Investigating Notetaking Strategies to Improve Reading Comprehension and Retention in Language Learning Contexts

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دراسة استراتيجيات تدوين الملاحظات لتحسين الفهم القرائي واستبقاء المعلومات في سياقات تعلم اللغة

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Abstract

This study examines how training in note-taking strategies influences the ability of Iraqi EFL learners to comprehend and retain information from written texts, while taking gender into account as a potential moderator. A total of 78 intermediate-level college EFL participants were at random allocated to either an experimental group or a control group, with no specialized instruction provided to the control group, whereas the experimental group was trained in Notetaking techniques utilizing graphic organizers as a framework.

Data were collected through a multiple-choice reading comprehension test, two written recall tasks (immediate and delayed), and an analysis of students' notes. The outcomes of the two-way ANOVA technique indicated that the experimental group showed significantly higher performance than the control one in terms of both comprehending and recalling measures. Gender, however, has no statistically significant influence on participants' comprehension or retention outcomes. Further analysis of written recall demonstrated that compared to the control group, the experimental group showed greater success in both identifying relationships between ideas and retaining a larger number of key concepts.

Keywords: Notetaking strategies; graphic organizers; reading comprehension; retention; EFL learners; gender differences ,

المستخلص

تبحث هذه الدراسة في كيفية تأثير التدريب على استخدام استراتيجيات تدوين الملاحظات في قدرة الطلبة العراقيين الذين يدرسون اللغة الإنجليزية بوصفها لغة أجنبية على فهم المعلومات من نص مكتوب واحتفاظهم بها، مع أخذ عامل الجنس في الاعتبار بوصفه متغيّرًا وسيطًا محتملاً. وقد وُزِّع ٧٨ طالبًا جامعيًا من المستوى المتوسط في اللغة الإنجليزية كلغة أجنبية عشوائيًا إلى مجموعة تجريبية وأخرى ضابطة. لم تتلقى المجموعة الضابطة أي نوع من التدريب الخاص على تدوين الملاحظات، في حين تلقت المجموعة التجريبية تدريبًا على أستراتيجيات تدوين الملاحظات باستخدام المُنظِّمات الرسومية كإطار عمل مرجعي.

تم جمع البيانات من خلال اختبار فهم المقروء متعدد الخيارات ، وأختبارات الأستذكار التحريرية (فورية ومؤجَّلة)، بالإضافة إلى تحليل ملاحظات الطلبة. وأشارت نتائج تحليل التباين ثنائي الاتجاه إلى أن المجموعة التجريبية حققت أداءً أعلى بدرجة دالّة إحصائيًا من المجموعة الضابطة في مقاييس الفهم والاسترجاع. ومع ذلك، لم يُظهر عامل الجنس تأثيرًا ذا دلالة إحصائية في نتائج فهم المشاركين أو احتفاظهم بالمعلومات. كما أظهر التحليل لمهمة الاسترجاع التحريرية (الكتابية) أن المجموعة التجريبية، مقارنةً بالمجموعة الضابطة، حققت نجاحًا أكبر في تحديد العلاقات بين الأفكار والاحتفاظ بعدد أكبر من المفاهيم الرئيسة.

الكلمات المفتاحية :استراتيجيات تدوين الملاحظات؛ المنظِّمات الرسومية؛ الفهم القرائي؛ الاحتفاظ بالمعلومات؛ متعلّمو الإنجليزية كلغةً أجنبية؛ الفروق بين الجنسين.

Introduction

Academic reading is a central component of higher education, as students are regularly assigned texts for independent study, which often serve as the primary mode of instruction in many courses (Clerehan, 1995, p. 137–155). Alongside reading, note-taking during lectures or while engaging with texts is a widely practiced learning strategy. Students typically record key points from assigned readings; However, questions remain regarding whether they employ effective note-taking strategies that genuinely enhance comprehension and retention.

It is recognized that reading comprehension that involves an intricate cognitive activity, it also involves the interplay of language proficiency, general knowledge, and topic-specific background knowledge. During reading, learners construct multiple mental representations to achieve varying levels of understanding. Field (2002) identifies three such representations: the surface code (The text as it appears word-for-word), the text base (the essential thoughts and meaning), and the situation model (a mental representation that integrates textual information with prior knowledge). Similarly, Nunan (2003) emphasizes that comprehension is a dynamic process in which textual information is continuously integrated with pre-existing schemata to construct meaning. Despite its importance, achieving effective comprehension presents challenges for many learners.

Many of these challenges emerge from difficulties in the tactical processing of texts. As Williams et al. (2001) note, learners may lack appropriate strategies for specific tasks or may be uncertain about when to apply strategies they do possess. Also, a number of studies have investigated the challenges faced by EFL learners

in academic writing, highlighting the importance of specialized instructional approaches to enhance the organization and clarity of their essays (Mahdi, 2025, p. 388–412). Note-taking is one such strategy that has long been considered beneficial for supporting comprehension, memory, and overall learning. Beyond aiding general academic tasks, it contributes to language development and research skills (White, 1996, p. 89–102). In their study, O'Malley and Chamot (1995) define it by way of recording relevant wordings and ideas in condensed verbal, pictorial, or numeric form, note-taking is a multifaceted process which joins listening, reading, selecting, making summaries, along with writing (Fajardo, 1996, p. 22–28). Importantly, students often achieve their highest levels of comprehension during note-taking (Nwokoreze, 1990, p. 39–40).

Research has highlighted two principal functions of note-taking. The first, explained by encoding theory, suggests that the act of note-taking enhances learning by directing attention, improving focus, and encouraging connections between new and prior knowledge (Kiewra, 1987, pp. 233). The second, external storage theory, stresses the value of reviewing notes as external repositories of information that can be recalled for later use. For learners to benefit fully from any function, they should not only make notes but also review such notes (Robinson et al., 2006). However, studies show that students frequently record less than half of the essential concepts, which limits the effectiveness of review and diminishes the potential benefits of external storage (Katayama & Robinson, 2000).

Kiewra et al. (1995) further distinguish between conventional notes, which reflect students' habitual practices, and structured

notes created through the application of any framework like outlines or graphic organizers. Unlike traditional notes, graphic organizers present information visually, making explicit the spatial and relational connections among ideas (Robinson & Schraw, 1994). They also offer cognitive advantages: when information is represented both verbally and visually, learners engage dual coding processes, which enhances retrieval from long-term memory (Robinson & Molina, 2002).

In addition to strategy use, learner characteristics may influence the effectiveness of note-taking. Green and Oxford (1995) argue that variables such as motivation, gender, and language proficiency warrant consideration when investigating strategy use. Accordingly, this study also examines potential gender differences in note-taking outcomes. Given the growing scholarly interest in this area and the particular significance of note-taking in EFL contexts involving non-English majors, examining both the processes and products of note-taking remains a timely and valuable line of inquiry.

Research Gap, purpose and Objectives

Although previous studies have highlighted the advantages of notetaking techniques and the potential advantages of graphic organizers, limited research has investigated their effects on EFL learners from non-English majors, particularly in the Iraqi context. Furthermore, the moderating role of gender in note-taking efficacy remains underexplored. This study addresses these gaps by examining how explicit training in Notetaking techniques utilizing graphic organizers influences the reading comprehension and memory retention of Iraqi EFL learners. It

also investigates whether gender differences shape these outcomes.

In the Iraqi setting, in educational contexts teaching English as a foreign language, the current work specifically aims at assessing the instructional influence of graphic organizer-based note-taking on the reading comprehension and retention of college students majoring in engineering (non-specialists in English). A further objective is to explore the degree that gender influences the efficiency of different Notetaking strategies. More precisely, the study examines whether explicit instruction in graphic organizers helps learners to better understand and retain relationships among ideas compared to traditional note-taking methods. In addition, participants were provided with verbal instruction on note-taking techniques to support the training process.

To address these objectives, the current study sought to answer the subsequent inquiries listed below:

1. How does instruction in note-taking with graphic organizers affect students' reading comprehension skills?
2. How does instruction in note-taking with graphic organizers affect students' ability to retain information?
3. To what extent can the gender variable affect Comprehension efficiency of graphic notetaking among the participants?
4. To what extent can the gender variable affect information retention of graphic note-taking among the participants?

Based on these inquiries, the subsequent null hypotheses were put into words:

1. Teaching students to make notes with graphic organizers has no significant effect on their reading comprehension.
2. Instructing students to make notes with graphic organizers has no significant effect on their retention of information.
3. Gender has no significant effect on the comprehension efficiency achieved through graphic note-taking among the participants.
4. Gender has no significant effect on the information retention achieved through graphic note-taking among the participants.

Previous and Related Studies

Research on note-taking has primarily examined its process and outcome functions. Slotte and Lonka (1999) investigated both aspects by exploring how note-taking influenced students' spontaneous comprehension of texts. In their study, 226 high school graduates were asked to read a philosophical text and take notes using their usual strategies. One group was informed beforehand that they could consult their notes while completing subsequent writing tasks, while the second group finished the tasks with having no access to notes. The outcomes demonstrated that performance on writing assignments was shaped by both the note-taking process and the opportunity to review notes. Interestingly, students having a previous knowledge can later consult the notes they made so as to take more comprehensive notes, highlighting the impact of review on note-taking behavior. However, the study had two methodological limitations: the text provided lacked headings, and students were not permitted to underline or annotate directly on the text, restricting them to writing on separate sheets.

In a related research, Lonka, Lindblom-Ylänne, and Maury (1994) examined the effects of Notetaking techniques—such as Highlighting and mapping of concepts—on deep learning, synthesizing tasks, and critical text analysis among 200 university applicants. Participants were allowed to make notes both within the text itself and in different sheet paper. The findings revealed that participants' retention and concentration had been directed by the hierarchical positioning of ideas. While concept mapping enhanced critical analysis, underlining improved both detailed comprehension and synthesis. Nonetheless, the study's design was limited by the absence of a delayed post-test, which could have revealed longer-term effects.

Other research has also underscored the importance of note quality over note quantity. Dunkel (1988) demonstrated that post-lecture performance was more strongly associated with the amount of informational units recorded compared to the sheer volume of notes. He emphasized the value of providing students with organizational tools to support more effective note-taking.

The function of graphic organizers in Notetaking Has elicited targeted interest. Katayama and Robinson (2000) investigated the benefits of using graphic organizers as well as summaries in combination with study and review activities. In their study, 117 undergraduates got allocated to six groups, then requested to work with a chapter-length text using either complete, incomplete, or skeletal kinds of graphic organizer and summary over couple sessions spaced two days apart. Learners using complete organizers and summaries were provided with all key concepts and their hierarchical relations, while those in partial or skeletal groups were required to identify missing information. All

groups were allowed to review their notes before testing. The findings showed that students using partial and complete graphic organizers performed better than those using summaries, particularly on application and factual tests administered after two days. These results were interpreted through the lens of encoding theory, which suggests that learners engage in deeper processing when required to generate missing information. However, the study did not assess participants' prior experience with graphic organizers or provide explicit training in spatial note-taking techniques.

Robinson et al. (2006) extended this line of inquiry through three quasi-experimental and one true experimental study, examining the influences of teaching visual Notetaking techniques on understanding. A total of 120 undergraduates in an educational psychology course were assigned partial or complete graphic organizers for twelve textbook chapters. Over time, the graphic organizers provided to students contained progressively less information, requiring greater learner input. Additionally, participants were trained to complete graphic organizers on computers by selecting missing concepts from pop-up options. Across all experiments, students who worked with incomplete graphic organizers outperformed the ones whom received complete kinds of organizer or made summaries about assessments of course content. Furthermore, students trained to complete visual organizers exhibited a shift from linear note-taking to more pictorial approaches. The authors concluded that graphic organizers are effective tools across disciplines, particularly when learning requires recognizing relationships among concepts.

Method

A- Participants

The study sample initially involved 90 undergraduates with mechanical engineering major. A standardized reading comprehension test was utilized to evaluate the language proficiency for the participants, and the study only included the ones who score one standard deviation above or below the mean in the test. This resulted in a final sample of 78 students. Due to practical constraints, random assignment was not feasible; instead, participants were drawn from two intact courses— Aircrafts and Air Conditioning—each comprising 39 students. These two groups were comparable in reading proficiency. A quasi-random procedural selection was used to assign one group as the Experimental Group (25 males, 14 females) and the other as the Control Group (26 males, 13 females).

B- **Materials**

Two standardized reading assessments were employed. The pretest consisted of the comprehending component of the Michigan Test of English Proficiency – reading section, which comprised four passages, each passage has five questions with multiple choices (MCQ). The posttest comprised the reading part of a TOEFL comprehension exam, consisting of five passages and 30 questions with multiple choices in total. Test reliability, which was measured utilizing the KR-21 formula, was acceptable: ٠،٦٨ for the pretest and 0.72 for the posttest.

Instructional materials for the intervention followed the method proposed by Billmeyer and Barton (٢٠٠٢), in which students were taught to use incomplete graphic organizers to identify main ideas, supporting details, and the organizational structure of texts.

Sample reading passages for training were drawn from Markstein and Hirasawa (2004). To ensure unfamiliarity, participants were asked preliminary questions about the passages before selection. An example of an incomplete graphic organizer is provided in the Appendix.

C- Procedure

Data collection spanned three months. A pretest was first administered to establish baseline reading proficiency. The 78 selected students attended two weekly sessions across 12 instructional periods (30 minutes each). While the two classes were taught by different instructors, both used the same textbook, syllabus, and instructional methods.

During the initial session, the researcher explained why Notetaking technique is significant and described the goals of structured Notetaking. Students previewed the text (examining subheadings, images, and key phrases) while following along as the instructor read aloud. They were encouraged to underline, use symbols, and highlight key points. The incomplete graphic organizer was then introduced on the board, containing partial information to be collaboratively completed with the instructor. Over subsequent sessions, progressively less information was provided in the organizers, until by the eighth session students were able to complete them independently.

Alongside using graphic organizers, participants were provided with verbal instructing on effective note-taking strategies, including recognizing purposes for note-taking, focusing on essential information, paraphrasing, underlining key points, and using symbols or acronyms to support retention.

At the end of the intervention, participants read passages, took notes, and completed a 30-item multiple-choice comprehension test within 30 minutes. They were allowed to consult their notes while answering. Immediately afterward, participants were asked to produce a free written recall of the passages. The experimental group used graphic organizers, while the control one used the standard notetaking methods with only blank papers.

To assess delayed retention, participants completed the same posttest (with different passages) one month later. Prior to testing, they reviewed their original notes for 10 minutes. The test was followed by a verbal recall task, in which students orally reported what they remembered from the earlier texts. Due to time and logistical constraints, written delayed recalls were not feasible. The instructor recorded participants' verbal recalls, and the researcher transcribed them for analysis. Fifty participants completed this procedure individually, yielding fifty sets of delayed recall data for qualitative examination.

Results and Discussion

Analysis of the pretest scores showed that the experimental group (M = 13.95) and the Control Group (M = 13.87) has no significant statistical variation among them. Similarly, no significant difference was observed between male participants (M = 13.80) and female participants (M = 12.99). Table 1 presents the pretest's statistical descriptive data, confirming that both groups were comparable in reading proficiency prior to the intervention.

Posttest data were subsequently analyzed to evaluate the effects of the treatment, given that the two groups were equivalent during the study's initial stage. Since reading comprehension and recall had been treated as independent constructs, a distinct two-

way ANOVA was separately run for every dependent variable. The current study included two independent variables: instructional method (traditional Notetaking vs. graphic organizers) along with gender.

Table 1. Mean Scores by Notetaking Instruction along with Gender

Gender	Intervention	Mean	Std. Deviation	N
Male	Note-taking	13.81	1.60	25
	Control	13.82	1.30	26
	Total	13.80	1.35	51
Female	Note-taking	12.92	1.66	14
	Control	13.79	1.35	13
	Total	12.99	1.90	27

Reading Comprehension

Descriptive statistics were calculated to look at the effects of notetaking instructional technique and gender upon students' comprehension of reading material. Table 2 shows both the mean values and corresponding standard deviations for each group, providing a clear overview of the performance across the experimental and control groups, as well as male and female participants. These descriptive data formed the basis for subsequent inferential analyses to determine the impact of the instructional intervention and the potential moderating role of gender.

Table 2. Reading Comprehension Performance as Influenced by Notetaking Instructional technique and Gender

Gender	Note	Mean	Std. Deviation	N
Male	Note-taking	20.60	2.68	25
	Control	17.70	2.60	26
	Total	19.10	2.22	51
Female	Note-taking	20.40	2.30	14
	Control	17.05	2.14	13
	Total	19.35	2.13	27

Dependent variable: Reading comprehension

Descriptive analysis revealed higher mean scores for the experimental group (M = 20.50) compared to the control group (M = 17.45) on average. Minimal differences were observed among males (M = 20.60) as well as females (M = 20.40) within the experimental group, suggesting that gender had little impact on reading comprehension outcomes.

To examine these effects statistically, ANOVA (a two-way variance analyzing) was carried out, considering notetaking instructional technique and gender as between-group factors. The results are shown in table 3, with rows 3–5 highlighting the key findings. In the fourth row, the analysis shown an important main influence of instructional method on reading comprehension, as the F-value for Instructed note-Taking (F (1,104) = 13.27) was greater than the critical value of 3.94. Moreover, the effect size was considerable (η^2 = .11), indicating that teaching notetaking techniques along with employing graphic organizers had a meaningful affirmative impact on students' comprehension. Accordingly, the null hypothesis concerning the instructional method was rejected.

Conversely, the gender's main influence did not statistically reach significance variance: F (1,104) = 0.16, p > .05, that the effectiveness of the Notetaking instructional technique on participants' reading comprehension was similar for both male and female students. The aforementioned findings demonstrate that structured note-taking instruction improves reading comprehension equivalently across genders.

Table 3. Reading Comprehension Outcomes by Notetaking Instructional technique and Gender: Two-Way ANOVA Results

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	85.674a	3	61.218	11.291	.001	.113
Intercept	43417.247	1.1	4217.246	538.000	.000	.687
Gender	1.726	1.2	1.737	.163	.687	.002
Note-Taking	149.872	1.1	149.672	13.27	.000	.112
Gender * Notetaking	6.073	1.1	6.073	.537	.465	.005
Error	1174.279	104	11.291			
Total	45555.000	107				
Corrected Total	1250.863	106				

Dependent Variable: Reading Comprehension; p < .05; a: Adjusted R² = .137 (Adjusted R² = .112); : Interaction effect

Furthermore, In the fifth row the interaction effect between note-taking instruction and gender was minimal, F (1,104) = 0.53, p > .05, indicating that the variances in performance amid the experimental and control groups can primarily be attributed to the instructional intervention itself. Although females slightly outperformed males, this difference was not statistically significant, further supporting the conclusion that structured note-taking benefits both genders comparably

Notetaking and Recall

On the subject of the second dependent variable, descriptive statistics indicated that the experimental group (M = 20.41) achieved a higher mean score compared to the control group (M = 18.62) in terms of average, as presented in Table 4. Within the experimental group, males exhibited slightly higher mean scores (20.66) than females (20.16), although the differences were minimal.

An ANOVA analysis was carried out so as to determine whether these differences had any statistical significance. As indicated within the fourth row of table 5, the analysis shown a significant primary impact of notetaking instructional technique on recall, F (1,104) = 13.30, p < .001, η^2 = .11, indicating that structured note-taking with graphic organizers substantially enhanced participants' ability to retain information. Thus, the second null hypothesis, which posited no effect of note-taking instruction on retention, was rejected.

As observed with reading comprehension, the instructional strategy appeared to have an even greater impact on recall than on comprehension. In contrast, the primary impact of gender was not significant, and no significant interaction effect between gender and instructional method was observed. These findings support the conclusion that note-taking instruction improves recall for both male and female students equally, confirming the hypothesis that gender does not moderate the effectiveness of graphic note-taking on retention.

Table 4. Reading Comprehension Performance as Influenced by Notetaking Instructional technique and Recall

Gender	Note	Mean	Std. Deviation	N
Male	Note-taking	20.44	1.42	25
	Control	18.44	1.88	26
	Total	19.89	1.82	51
Female	Note-taking	20.16	2.20	14
	Control	18.80	2.21	13
	Total	19.64	2.30	27

Dependent variable: Retention

Table 5. The Reading Comprehension Outcomes by Notetaking Instructional technique and Recall: Two-Way ANOVA Results

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	88.210a	3	28.093	13.302	.001	.122
Intercept	43136.797	1.1	43127.79	20729.966	.000	.988
Gender	6.648	1.2	5.548	1.177	.248	.012
Note	74.418	1.1	64.317	13.302	.001	.122
Gender * Note*	.007	1.1	.006	.001	.961	.000
Error	537.384	104	4.147			
Total	47750.000	107				
Corrected Total	533.547	106				

*Dependent Variable: Retention; $p < .05$; a: Adjusted $R^2 = .140$ (Adjusted $R^2 = .115$); *: Interaction effect

Nonetheless, it is apparent that the gender variable exerts a greater influence on recall than on reading comprehension, as indicated by the F-ratio for recall (F = 1.27), compared with the corresponding value for comprehension (F = 0.15). Given the

minimal F-value for the interaction between the two factors, it is likely that the observed improvements in recall are primarily attributable to the instructional intervention rather than to gender. Notably, in this instance, males outperformed females across both groups.

The descriptive statistics and ANOVA results are presented in Tables 4 and 5. A comparison of the two sets of findings reveals that, while females achieved higher scores than males in reading comprehension, males surpassed females in recall. In other words, the note-taking instructional strategy appears to have selectively enhanced males' recall performance while improving females' comprehension. Collectively, these results provide strong evidence that implementing structured note-taking strategies, particularly using graphic organizers, effectively enhances both reading comprehension and recall skills among intermediate-level EFL participants from non-English majors.

Analysis of Notes

Dunkel (1988) emphasizes that "note-taking instructors and researchers should be aware of the type and variety of data documented in notes, not merely the quantity of such data being collected" (p. 273). In line with this perspective, qualitative analyses were conducted alongside statistical evaluations. Two additional university instructors independently reviewed the recall protocols of both groups and reached consensus on their assessments to validate the statistical findings. This qualitative evaluation focused on the content and organization of the notes rather than numerical scoring alone.

The overall quality of the recall protocols and notes was assessed based on several criteria, including the amount of verbatim

versus paraphrased content, the use of symbols and abbreviations, total word count, and the hierarchical organization of content (key concepts, subordinate details, and their relationships) (Clerehan, 1995; Badger, White, Sutherland, & Haggis, 2001). Spelling and syntactical errors were not considered in the evaluation.

The first notable distinction amid the groups was the volume of text recorded: the Experimental Group produced a substantially larger amount of written material compared to the Control Group. Additionally, experimental group participants recorded additional key concepts as well as detailed notes, whereas the control group often produced brief, incomplete notes. While both groups primarily captured main and significant concepts over minor details, the experimental group consistently included a greater proportion of key ideas. Table 6 presents a breakdown of central concepts, supporting details, and omissions for both groups.

Table 6. Percentage Central Ideas, Supporting Details, and Omissions

Groups	Central Ideas	Supporting Details	Omissions	Total
Experimental	44%	27%	29%	100%
Control	31%	22%	47%	100%

The control group's notes more frequently separated key concepts from their supporting details, indicating less effective integration of information. Both groups' protocols contained spelling and grammatical errors, and occasionally included L1, reflecting the participants' limited proficiency in English. Overall, participants in both groups relied more on verbatim notetaking—that is, directly copying textual material—than on

paraphrasing. It is noteworthy that no significant variances had been observed among male and female participants regarding the types of notetaking strategies employed or the total volume of material recorded.

Conclusion

The current study aimed at investigating the effects of teaching notetaking technique using graphic organizers on students' reading comprehension and recall, as well as to examine whether participants' gender influenced these outcomes.

The findings indicate that students who were trained to take and complete graphic organizers outperformed those using traditional note-taking methods on both comprehension and recall measures. In other words, the instructional impact of structured note-taking was evident in the learning process as well as its outcomes. While reviewing notes had a slightly greater effect on recall, this difference was not statistically significant, highlighting the pivotal role of graphic organizers in facilitating memory retention.

These results are consistent with prior research demonstrating that traditional note-taking often leads to lower test performance (Kiewra et al., 1995), whereas the use of graphic organizers enhances text-based learning (Robinson & Kiewra, 1995; Robinson & Molina, 2002). Moreover, note-taking instruction— particularly when implemented using partial or incomplete graphic organizers— has been demonstrated to increase active interaction with the material and improve learning outcomes (Katayama & Robinson, 2000).

Regarding gender, the findings of both the two-way ANOVA and the qualitative note analysis indicated no significant variances in

the effectiveness of Notetaking instruction among male and female participants. However, descriptive trends suggested that females slightly outperformed males in reading comprehension, whereas males demonstrated somewhat higher recall performance. Overall, structured note-taking using graphic organizers was effective in enhancing both comprehension and recall for intermediate-level EFL students majoring in Engineering, irrespective of gender.

Qualitative Evaluation with Pedagogical Implications

Two measures of recall—immediate and delayed—were collected from participants to provide a qualitative explanation for the quantitative findings. As described in the methodology, the recall protocols of the experimental group contained a greater number of conceptual units, higher word counts, and more clearly represented connections between ideas across both recall tasks. These findings support previous research indicating that test performance is associated with the quantity of information recorded in notes (Clerehan, 1995, p. 137–155).

Analysis of the notes demonstrated that participants in the experimental group were more effective in differentiating among distinct layers of textual information and recognizing relationships among concepts. This provides further evidence for the quantitative results, suggesting that visual organizers help emphasize key concepts and facilitate meaningful learning. Therefore, both the quantity and quality of notes appear to contribute significantly to learning outcomes.

In general, students' notes contained fewer secondary details compared to primary concepts, consistent with Clerehan's (1995) observation that second-language learners tend to record fewer supporting ideas as they progress from main ideas to subordinate

details. Delayed recall was less complete than immediate recall, which may be attributed to the limitations of the verbal-only assessment procedure. Additionally, analysis revealed that various participants in both groups were unable for the proficient application of Notetaking strategies; some merely copied or substituted words without understanding or making conceptual connections.

These findings carry several pedagogical implications regarding the conceptualization and instruction of note-taking techniques. It is essential to teach students that different note-taking methods engage distinct cognitive processes and are influenced by multiple factors. Students should be provided with metacognitive guidance to determine when and under what circumstances a particular technique is most effective.

The use of spatial note-taking strategies, for instance graphic organizers, facilitates the effective organization and integration of information by students. Furthermore, students should recognize that not all information carries equal weight, and learning should prioritize the retention of key concepts rather than excessive detail. Instructors should focus not only on students' observable study behaviors but also on the effectiveness of the strategies they employ, thereby fostering deeper and more efficient learning.

Restrictions and Ideas for Further Study
As noted by Dunkel (1988), the process of note-taking can be influenced by students' attitudes, including their motivation, curiosity, and prior knowledge of the subject matter. Because note-taking is often not required for course success, students may lack the incentive to engage fully with the process.

The current work focused on the impact of a single notetaking technique. Future research could expand this understanding by investigating other strategies, or combinations of strategies, especially by using web techniques like the blogging (Mahdi, 2024, p. 1969–1996), to determine their relative effectiveness. Additionally, examining how note-taking instruction influences students' performance on final examinations or other long-term assessments would provide valuable insights into its enduring impact.

Recent research suggests that students' use of study techniques is also shaped by their learning perspectives and approaches (Ferla, Valcke, & Schuyten, 2008). Future studies could explore potential interactions between note-taking practices and students' cognitive styles—for example, visual versus auditory learners, or analytic versus holistic thinkers—to determine how these factors influence learning outcomes.

In conclusion, examining the long-term impact of note-taking instruction on retention and recall would be advantageous, using delayed assessments administered a week, a month, or longer after instruction. Such studies would help clarify the durability of the benefits associated with structured note-taking strategies, including the use of graphic organizers.

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APPENDIX
Partial Graphic Organizer
Topic (Choose one): *Challenges of Online Study Faced by Students*
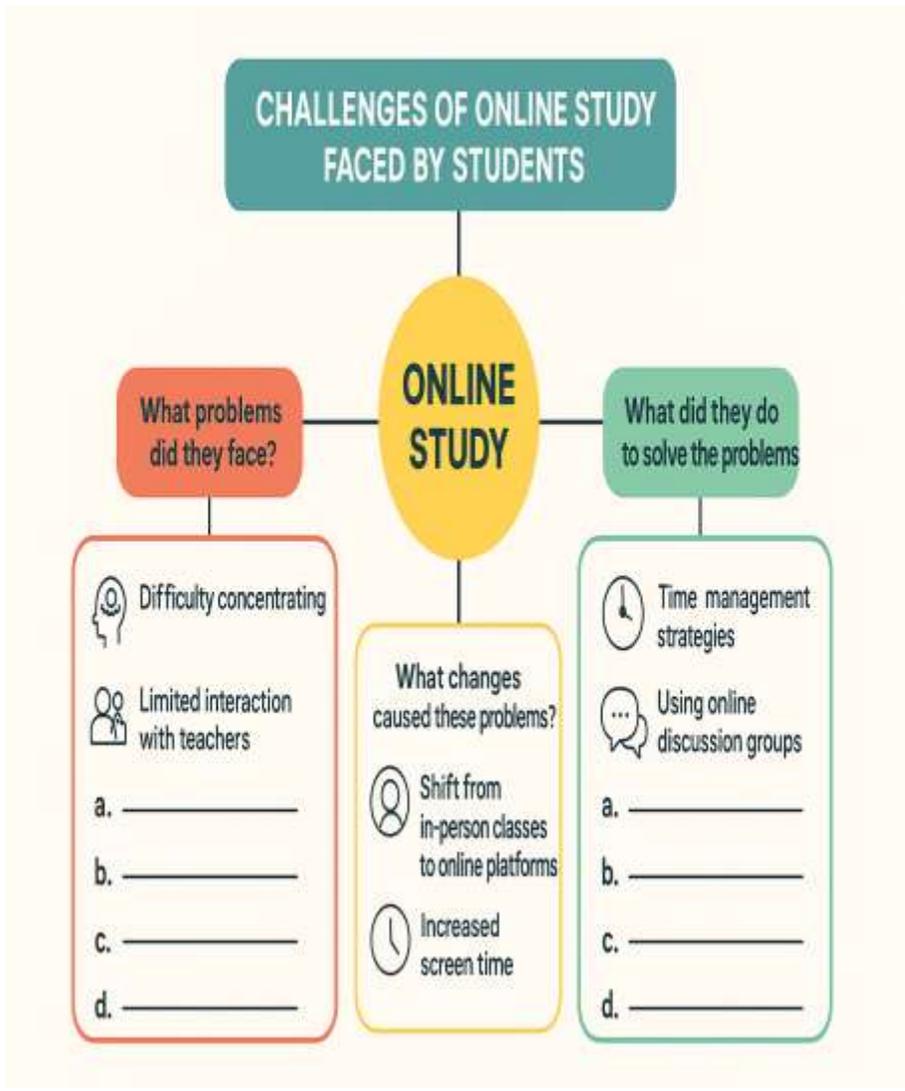
Topic: *Challenges of Online Study Faced by Students*

1. What problems did they face?

a. Difficulty concentrating

b. Limited interaction with teachers

c. ………

d. ………

2. What changes caused these problems?

a. Shift from in-person classes to online platforms

b. Increased screen time

c. ………

d. ………

3. What did they do to solve the problems?

a. Time management strategies

b. Using online discussion groups

c. ………

d. …….