined to a single school context. Despite these limitations, the present study makes an important contribution to the field by enriching the body of knowledge on collaborative learning models that have been empirically shown to improve students' analytical skills. Therefore, the findings may serve as a foundation for future research aimed at developing more comprehensive instructional models in Islamic education as well as in other subject areas.

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