

The Effectiveness of the K-W-L Strategy to Increase Students' Reading Comprehension and Decrease Reading Anxiety

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Abstract :	This study investigated the impact of a K-W-L strategy on enhancing reading comprehension and alleviating reading-related anxiety among Algerian middle school students. It also aimed to assess to what extent the K-W-L approach contributed to the development of their reading comprehension abilities. A quasi-experimental approach was applied to a sample of 60 Algerian middle school learners, split into experimental and control cohorts. The instruments developed by the researcher included reading comprehension tests, a reading anxiety inventory, and an instructional program grounded in the K-W-L strategy. Data analysis involved means, standard deviations, percentages, independent-sample T test and paired-sample t-tests. The Findings showed a statistically significant improvement in the experimental group's Post test scores, indicating that the strategy had a positive and meaningful effect on reading comprehension. The results also revealed that the experimental intervention significantly lowered reading anxiety in the
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	experimental group compared with the control group. Moreover, within the experimental group, the pre-to-post comparisons demonstrated noticeable gains in reading comprehension, alongside a reduction in reading anxiety. Overall, the K-W-L strategy positively influenced students' cognitive and emotional engagement with reading, thereby increasing their participation and motivation.
Keywords :	Effectiveness, K-W-L strategy, reading comprehension, Reading anxiety, Middle School Students

1. **Introduction:**

Reading serves as a foundational conduit for knowledge acquisition, enabling individuals to extract meaning, cultivate values, and broaden cognitive paradigms (Abdullah, 2017). It is closely linked with linguistic development, facilitating proficiency in both writing and oral production (Mason & Krashen, 1997; Proctor et al., 2005). Furthermore, it enhances cognitive abilities and language generation processes, making comprehension a primary pedagogical goal (Hafiz & Tudor, 1989). Modern perspectives view comprehension as an intricate cognitive process requiring higher-order thinking skills, including critical evaluation and inference (Ta'imah, 2006). The K-W-L strategy (What I Know, What I Want to Know, What I Learned) offers a potent metacognitive intervention to optimize this process by guiding student interaction with text (Abu Jado, 2015). Grounded in constructivism, it promotes student agency, autonomy, and self-regulation (Al-Nafie, 2018), while strengthening academic focus, knowledge synthesis, and creative inquiry (Al-Brizat, 2011). Despite recognized importance, significant barriers in text interpretation exist for Algerian middle school students, particularly during academic transitions. This cognitive struggle is compounded by reading anxiety—a phenomenon of tension and diminished self-efficacy that adversely impacts motivation and achievement. Therefore, there is a critical need for instructional strategies that simultaneously enhance comprehension and mitigate affective barriers, with this study aiming to evaluate the K-W-L strategy in this context

Research Problem

Reading comprehension is essential for academic success during middle school, yet many Algerian students display significant deficiencies in text interpretation. Simultaneously, reading anxiety acts as a profound barrier to student engagement and academic performance. While instructional methods exist, there is a need for empirically validated, holistic approaches that address both cognitive and emotional dimensions of literacy.

Research Questions

1. How does the K-W-L strategy impact reading comprehension scores among Algerian middle school students?
2. How does the K-W-L strategy influence reported reading anxiety levels in this demographic?

3. What is the magnitude of improvement in reading comprehension between pre-test and post-test metrics?
4. To what extent does the K-W-L strategy yield a statistically significant reduction in reading anxiety from pre- to post-intervention?

Research Objectives

1. Evaluate the instructional efficacy of the K-W-L strategy in improving reading comprehension compared to a control group.
2. Determine the effectiveness of the intervention in reducing reading anxiety among the experimental group.
3. Quantify the longitudinal progression of comprehension scores within the experimental cohort.
4. Analyze the reduction trajectories in reading anxiety scores within the experimental group.

Significance of the Study

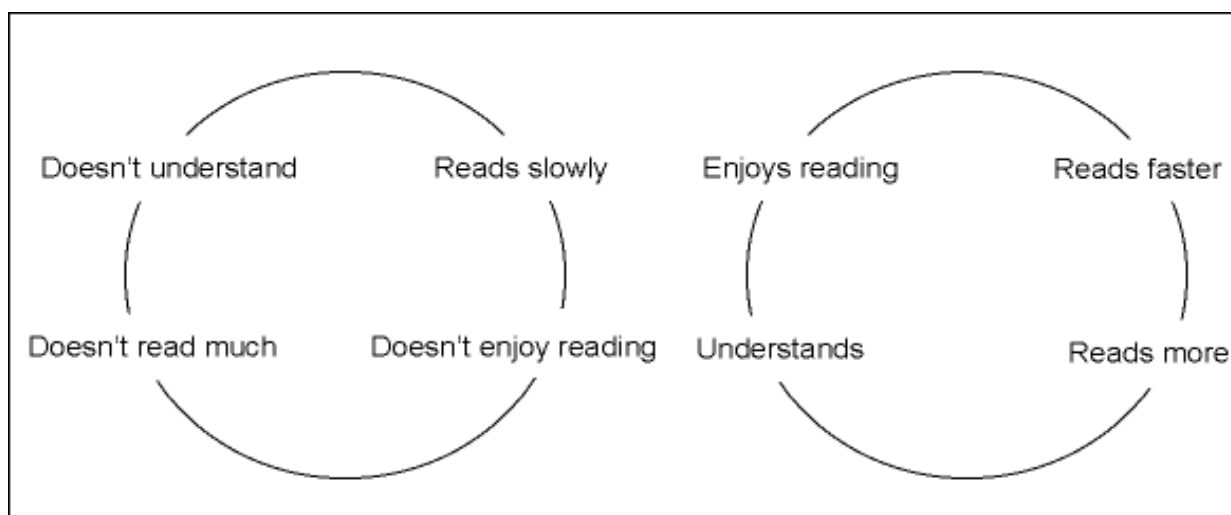
This research offers insights into literacy pedagogy by validating the K-W-L strategy for active learning. It addresses the intersection of affective variables, such as anxiety, and cognitive outcomes, and equips practitioners with actionable, scalable methodologies to optimize literacy in the Algerian context.

Operational Definitions

- **Reading Comprehension:** A complex cognitive architecture for interpreting written discourse, involving identifying thematic structures and evaluating text-based propositions (Abdelwahid, 2013; Maghawry, 2024).
- **Reading Anxiety:** A situational psychological state characterized by emotional distress, apprehension, and lack of confidence when interpreting text (Taylor, 2018).
- **K-W-L Strategy:** A metacognitive instructional intervention utilizing three phases: accessing prior knowledge (K), articulating learning goals (W), and reflecting on acquired insights (L).

Figure 1

The Virtuous Circle of the Good Read (Nuttal. C, 1983, .167)



Reducing Anxiety

Anxiety is one of the most prevalent psychological phenomena affecting individuals across different developmental stages and educational contexts. Although experiencing anxiety is a normal aspect of human functioning, excessive levels of anxiety may negatively influence cognitive, emotional, and behavioral performance. In educational settings, heightened anxiety can interfere with students' ability to concentrate, process information, and engage effectively in learning activities. Moreover, persistent anxiety may be accompanied by various physiological symptoms, including headaches, fatigue, sleep disturbances, and gastrointestinal discomfort, as well as psychological difficulties such as depression, reduced self-confidence, and impaired academic performance (Al-Subhi, 2023).

From a psychological perspective, anxiety is considered a natural response to perceived challenges or threats. Moderate levels of anxiety may serve an adaptive function by motivating individuals to prepare for and respond effectively to demanding situations. However, when anxiety exceeds a manageable threshold, it can become maladaptive and may contribute to emotional distress, behavioral difficulties, and diminished academic achievement. Furthermore, anxiety is closely associated with related psychological constructs such as fear, frustration, internal conflict, and uncertainty, all of which may influence an individual's adjustment and well-being (Jamil, 2021).

In language learning environments, reading anxiety has emerged as a significant factor affecting learners' engagement with written texts. Students who experience high levels of reading anxiety often demonstrate reduced confidence, lower comprehension performance, and a tendency to avoid reading-related tasks. Consequently, identifying effective instructional approaches that alleviate anxiety while promoting active engagement with texts has become an important objective in contemporary educational research.

The K-W-L Strategy: Theoretical Background

The K-W-L strategy is a metacognitive instructional approach designed to facilitate meaningful learning by activating learners' prior knowledge and encouraging active engagement with new information. The strategy is commonly associated with constructivist

learning theory, which posits that knowledge is actively constructed through the interaction between existing cognitive structures and newly acquired information. From this perspective, learning occurs when learners integrate new experiences with their prior knowledge, thereby constructing deeper and more meaningful understanding (Hafez, 2008).

Although constructivist principles have long influenced educational thought, the K-W-L strategy reflects contemporary shifts in educational psychology that emphasize internal cognitive processes rather than external instructional variables. This shift has redirected attention from factors such as teacher characteristics, curriculum design, and school environment toward learners' cognitive engagement, self-regulation, and knowledge construction processes (Abdul Bari, 2010).

The primary purpose of the K-W-L strategy is to activate learners' background knowledge and establish meaningful connections between what they already know and what they are expected to learn. By encouraging learners to identify prior knowledge, formulate questions, and reflect on newly acquired information, the strategy promotes active thinking and supports deeper comprehension during reading activities (Ibrahim, 2005; Al-Zahrani, 2011).

Stages of Implementing the K-W-L Strategy

The implementation of the K-W-L strategy typically occurs through three sequential phases: pre-reading, during-reading, and post-reading (Atia, 2009, 2015).

Pre-reading Phase

During the pre-reading phase, students are encouraged to activate their prior knowledge regarding the topic under study. The teacher introduces the lesson through stimulating questions intended to generate curiosity and engagement. Students then complete the first column of the K-W-L chart (K: What I Know) by recording their existing knowledge, experiences, and assumptions related to the topic.

Subsequently, students formulate questions about aspects of the topic they wish to learn more about. These questions are recorded in the second column (W: What I Want to Know). This process encourages learners to establish personal learning objectives, identify knowledge gaps, and develop purposeful reading goals. Brainstorming and collaborative discussion are frequently employed to facilitate idea generation and enhance students' engagement with the learning task.

During-reading Phase

In the during-reading phase, students read the assigned text while actively searching for answers to the questions generated during the previous stage. As they interact with the text, they monitor their comprehension, identify relevant information, and record newly acquired knowledge. This stage promotes self-regulated learning and encourages learners to engage in purposeful reading rather than passive information processing.

Post-reading Phase

The post-reading phase focuses on reflection, evaluation, and knowledge consolidation. Students complete the third column of the chart (L: What I Learned) by summarizing the information they have acquired from the text. They compare their newly acquired knowledge with their initial assumptions and questions, evaluate the extent to which their learning objectives have been achieved, and identify any remaining questions requiring further investigation.

Through discussion, reflection, and self-evaluation, learners reconstruct their understanding, correct misconceptions, and organize newly acquired information within their cognitive structures. Consequently, the K-W-L strategy supports meaningful learning, promotes metacognitive awareness, and enhances learners' ability to monitor and regulate their own comprehension processes.

Group	N	Arithmetic mean	Standard deviation	T-value	Statistical significance	Significance level (a)	Conclusion
Experimental group	30	82.5	6.8	3.25	0.002	0.05	Statistically significant (in favor of the experimental group)
Control group	30	75.1	7.2				

Post-Test Reading Comprehension Results

The results presented in Table 1 indicate that students in the experimental group achieved a higher mean score on the post-reading comprehension test ($M = 82.50$) than those in the control group ($M = 75.10$). To determine whether this difference was statistically significant, an independent-samples *t*-test was conducted. The analysis revealed a statistically significant difference between the two groups, $t(58) = 3.25$, $p = .002$.

Because the obtained probability value was lower than the predetermined significance level of .05, the null hypothesis was rejected. Consequently, the alternative hypothesis was accepted, indicating that a statistically significant difference existed between the mean scores of the experimental and control groups on the post-reading comprehension test in favor of the experimental group.

These findings suggest that the instructional intervention implemented with the experimental group had a positive effect on students' reading comprehension performance. The higher post-test mean score achieved by the experimental group indicates that students who received instruction through the K-W-L strategy demonstrated superior comprehension skills compared with their peers who were taught using conventional instructional methods.

Furthermore, the obtained *t*-value exceeded the critical value required for significance at 58 degrees of freedom, confirming that the observed difference was unlikely to have occurred by chance. The probability associated with the test statistic ($p = .002$) indicates that there was only a 0.2% likelihood that the observed difference resulted from random sampling variation. Therefore, the difference can be attributed with reasonable confidence to the instructional treatment rather than to chance factors.

These results provide empirical support for the effectiveness of the K-W-L strategy in enhancing reading comprehension among middle school students. The findings are consistent with the theoretical assumptions underlying constructivist and metacognitive learning approaches, which emphasize the activation of prior knowledge, purposeful questioning, and reflective learning processes as mechanisms for improving comprehension. Overall, the statistical evidence demonstrates that the K-W-L strategy contributed significantly to students' reading achievement and can be considered an effective instructional approach for fostering reading comprehension skills.

Post-Test Reading Anxiety Results

To examine the second hypothesis, which proposed that there would be statistically significant differences between the experimental and control groups on the post-reading anxiety scale in favor of the experimental group, the following hypotheses were tested:

Null Hypothesis (H_0): There are no statistically significant differences between the mean post-test anxiety scores of students in the experimental group and those in the control group.

Alternative Hypothesis (H_1): There are statistically significant differences at the .05 level between the mean post-test anxiety scores of students in the experimental group and those in the control group, in favor of the experimental group, indicating lower levels of reading anxiety.

To test this hypothesis, the post-test anxiety scores of the two groups were compared using an independent-samples *t*-test. The results of this analysis are presented in Table 2 and are discussed in relation to the study hypothesis.

Table (2) demonstrates the presence of statistically significant differences at the 0.05 level between the average scores of students in the experimental group and the control group on the post-reading anxiety scale in favor of the experimental group (i.e., with lower anxiety).

Group	N	Arithmetic mean	Standard deviation	T-value (T)	Degree of freedom (df)	Level of statistical significance	Statistical significance
Experimental Group	30	22.40	4.15	3.27	58	0.002	Significant at 0.05
Control	30	27.85	5.10				

The previous table shows that:

The mean score of the experimental group (22.40) on the post-test reading anxiety scale was lower than that of the control group (27.85), indicating a lower level of anxiety among students who underwent experimental treatment. The independent samples t-test showed a positive t-value of 3.27, indicating a significant difference between the two groups. The significance level (sig. = 0.002) was lower than the specified significance level (0.05), indicating that the difference between the two groups was statistically significant. Accordingly, we reject the null hypothesis and accept the alternative hypothesis, which states a difference in favor of the experimental group. The results indicate that the experimental program or treatment applied to the experimental group was effective in reducing the level of reading anxiety among students compared to the control group, which did not receive treatment. This supports the effectiveness of the educational or instructional intervention and recommends its use in similar educational settings.

The results extracted from the table indicate a positive effect of the program or experimental treatment applied to the experimental group in reducing their reading anxiety levels, compared to the control group, which did not receive any intervention.

The average score of the experimental group on the post-reading anxiety scale was (22.40), which was lower than that of the control group, (27.85). This difference in averages indicates that the students who underwent the experimental program showed lower levels of reading anxiety than their peers in the control group.

An independent sample t-test was used to compare the averages of the two groups. The calculated t-value was (3.27), which was positive, indicating that the difference was in the expected direction (i.e., in favor of the experimental group). This value reflects the presence of a real difference in the averages, not a difference resulting from random variation. The statistical significance value associated with the test was (0.002), which was less than the significance level adopted in the study (0.05). This confirms that the difference between the two groups was statistically significant. This means that there is a very low probability (less than 0.2%) that this difference occurred by chance.

Based on these results, the null hypothesis, which states that there are no statistically significant differences between the two groups, was rejected. The alternative hypothesis, which assumes a statistically significant difference in favor of the experimental group, was accepted.

These results indicate that the training program or experimental treatment was effective in reducing students' levels of reading anxiety. Therefore, it is recommended that this type of educational intervention be adopted in similar educational environments, given its clear positive impact on improving learners' psychological

state, particularly in reducing anxiety associated with academic skills, such as reading. Answer to the third hypothesis: Which states? (There are no statistically significant differences between the average scores of the experimental group students in the pre- and post-reading comprehension test after using the K-W-L method?). A paired samples t-test was used because the same group (60) of students was compared before and after applying the K-W-L method. There are several methodological steps to answer this hypothesis, including:

Formulating the null hypothesis (H0): There are no statistically significant differences between the average scores of the pre- and post-tests.

Formulating the alternative hypothesis (H1): Statistically significant differences exist between the average scores of the pre- and post-tests.

The statistical test used (t-test) indicated d that the two samples were related.

Table (3) shows no statistically significant differences between the average scores of the experimental group students on the pre- and post-reading comprehension tests s after using the K-W-L method.

Procedur e	n	Arithmet ic mean	Standard deviation	Calculate d t-value	Significan ce level	Statistica l significan ce
Pre-test	60	12.40	3.21			
Post-test	60	17.85	2.95	9.45	0.000	Statistical ly significan t

The previous table shows that:

The mean post-test score (17.85) was significantly higher than the mean pre-test score (12.40).

The calculated t-value was 9.45, which is a positive and significant value.

The significance level = 0.000 > 0.05, indicating that the differences were statistically significant.

Therefore, the null hypothesis (H0) was rejected and the alternative hypothesis (H1) was accepted.

This indicates that the K-W-L method has a clear positive effect on improving students' reading comprehension.

The results indicate statistically significant differences between the students' mean scores on the pre- and post-tests, in favor of the post-test, demonstrating the effectiveness of the K-W-L method in developing the reading comprehension skills of students in the experimental group.

The data in the table indicate a clear and statistically significant difference between the students' results in the pre-test and post-test, as shown by the increase in the average scores after application, as the average post-test score was (17.85) compared to the average pre-test score (12.40). This clear difference indicates a noticeable improvement in students' performance level after applying the K-W-L strategy, which reflects the development of their reading comprehension skills. For the high t-value, the calculated t-value reached 9.45, which is a positive and large value. This value indicates that the difference between the mean scores is not the result of chance or random variation, but rather a real difference that can be explained by the effect of the experimental intervention (the use of the K-W-L strategy).

The analysis results showed significance level (sig) = 0.000, which is much lower than the significance level adopted in educational and social studies ($\alpha = 0.05$). This means that the differences between the two groups are statistically significant, indicating an extremely low probability that this difference occurred by chance. Based on the previous results, the null hypothesis (H_0) stating that "there is no statistically significant difference between the mean scores of the pre- and post-tests" is rejected. The alternative hypothesis (H_1), stating that "there is a statistically significant difference in favor of the post-test," is accepted.

These results demonstrated d that the use of the K-W-L strategy had a clear and effective positive impact on students' reading comprehension skills in the experimental group. This is evidenced by the significantly improved performance in the post-test compared with the pre-test.

These results strongly support the effectiveness of the K-W-L strategy as an educational tool that contributes to improving learners' reading comprehension. It is recommended that this strategy be implemented in similar educational settings, given its statistically and educationally significant results in this context. Answer to the fourth hypothesis: Which states "There are no statistically significant differences between the mean scores of the experimental group students on the pre- and post-reading anxiety scale after using the K-W-L method?." Since we compared ed the mean scores of the same group (experimental) before and after the K-W-L method intervention, the appropriate statistical test was the paired samples t-test. Data on the reading anxiety scale were collected before and after using the K-W-L method, and the results are as follows:

Table (4)

shows that there were no statistically significant differences between the mean scores of the experimental group students on the pre- and post-reading anxiety scale after using the K-W-L method.

Measurement	Arithmetic mean	Standard deviation	Number
Pre-test	70.5	10.2	60
Post-test	65.3	9.8	60

A T-test was conducted for the related samples, and the results are as follows:

Table (5)

shows the T-test for related samples

Item	Value
Number of students (n)	60
Difference in means (M_diff)	5.2
Standard deviation of the difference	6.5
Calculated t-value (t)	6.02
Degrees of freedom (df)	59
P-value (statistical significance)	**0.000

The approved significance level is 0.05.

A p-value of 0.000 indicated d a statistically significant difference between the pre- and post-test mean scores. At p<0.05, The null hypothesis (no difference) was rejected at p < 0.05.

The post-test mean (65.3) was lower than the pre-test mean (70.5), indicating a decrease in reading anxiety after using the K-W-L method.

The difference in means (5.2 points) may have a significant educational impact, especially if the reading anxiety scale is valid and has an impact on academic performance.

Since the p-value is less than 0.05, and the difference between the means is in the expected direction (decreased anxiety), we reject the null hypothesis and accept the alternative hypothesis, which states: "There are statistically significant differences

between the mean scores of the experimental group students on the pre- and post-reading anxiety scale after using the K-W-L method."

The results indicated d that using the K-W-L method contributed to reducing students' reading anxiety, which supports the effectiveness of this method as a useful educational strategy.

It is recommended to implement the K-W-L method more widely and study its impact on other reading skills, such as comprehension and understanding.

The results of the statistical analysis indicate that there are statistically significant differences between the average scores of students on the reading anxiety scale pre- and post-applications. This was based on a probability value of 0.000 (p-value = 0.000), which is much lower than the significance level adopted in educational and social studies (0.05). Therefore, the null hypothesis (H₀), which states that there are no statistically significant differences, is rejected, and the alternative hypothesis, which assumes the presence of significant differences between the pre- and post-tests, is accepted.

The average reading anxiety scores in the pre-test were 70.5, while in the post-test they were 65.3, reflecting a decrease of 5.2 points after applying the K-W-L strategy. This decrease in averages s indicates a clear positive effect of using this strategy on reducing reading anxiety levels among the sample members. If the reading anxiety scale used has high degrees of validity and reliability, the aforementioned difference is of practical significance, not just statistical significance.

This decrease in reading anxiety scores after applying the K-W-L strategy indicates that the strategy has effectively contributed to improving students' emotional states s during the reading process, which may lead to enhanced participation and motivation to engage in reading. Reading activities we are more positive.

This result supports theoretical frameworks that emphasize the relationship between anxiety reduction and improved academic performance, particularly in reading skills.

Therefore, thise study recommends expanding the use of the K-W-L strategy in various educational settings, particularly in teaching reading skills, given its proven effectiveness in reducing reading anxiety. Future studies are also recommended to measure the impact of this strategy on other reading skills, such as reading comprehension, understanding, and critical analysis, to-develop a more comprehensive understanding of the strategy's effectiveness.

Recommendations: The study recommends the following:

- It is recommended the K-W-L strategy be used in reading lessons because of its positive impact on enhancing reading comprehension and students' engagement with texts.

- It is necessary for teachers to include training courses on how to effectively employ the K-W-L strategy in the classroom.
- It is recommended that the K-W-L strategy should be included in the teacher's guide as modern and effective strategies for teaching reading.
- Students should be encouraged to use the K-W-L strategy in their daily activities to develop their self-understanding and self-learning skills.
- Emphasize the need to adapt the strategy to suit students' different levels, based on their cognitive and psychological abilities.
- Use the K-W-L strategy in a psychologically supportive classroom environment to reduce reading anxiety and enhance learners' self-confidence. The present study aimed to investigate the effectiveness of the K-W-L strategy in enhancing reading comprehension and reducing reading anxiety among middle school students in Arabic. The findings consistently demonstrated that strategy had a statistically and educationally significant impact on both the cognitive and affective dimensions of learning. First, the results revealed statistically significant differences between the experimental and control groups in the post-reading comprehension test, favoring the experimental group. The higher mean scores achieved by students taught using the K-W-L strategy indicate that the intervention significantly enhanced their ability to understand and interpret Arabic texts. Activating prior knowledge, setting reading goals, and reflecting on learned information have been shown to strengthen students' capacity to construct meaning and engage critically with the material. Second, the findings demonstrated significant differences in post-reading anxiety levels, with the experimental group reporting lower anxiety. This suggests that the K-W-L strategy not only fosters cognitive development, but also positively shapes students' emotional responses to reading tasks. By structuring the reading process and increasing students' sense of control and engagement, the strategy effectively reduced the feelings of tension and apprehension associated with reading in Arabic. Third, within-group comparisons for the experimental group indicated notable improvements in reading comprehension from pretest to posttest, confirming that the observed gains were directly attributable to the instructional intervention. Fourth, the study showed a statistically significant decrease in reading anxiety within the experimental group, further highlighting the role of the strategy in creating a supportive, confidence-enhancing learning environment. Overall, these findings provide robust empirical support for the effectiveness of K-W-L strategy as a metacognitive and constructivist instructional approach. The strategy proved effective not only in improving comprehension of Arabic texts, but also in alleviating reading-related anxiety, demonstrating its dual impact on students' cognitive and emotional development. These results underscore the importance of integrating active, strategy-based learning into reading instruction and offer practical implications for educators aiming to enhance both academic performance and psychological well-being in Arabic reading classrooms.

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