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## The Effect of Metacognitive Learning on Memorization Retention Among Students in the Tahfidz Class at Muhammadiyah 7 High School in Surabaya

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### ABSTRACT

The high rate of Quran memorization loss among tahfidz students is one of the challenges in maintaining memorization over the long term. Therefore, this study aims to analyze the effect of metacognitive learning on memorization retention among students in the Tahfidz program at Muhammadiyah 7 High School in Surabaya. This study employs a quantitative approach using an associative research design through simple linear regression. The sample consisted of 47 students from the 10th-grade Class X-1 and 11th-grade Class XI-1 of the Tahfidz program, selected through purposive sampling. Data were collected using a Likert-scale questionnaire and analyzed using IBM SPSS Statistics Version 25. The results indicate that Metacognitive Learning has a positive and significant effect on students' memorization retention, with a significance value of 0.000 and a coefficient of determination ( $R^2$ ) of 0.330. This means that Metacognitive Learning contributes 33% to memorization retention, while 67% is influenced by other factors. These findings can serve as a reference for teachers and administrators of the Tahfidz program in integrating the planning, monitoring, and evaluation of memorization into murojaah activities to help students retain what they have memorized.

## 1. Introduction

Qur'an memorization instruction focuses on the memorization process, which emphasizes not only the amount memorized, but also the structured management of memorization through activities such as reading, listening, reciting, recitation, and review (Ayuni & Ritonga, 2025; Hasan & Inayati, 2025; Ishak et al., 2022; Othman et al., 2024; Setiawan et al., 2025; Tsabit et al., 2022). Therefore, success in tahfidz learning is not only measured by the acquisition of new material, but also by the ability to retain what has already been memorized. Retention is an important aspect because it relates to the ability to retain and recall information over the long term

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(Alhebaishi et al., 2025; Mehyar et al., 2024). In tahfidz instruction, retention of memorized material is reflected in the consistency of review, a reduction in repetition errors, and the ability to recall verses without assistance. The ability to retain information varies among students and may decline if the information is not retained or retrieved optimally (Juliano et al., 2022).

One learning approach that can support students in managing their learning process to retain what they have memorized is Metacognitive Learning. This approach has been implemented in the tahfidz program at Muhammadiyah 7 High School in Surabaya through the planning of memorization goals, monitoring of progress via a special tahfidz report card and identification of difficulties encountered while memorizing the Qur'an, as well as evaluation through murojaah after each recitation session. This implementation aligns with the management of the tahfidz program, which emphasizes regular planning, recitation sessions, and review. However, although these activities have been implemented, the effect of metacognitive learning on students' memorization retention has not yet been empirically established. Therefore, it remains to be seen whether metacognitive learning can influence memorization retention.

Metacognitive learning is a concept of metacognition developed by John Flavell as an individual's ability to be aware of and control their thinking processes, which was later expanded upon by Ann L. Brown through metacognitive regulation in the form of planning, monitoring, and evaluation (Zepeda & Nokes-malach, 2023). In tahfidz instruction, these aspects are implemented through setting memorization goals, monitoring progress, and evaluating memorization strategies (Prasetyo et al., 2024). Meanwhile, memorization retention can be explained by Atkinson and Shiffrin's information processing theory, which states that information is processed until it is stored in long-term memorization and can be recalled through the retrieval process (Wixted, 2024). In this study, memorization retention was measured through recall, recognition, and reintegration the ability to retain and retrieve information that has been learned (Yusuf et al., 2025). Thus, metacognitive regulation can theoretically support memorization retention through the management of learning strategies and help students maintain and recall what they have memorized. This is also supported by several studies on the relationship between metacognitive abilities and students' knowledge retention and learning retention (Rahmah, 2022; Sudirman & Yusnaeni, 2022).

Previous research has shown that metacognitive skills play a role in supporting the learning process by regulating and monitoring students' cognitive activities. Research by Wang et al. (2022), Robillos (2023), Shams et al. (2025) and Barrientos et al. (2025) shows that strategies and metacognitive skills are related to self-regulation and learning effectiveness. Regarding the relationship between metacognition and retention, Yusuf et al. (2025), Rahmah (2022), and Sudirman and Yusnaeni (2022) indicates a correlation between metacognitive abilities and the ability to retain information or knowledge. In addition, Lensun et al. (2025), Pratiwi et al. (2025) explains that metacognitive awareness and certain learning strategies can support memorization processes and learning regulation. However, much of this research has been conducted in the context of general learning and has not

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specifically examined the effect of Metacognitive Learning on the retention of the Qur'an. Research in the context of Tahfidz also continues to focus primarily on the management and implementation of memorization programs, consequently, the effect of metacognitive learning on students' memorization retention remains empirically unknown. Therefore, this study was conducted to address the gaps in variables, context, and empirical evidence regarding the effect of metacognitive learning on memorization retention in Tahfidz instruction.

Based on this gap, this study was conducted to examine the effect of metacognitive learning in Tahfidz instruction, with a focus on students' retention of memorized material. The novelty of this study lies not only in the examination of metacognitive learning in relation to the retention of the Qur'an, but also in the characteristics of Qur'anic memorization, which require a continuous process of recalling, repeating, and maintaining the accuracy of the verses. Unlike memorization of general knowledge, which is generally oriented toward mastering information, memorizing the Qur'an requires monitoring the accuracy of recitation and the sequence of verses, identifying sections that are beginning to be forgotten, and continuously evaluating review strategies. Therefore, the application of planning, monitoring, and evaluation in Metacognitive Learning becomes more specific because it directly helps students manage the process of retaining and recalling their Qur'an memorization. Therefore, this study aims to analyze the effect of metacognitive learning on the retention of memorized material among students in the Tahfidz class at SMA Muhammadiyah 7 Surabaya

## **2. Methodology**

This study employed a quantitative approach using an associative research design to determine the effect of metacognitive learning on students' memorization retention through simple linear regression analysis. This study was conducted at Muhammadiyah 7 High School in Surabaya with a population of all 67 students in the tahfidz classes. The research sample was selected using purposive sampling, comprising 47 students from the 10th-grade Class 1 and 11th-grade Class 1 tahfidz classes based on characteristics relevant to the study's objectives (Sugiyono & Puji, 2021). To ensure that the samples met the study's criteria, the inclusion criteria were defined as active students in classes X-1 and XI-1 who participated in the Tahfidz program during the study period with a memorization target of 2 juz per semester, while the exclusion criteria included students who did not actively participate in the Tahfidz activities and did not complete the questionnaire in full. A quantitative approach is used to test the relationships between variables through statistical analysis (Machali, 2021).

Data collection was conducted through initial observations and a questionnaire using a 4-point Likert scale, Strongly Disagree (SD), Disagree (D), Agree (A), and Strongly Agree (SA) to measure the variables of Metacognitive Learning and Memorization Retention. The research instruments were developed based on the operational definitions of the variables, namely Metacognitive Learning, which was measured through the indicators of planning, monitoring, and evaluating (Kuswara

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et al., 2024; Suprayitno et al., 2025), as well as memorization retention, as measured by the indicators of recall, recognition, and reintegrative (Yusuf et al., 2025). There are 4 statement items representing each indicator, such as the example statement item for the planning indicator “Before memorizing, I set a memorization goal I want to achieve,” an example of an item for the monitoring indicator “When reviewing what I’ve memorized, I double check the parts of the verses that I still often forget,” an example of an item for the evaluation indicator “After reviewing what I’ve memorized, I assess the parts of the memorization that I still need to improve,” an example of a recall indicator item “I can recall the Quranic verses I have memorized,” an example of a recognition indicator item “I can recognize the Quranic verses I have previously memorized when I read them” and an example of a reintegrative indicator item “I can connect the verse I am currently memorizing with the previous verse”. Before use, the research instrument underwent a validity test using Pearson’s product-moment correlation to determine whether it measured what it was intended to measure, and a reliability test using Cronbach’s alpha, with a reliability coefficient criterion of  $>0.70$ , to ensure the instrument’s suitability for measuring the research variables.

Next, data analysis was conducted using IBM SPSS Statistics Version 25. The analysis began with descriptive statistics to characterize the data, followed by prerequisite tests, including the Shapiro-Wilk normality test and the Test for Linearity. Next, a simple linear regression analysis was performed to determine the magnitude of the effect of Metacognitive Learning on memorization retention, followed by hypothesis testing using a t-test at a 5% significance level to determine whether or not Metacognitive Learning had an effect on students’ memorization retention, and finally, the coefficient of determination ( $R^2$ ) was used to determine the extent of the contribution of Metacognitive Learning to students’ memorization retention (Fauzi, 2023).

### **3. Results and Discussion**

Preliminary observations indicate that students’ ability to retain what they have memorized varies, and some students struggle to maintain fluency in their recitation, particularly when they are inconsistent in their review (murojaah). In the Tahfidz program, students are expected to memorize 2 juz per semester, but their progress depends on their ability to manage and sustain their learning process. Planning is carried out by setting memorization targets, while monitoring and evaluation take place through the processes of recitation, review (murojaah), and consolidation (tazmi’). However, the consistency of review at home remains one of the challenges identified. This situation indicates that the success of Tahfidz learning depends not only on targets and teacher guidance but also on students’ active involvement in managing their own learning process. This aligns with the characteristics of student-centered Metacognitive Learning through the abilities of planning, monitoring, and evaluating. These three aspects enable students to plan their memorization goals, monitor areas of memorization that are still weak, and independently evaluate and improve their learning strategies. Thus, the application of Metacognitive Learning in Tahfidz instruction is not only related to the strategies

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provided by the teacher but also to the extent to which students apply these metacognitive processes in their daily memorization and review activities.

To determine the extent to which these metacognitive processes and retention abilities are reflected in students, both variables were measured using a questionnaire designed based on the indicators for each variable. Metacognitive learning includes planning, monitoring, and evaluating, while memorization retention includes recall, recognition, and reintegration. The questionnaire used a 4-point Likert scale, with each indicator consisting of four statements. Several examples of items representing each indicator are presented in Table 1.

Table 1. Questionnaire Item

| Variable               | Indicator     | Statement Item                                                                                    |
|------------------------|---------------|---------------------------------------------------------------------------------------------------|
| Metacognitive Learning | Planning      | "Before memorizing, I set a memorization goal I want to achieve"                                  |
|                        | Monitoring    | "When reviewing what I've memorized, I go over the parts of the verses that I still often forget" |
|                        | Evaluating    | "After reviewing what I've memorized, I assess which parts still need improvement"                |
| Memorization Retention | Recall        | "I can recall the verses of the Qur'an that I have memorized"                                     |
|                        | Recognition   | "I can recognize the verses of the Qur'an that I once memorized when I read them"                 |
|                        | Reintegrative | "I can connect the verse I'm memorizing to the previous verse"                                    |

These items were used to represent each indicator in measuring the variables of metacognitive learning and students' memorization retention. All items were administered to 47 respondents using a 4-point Likert scale so that each response could be converted into a score for subsequent quantitative analysis. The data obtained from both variables were then used to determine the relationship between metacognitive learning and students' memorization retention. Before further analysis, the instrument was first tested for validity and reliability to ensure that each item was suitable for use in the study. Table 1 presents representative items for each indicator, while the initial questionnaire consisted of 12 items for each variable

### ***Research Instrument Validation***

#### ***Validity Test***

A validity test was conducted to determine the accuracy of each item in the instrument in measuring the research variable. The test was conducted using Pearson's Product-Moment correlation, with items deemed valid if the calculated  $r$  value was greater than the table  $r$  value and the significance level was less than 0.05. The  $r$ -table value was determined based on a sample size of 47 students using the formula  $df = n - 2$ , resulting in  $df = 45$  and a table  $r$  value of 0.2876. The initial instrument consisted of 12 items for each variable. The test results showed that there was one invalid item in the Metacognitive Learning variable (X3) and one item in

the Memorization Retention variable (Y2); therefore, both items were eliminated. Consequently, the final instrument used consisted of 11 items for each variable.

### ***Reliability Test***

A reliability test was conducted to determine the consistency of the instrument after the invalid items were eliminated. The test was conducted using Cronbach's Alpha, with the instrument deemed reliable if the Cronbach's Alpha value was greater than 0.70 (Fauzi, 2023). The test results showed Cronbach's Alpha values of 0.753 for the Metacognitive Learning variable and 0.780 for Memorization Retention. Both values met the reliability criteria; therefore, the research instrument was deemed reliable and suitable for further analysis.

### ***Descriptive Statistical Analysis***

Descriptive statistical analysis was conducted to provide an overview of the characteristics of the research data regarding the variables of Metacognitive Learning and Memorization Retention. Data on metacognitive learning and students' learning retention were obtained through a 4-point Likert scale questionnaire administered to 23 students in Class X-1 and 24 students in Class XI-1 at SMA Muhammadiyah 7 Surabaya. The results of the descriptive statistical analysis are presented in Table 2 below:

Table 2. Descriptive Statistical Analysis Results

|                        | N  | Descriptive Statistics |         | Mean  | Std. Deviation |
|------------------------|----|------------------------|---------|-------|----------------|
|                        |    | Minimum                | Maximum |       |                |
| Metacognitive Learning | 47 | 31                     | 44      | 37.70 | 3.526          |
| Memorization Retention | 47 | 24                     | 42      | 35.00 | 4.049          |
| Valid (listwise)       | 47 |                        |         |       |                |

Based on Table 2, which presents the results of the analysis of 47 respondents, the Metacognitive Learning variable (X) had a mean of 37.70 with a standard deviation of 3.526, while the Memorization Retention variable (Y) had a mean of 35.00 with a standard deviation of 4.049. The fact that the standard deviation for both variables is smaller than their respective means indicates that the data dispersion is relatively low, meaning the research data exhibits a relatively homogeneous level of variation.

### ***Prerequisite Tests for Analysis***

#### ***Normality Test***

A normality test was conducted to determine whether the research data are normally distributed, as this is one of the requirements for simple linear regression analysis. The test was performed using the Shapiro-Wilk test. The results of the normality test are presented in Table 3 below:

Table 3. Normality Test Results

| Shapiro-Wilk |           |    |       |
|--------------|-----------|----|-------|
|              | Statistic | df | Sig.  |
| X            | 0.961     | 47 | 0.117 |
| Y            | 0.955     | 47 | 0.068 |

Based on Table 3, the test results show that the Metacognitive Learning variable has a significance value of 0.117, while the Memorization Retention variable has a significance value of 0.068. Data are considered to be normally distributed if the significance value is greater than 0.05. Both values are greater than 0.05; therefore, it can be concluded that the data for both research variables are normally distributed and meet the requirements for simple linear regression analysis.

### *Linearity Test*

A linearity test was conducted to determine whether there is a linear relationship between Metacognitive Learning as the independent variable and Memorization Retention as the dependent variable prior to performing a simple linear regression analysis. The test was conducted using the Test for Linearity by examining the Deviation from Linearity value. The results of the linearity test are presented in Table 4 below:

Table 4. Linearity Test Result

| ANOVA Table                                     |                |                          |                |    |             |        |       |
|-------------------------------------------------|----------------|--------------------------|----------------|----|-------------|--------|-------|
|                                                 |                |                          | Sum of Squares | df | Mean Square | F      | Sig.  |
| Memorization Retention * Metacognitive Learning | Between Groups | (Combined)               | 372.950        | 13 | 28.688      | 2.485  | 0.017 |
|                                                 |                | Linearity                | 248.551        | 1  | 248.551     | 21.525 | 0.000 |
|                                                 |                | Deviation from Linearity | 124.399        | 12 | 10.367      | 0.898  | 0.558 |
|                                                 | Within Groups  |                          | 381.050        | 33 | 11.547      |        |       |
|                                                 | Total          |                          | 754.000        | 46 |             |        |       |

Based on Table 4, the results of the linearity test show a significance value for "Deviation from Linearity" of 0.558. In linearity testing, the relationship between variables is considered linear if the significance value for "Deviation from Linearity" is greater than 0.05. Since the obtained significance value of 0.558 is greater than 0.05, it can be concluded that there is a linear relationship between the variables "Metacognitive Learning" and "Memorization Retention." Thus, the research data have met the assumption of linearity and can proceed to simple linear regression analysis.

### *Simple Linear Regression Test*

#### *Simple Linear Regression Test*

A simple linear regression analysis was conducted to determine the extent of the influence of the Metacognitive Learning variable on Memorization Retention. The results of the simple linear regression test are presented in Table 5 below:

Table 5. Results from the Simple Linear Regression Test and Significance Test (T-Test)

| Model |                        | Coefficients                  |            | Standardized Coefficients Beta | t     | Sig. |
|-------|------------------------|-------------------------------|------------|--------------------------------|-------|------|
|       |                        | Unstandardized Coefficients B | Std. Error |                                |       |      |
| 1     | (Constant)             | 10.143                        | 5.307      |                                | 1.911 | .062 |
|       | Metacognitive Learning | .659                          | .140       | .574                           | 4.704 | .000 |

Based on Table 5, the regression equation is  $Y = 10.143 + 0.659X$ . The constant value of 10.143 indicates that if the Metacognitive Learning variable remains constant, the Memorization Retention value will be that number. Meanwhile, the regression coefficient of 0.659 indicates that a one-unit increase in Metacognitive Learning is associated with a 0.659-unit increase in Memorization Retention.

### *Significance Test (T-Test)*

Based on Table 5, the results of the t-test show a calculated t-value of 4.704 with a significance level of 0.000. With  $df = 45$  at a 5% significance level, the critical t-value is 2.014. Since the calculated t-value (4.704) is greater than the critical t-value (2.014) and the significance value of 0.000 is less than 0.05, it can be concluded that Metacognitive Learning has a significant effect on students' memorization retention.

### *Test of the Coefficient of Determination ( $R^2$ )*

A coefficient of determination test was conducted to determine the extent to which the Metacognitive Learning variable contributes to explaining the variation in students' memorization retention. The results of the coefficient of determination test are presented in Table 6 below:

Table 6. Coefficient of Determination Test Results ( $R^2$ )

| Model | Model Summary <sup>b</sup> |          |                   | Std. Error of the Estimate |
|-------|----------------------------|----------|-------------------|----------------------------|
|       | R                          | R Square | Adjusted R Square |                            |
| 1     | .574 <sup>a</sup>          | 0.330    | 0.315             | 3.351                      |

Based on Table 6, the R-squared value was found to be 0.330. This value indicates that the Metacognitive Learning variable accounts for 33% of the variation in students' memorization retention, while the remaining 67% is explained by other factors outside the scope of this study. Thus, the application of Metacognitive

Learning contributes to improving memorization retention among students in the tahfidz class at SMA Muhammadiyah 7 Surabaya.

Based on the results of a simple linear regression analysis, metacognitive learning was found to have a significant effect on the memorization retention of students in the tahfidz class at SMA Muhammadiyah 7 Surabaya. The results of the hypothesis testing show that the calculated *t* value is greater than the critical *t* value, so the research hypothesis stating that Metacognitive Learning influences memorization retention can be accepted. These results indicate that students' ability to manage their learning process plays a role in retaining what they have memorized. In the context of tahfidz learning, the impact of Metacognitive Learning can be observed through three indicators used in this study: planning, monitoring, and evaluating. In the planning phase, students set memorization goals before beginning the memorization process. In the monitoring phase, students review the parts of the verses they still frequently forget while repeating their memorization during muroja'ah sessions. Meanwhile, during the evaluation phase, students assess which parts of their memorization still need improvement after the review process. The findings indicate that metacognitive learning can support a more focused and independent learning process through the use of systematic learning tools (Safitri & Andromeda, 2023; Sundari et al., 2025). These three indicators demonstrate how Metacognitive Learning is applied in the students' learning process from setting goals, identifying weak areas in their memorization, to determining which parts need improvement thereby supporting students' ability to retain and recall what they have memorized.

The results of this study are consistent with the theoretical framework used to explain the relationship between metacognitive learning and memorization retention. In metacognitive theory, the learning process involves not only the ability to receive information but also an individual's ability to be aware of, control, and manage their thinking processes through metacognitive regulation in the form of planning, monitoring, and evaluation. These regulatory abilities enable students to be aware of their learning processes, including determining the strategies they use and evaluating the effectiveness of those strategies. Meanwhile, memorization retention can be explained through Atkinson and Shiffrin's information processing theory, which states that learned information undergoes a storage process until it enters long-term memorization and can be recalled through the retrieval process (Wixted, 2024). Based on these two theories, students' ability to consciously manage the learning process is related to how information is retained and retrieved. Thus, the results of this study reinforce the alignment between the application of Metacognitive Learning and the theory of memorization retention, namely that effective management of the learning process can support students' ability to retain information.

Previous studies have also shown a correlation between metacognitive learning skills and learning retention. Research by Yusuf et al. (2025) shows that metacognitive skills have a significant effect on high school students' information retention in biology classes, with a *t*-value of 9.323 and *p* = 0.000. The study explains that students who are able to organize, monitor, and evaluate their learning

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process tend to have better retention abilities. This is also supported by Sudirman dan Yusnaeni (2022) which found a positive relationship between metacognitive knowledge and regulation and high school students' learning retention, with a contribution of 13.4%. Both studies showed a pattern similar to the results of this study, namely that metacognitive abilities related to managing the learning process are associated with students' ability to retain information they have learned. Thus, the results of this study are consistent with previous research and reinforce the notion that Metacognitive Learning can be used to support students' retention of memorized material.

The magnitude of Metacognitive Learning's contribution to memorization retention is indicated by a coefficient of determination ( $R^2$ ) of 0.330. This value indicates that Metacognitive Learning accounts for 33% of the variation in memorization retention, while the remaining 67% is explained by other factors outside the scope of this study. This suggests that the ability to retain memorized material is not only related to students' ability to manage their learning process but can also be influenced by other factors in the learning process. As in the study Mehyar et al. (2024) which explains that long-term retention may be related to learning methods, the frequency of application or repetition of the material, and the students' level of familiarity with the information being studied. Meanwhile, research by Alhebaishi et al. (2025) This indicates that a supportive learning environment, repetition, assessment, and feedback can also help strengthen knowledge retention. Preliminary observations also indicate that some students still struggle to retain what they have memorized when they do not review consistently. This suggests that the frequency of review may be a factor influencing student retention. Furthermore, differences in parental support and involvement in monitoring memorization suggest that the learning environment outside of school can also play a role in helping students retain what they have memorized. Thus, the 67% of variation in memorization retention not explained by Metacognitive Learning in this study may be related to other unmeasured factors, particularly the frequency of review and the support provided by the learning environment outside of school. Thus, the application of metacognitive learning is one factor that supports retention of memorized material; however, its implementation must be supported by other factors, such as consistent review and support from the learning environment outside of school, so that students' ability to retain what they have memorized can develop optimally (Hidayati et al., 2026).

The existence of other factors that have not yet been examined indicates that there are still other aspects that may influence students' retention of memorized material beyond the application of metacognitive learning. In this regard, this study has limitations because it focuses only on one variable namely, metacognitive learning and thus cannot yet describe the contribution of other factors that may play a role in retaining memorized material. Furthermore, this study involved only 47 students in the Tahfidz class at SMA Muhammadiyah 7 Surabaya; therefore, the results cannot yet be generalized to students or schools with different characteristics. Consequently, future research should involve a broader sample and examine other factors such as learning motivation, the intensity of review (murojaah),

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memorization strategies, and the learning environment to gain a more comprehensive understanding of students' memorization retention.

#### 4. Conclusion

This study shows that metacognitive learning plays a role in supporting students' memorization retention in Tahfidz learning through planning, monitoring, and evaluating, as reflected in activities such as setting memorization goals, reviewing verses that are frequently forgotten, and assessing parts of the memorization that still need improvement. Based on these findings, Tahfidz teachers are advised to design learning modules or activities that provide students with opportunities to apply these three indicators in a targeted manner, both during the memorization process and during muroja'ah, so that students not only focus on achieving memorization but are also able to manage their own learning process. This study has limitations regarding the scope of the subjects and the research context, which are still confined to a single school environment, as well as the use of questionnaires as the primary source of measurement. Therefore, future research is recommended to involve a more diverse range of subjects and learning contexts and to use a wider variety of data collection techniques to gain a deeper understanding of the application of Metacognitive Learning in supporting memorization retention.

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