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A quasi-experimental study comparing textual and audio dynamic glosses: Effects on L2 vocabulary learning among novice EFL learners

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This study investigates the impact of dynamic glossing techniques on vocabulary acquisition among novice (A2) English as a Foreign Language (EFL) learners. Specifically, the effectiveness of two forms of glossing i.e., Dynamic Textual Glossing (DTG) and Dynamic Auditory Glossing (DAG) in enhancing vocabulary learning are compared. The interventionist approach of dynamic glossing was employed in this study. The importance of this comparison lies in the growing need for finding effective vocabulary instruction strategies in EFL contexts and also highlighting the role of input enhancement in facilitating vocabulary acquisition. A quasi-experimental design was implemented with 75 novice (A2 proficiency level) EFL learners, randomly assigned into three groups: no gloss, DTG, and DAG. Participants completed a vocabulary pretest prior to treatment sessions. During treatment sessions, learners received passages from the "Select Reading" (A2 level) book containing highlighted unfamiliar words via the WhatsApp application and they were asked to send the meanings of those words to the instructor. The DTG group received gradual text message support, while the DAG group received audio message assistance. Following the all groups completed two immediate and two delayed posttests, with significance levels and effect sizes analyzed using one-way ANOVAs. Results of posttests and delayed posttests showed that both DTG and DAG significantly outperformed the no-gloss condition, affirming their efficacy as vocabulary instruction strategies. However, no significant difference was found between DTG and DAG, ($p < .001$), indicating both methods are effective. This research highlights the value of

integrating dynamic glossing into EFL teaching practices, advocating for tailored strategies that promote deeper engagement with vocabulary.

Keywords: gloss, dynamic gloss, audio gloss, textual gloss, mobile-mediated learning, vocabulary learning, input enhancement, multimodal gloss, EFL vocabulary instruction

Introduction

Vocabulary knowledge plays a central role in foreign language learning (Nation, 2011; Read, 2000) as it underpins effective communication and comprehension. However, many second language (L2) learners, often face challenges in understanding unfamiliar words in a context. This can lead to misunderstandings and ineffective communication. Due to the critical importance of vocabulary acquisition, innovative instructional techniques are essential for enhancing learners' vocabulary knowledge. Research indicates that vocabulary learning rates can be significantly improved through reading (Horst, 2005; Pigada & Schmitt, 2006); however, L2 learners frequently encounter barriers in grasping unfamiliar terms. One promising solution to this issue is the use of glosses – brief explanations, translations, definitions, or synonyms provided for unknown words in a text (Jacobs et al., 1994). Previous studies highlight the efficacy of various glossing techniques in aiding vocabulary retention among L2 learners (e.g. Azari, 2012; Fievez et al., 2023; Hosseini Alast & Baleghizadeh, 2024; Hulstijn et al., 1996; Hung & Hoang, 2023; Jacobs et al, 1994; Kim, et al., 2024; Outamgharte et al., 2024; Phadungsilp & Supasiraprapa, 2023; Stein, 2023; Ünal, 2023; Wang et al., 2023; Yanguas, 2009; Yoshii, 2006; Zhang & Ma, 2021) emphasizing their roles as a remedy for misleading guesses and misunderstandings of vocabulary meanings. Despite the extensive use of various glossing methods documented in the literature, a significant gap exists in comparative empirical studies investigating the effectiveness of textual versus auditory glossing, particularly in the context of novice English as a Foreign Language (EFL) learners within authentic classroom environments. This gap in the literature underscores the need for research that assesses the effectiveness of these two approaches and their roles in enhancing vocabulary acquisition.

Glossing serves to prevent misinterpretation and facilitate incidental vocabulary learning (Hu et al., 2014; Laufer, & Israel, 2000). While previous research has explored different gloss types with various outcomes (Çekiç, 2024; Jeon, 2023; Jung et al., 2022; Khezrlou et al., 2017; Ramazanali & Faez, 2019; Ramezanali et al., 2021; Rassaei, 2017, 2023; Shabani & Rahimy, 2019; Wang et al., 2023; Yanagisawa et al., 2020), most findings suggest that integrating glosses with teaching materials positively influences vocabulary acquisition. In light of Vygotsky's (1978a) sociocultural perspective on education, which emphasizes the importance of interaction between learners and instructors, dynamic approaches to glossing have gained prominence. Dynamic Textual Glossing (DTG) and Dynamic Auditory Glossing (DAG) build upon the foundational concepts of Dynamic Assessment by offering tailored assistance that

adapts to learners' needs (Rassaei, 2020). Despite prior studies examining DTG (e.g., Alcaraz-Marmol, 2021; Rassaei, 2020), the potential of DAG remains under-explored, particularly for novice EFL learners.

Dynamic textual glossing includes contextualized definitions or explanations accessed interactively by learners, promoting immediate comprehension and active engagement with the material. Conversely, auditory glossing provides spoken definitions or contextual usages of vocabulary, catering to diverse learning preferences and enhancing retention through auditory reinforcement.

This study addresses the existing gap by investigating the effects of dynamic glossing techniques – both textual and auditory – on vocabulary acquisition. The research focuses on understanding how these methods influence vocabulary retention and acquisition, particularly among novice EFL learners. By explicitly identifying and analyzing the comparative effects of these glossing strategies, this research seeks to enhance practical implications for best practices in L2 instruction. In light of the recent rise of mobile learning technologies, which facilitate learning beyond traditional classroom limits (Kaveh, 2024; Kayra, 2024; Lin & Lin, 2019), this study also explores how integrating mobile devices into vocabulary instruction can provide immediate feedback and increase learner engagement. This approach is particularly relevant for low-proficiency students who often benefit from tailored instructional strategies. Ultimately, this research aims to transform conventional vocabulary instruction into a more interactive and effective learning experience by comparing the effects of textual and auditory dynamic glossing on L2 vocabulary learning. By filling a crucial gap in the literature concerning the comparative effectiveness of these two glossing methods, this study lays the groundwork for further exploration of dynamic approaches in second language learning contexts.

Literature review

Vocabulary acquisition is a fundamental aspect of second language learning, particularly for EFL learners who face significant challenges in acquiring and retaining unfamiliar words in various contexts. Traditional methods of vocabulary instruction, such as isolated word lists and repetitive drills, often fail to promote meaningful comprehension and retention. This inadequacy impedes learners' ability to understand and produce the target language, highlighting the necessity for effective vocabulary acquisition strategies (Nation, 2001). Importance of vocabulary acquisition research has consistently underscored the role vocabulary plays in second language acquisition (SLA), with studies suggesting that incidental vocabulary learning through reading can be particularly effective (Hulstijn, 2001; Sadegh & Ahmadi, 2012).

Since vocabulary acquisition is fundamental in language learning, numerous approaches have been investigated to enhance this process. Unfamiliar words can significantly impede reading comprehension, as learners often struggle to infer their meanings accurately. One solution to this problem is providing different types of glosses (Webb & Nation, 2008). Glossing offers brief explanations of unfamiliar words, which can appear in the learners' first

language (L1) or second language (L2) (Bowles, 2004; Nation, 2001), and can include various techniques such as translations, synonyms, antonyms, example sentences, or combinations thereof (Lee et al., 2017).

The effectiveness of glossing has been documented in numerous studies (e.g., Ebadi & Bashiri, 2021; Herazo et al., 2019; Hulstijn et al., 1996; Kim et al., 2024; Kongtawee & Sappapan, 2018; Lee & Lee, 2024; Liao, 2018; Mahdi et al., 2024; Ouyang et al., 2020; Qin & Van Compernelle, 2021; Taylor, 2021). For instance, Jung et al. (2022) focused on the efficacy of different forms of glossing on reading comprehension and vocabulary learning. The results revealed that glossing promoted reading comprehension significantly. Rassaei and Folse (2024) focused on the effects of word-level and sentence-level glosses on vocabulary learning and the results revealed that both glosses positively impact vocabulary acquisition. However, sentence-level glosses were significantly superior and more effective than word-level glosses. Erturk (2016) examined the effect of glossing on EFL learners' incidental vocabulary learning of low-proficiency English learners. In this study, three versions of a reading text were used: no-glossed, L1-glossed, and L2-glossed. The results of this study indicated that the L1 gloss group significantly outperformed the other groups. Furthermore, the results of the questionnaire indicated that the participants preferred glosses in reading passages and they preferred L1 glosses. A study conducted by Phadungsilp and Supasiraprapa (2023) focused on the efficacy of task-induced involvement load and the language used in providing vocabulary glosses on incidental vocabulary learning in low proficiency EFL learners. The results of this study revealed that providing learners with L1 or L2 glossing can be beneficial and can effectively assist lower proficiency learners in vocabulary acquisition and reading comprehension. Another study which was done by Hung and Hoang (2023) focused on the efficacy of first and second language glosses on learners' reading comprehension and vocabulary retention. The results revealed that both L1 and L2 glosses were useful and that the glosses should be in accordance with the learner's levels.

Advances in multimedia technologies, computers, and mobile phones lead to development of learning environments for language acquisition. These technologies facilitate the creation of a more interactive learning environment (Beach et al., 2011). Unlike traditional glosses which relied on printed materials, Mobile-mediated Language Learning (MALL) and Computer-assisted Language Learning (CALL) glosses are not limited to printed textual information and enable dynamic engagement with glosses. So, researchers have become interested in investigating the effects of different forms of computerized or mobile-mediated glosses (e.g., Koleini et al., 2024; Yang & Sang, 2024). Empirical research consistently supports the efficacy of different forms of glossing enhancing vocabulary learning (Davis et al., 1997; Durongbhandu & Suwanasilp, 2021; Jung et al., 2022). Studies have shown that incorporating CALL and MALL in the research is more effective for vocabulary learning than traditional paper-based methods due to the opportunities these technologies provide for interactive and context-rich learning. CALL platforms harness the power of online tools to facilitate collaborative learning experiences, allowing



learners to engage actively with vocabulary in meaningful contexts. Through features such as multimedia presentations, collaborative glossaries, and online discussions, learners can explore and internalize new words dynamically, enhancing retention and comprehension. Similarly, MALL takes advantage of the increasing ubiquity of mobile devices to create on-the-go learning opportunities, enabling learners to access vocabulary resources, engage with contextual exercises, and communicate with peers at their convenience. This flexibility not only encourages frequent and spontaneous practice but also reinforces learning through immediate feedback and context-driven engagement. By utilizing MALL, our approach to dynamic glossing becomes more adaptable and responsive to learners' needs, fostering a richer and more engaging vocabulary acquisition process that aligns with contemporary educational practices. For instance, Taylor (2021) focused on CALL glossing and found that learners exposed to CALL glosses comprehend L2 passages more effectively than the non-CALL gloss group. Similarly, Plonsky and Ziegler (2016) found that CALL multimodal glosses were more effective than traditional paper-based glosses. Katemba (2021) focused on the efficacy of using mobile phones on enhancing vocabulary performance and reported that the experimental group outperformed the control group. Wang et al. (2023) focused on the efficacy of CALL glossing on EFL learners' idiom learning and the results indicated that all glossing modes employed in the study promoted idiom acquisition. A study done by Shahipanah et al. (2024) focused on the efficacy of multimedia glossing on incidental vocabulary learning on mobile devices and the results indicated that participants who had access to L1 textual and pictorial glosses had significantly higher vocabulary gains than other conditions. Ebadi et al. (2018) adopted a computerized dynamic approach of vocabulary learning through a software. Results showed that vocabulary gains in the dynamic group were significantly higher than those in the control group. The findings suggest that a dynamic approach could enhance vocabulary gains from lexical inferencing.

It is apparent that traditional glossing methods often provide static definitions that fail to engage learners actively in their vocabulary acquisition, which is where dynamic glossing techniques come into play. Rassaei (2020) defines dynamic glossing as a technique that enhances L2 vocabulary learning through interactive engagement and graduated assistance. This approach improves comprehension and retention by presenting definitions contextually rather than as static entries. The concept is grounded in Vygotsky's Zone of Proximal Development, emphasizing the need for scaffolding in learners' developmental processes (Vygotsky, 1978b).

Grabe and Stoller (2019) argued that skilled readers are able to derive the meanings of unfamiliar words and engage in reading comprehension activities. In contrast, novice readers may struggle to understand the meaning of unknown words while reading. Therefore, utilizing dynamic types of glossing, which maximize learners' processing of glossed items can be more effective. Recent research has also explored the potential of dynamic glossing techniques as more engaging and effective approaches to support vocabulary development in second language learning.

Dynamic glossing supports students' learning by providing a series of hints and prompts, which are presented by an instructor or a mediator. Unlike traditional glossing, where learners receive correct definitions at once, dynamic glossing offers graduated assistance. Dynamic glossing can also be linked to the Dual Code Theory by Paivio (1991) which mentions that information is processed and represented in mind through two distinct but interconnected systems: verbal and non-verbal. This theory suggests that individuals can enhance their comprehension and retention of information by utilizing both auditory/verbal and visual imagery strategies. By offering glosses that encompass both definitions and visual or verbal aids, instructors enable learners to form a richer mental representation of new words. This dual engagement not only aids in guessing meanings but also facilitates deeper understanding and better retention of vocabulary, thereby enhancing the overall learning experience. Another theory which can be related to dynamic glossing is Cognitive Load Theory by Sweller (1994). This theory emphasizes the importance of managing the cognitive resources required for learning, particularly in relation to working memory. This theory suggests that instructional methods should be designed to reduce extraneous cognitive load while optimizing essential and relevant loads to enhance learning efficiency. When applied to dynamic glossing, this theory highlights the effectiveness of providing contextualized support for vocabulary acquisition. Dynamic glossing minimizes the cognitive load associated with processing unfamiliar words by offering glosses that are readily accessible and immediately relevant to the text. Instead of overwhelming learners with excessive information, well-implemented glossing can be used to draw learners' attention on essential meanings which can lead to improved comprehension and retention without overloading their cognitive capabilities. Noticing Hypothesis which was proposed by Schmidt (1990) can also be linked to dynamic glossing. This theory asserts that if we want the learners to learn a language effectively, they must first notice them in the input. This means that learners need to become aware of the linguistic elements they encounter in their reading or listening activities. In a dynamic glossing session, we can obviously see how this approach actively draws learners' attention to unfamiliar vocabulary and grammatical structures within a text. It can be said that dynamic glossing not only aids comprehension but also fosters a greater awareness of language forms. As learners engage with glossed terms, they are more likely to notice these features, facilitating their understanding and subsequent internalization of the language.

Dynamic textual glossing presents vocabulary definitions in a way that can adapt based on learner interaction. Studies indicate that DTG significantly enhances vocabulary retention and comprehension compared to traditional glossing methods (Rassaei, 2020; Torang & Weisi, 2023). In contrast, Dynamic Auditory Glossing (DAG) provides spoken definitions, reinforcing pronunciation and context comprehension, which is particularly advantageous for learners who benefit from auditory input (Rassaei, 2023). Emerging technologies, notably MALL and CALL, further augment the effectiveness of dynamic glossing. These platforms create opportunities for radical interactivity and context-rich

learning environments, allowing learners to engage with vocabulary dynamically (Beach et al., 2011; Chun & Plass, 1996; Koleini et al., 2024; Taylor, 2021). Research has shown that these technologies can yield better vocabulary acquisition outcomes compared to traditional paper-based glosses (Durongbhandu & Suwanasilp, 2021; Lantolf & Poehner, 2011; Wang et al., 2023). While the body of research on dynamic glossing is growing, gaps remain regarding the comparative efficacy of dynamic textual versus auditory glossing, particularly among novice EFL learners. Most research has focused on the benefits of one form of dynamic glossing over traditional methods, thus far neglecting the nuanced interactions that might occur between different forms of dynamic glossing. Moreover, there is a lack of exploration into how these methods address the unique needs of low-proficiency learners who are significantly challenged by vocabulary acquisition. Existing literature suggests that novice learners could benefit tremendously from dynamic glossing techniques that present vocabulary in immediate, context-specific formats. However, few studies have specifically targeted how DAG stacks up against DTG in promoting vocabulary retention and understanding among novice EFL learners. This oversight creates an opportunity for the current investigation to fill these critical gaps.

Novice EFL learners were chosen to be involved in this study because they often face challenges in vocabulary acquisition and comprehension due to their limited language proficiency. This approach also addresses learners heightened cognitive load by offering immediate, context-specific definitions, thereby facilitating understanding and retention without overwhelming them with information.

Thus, little is known about the efficacy of DAG and whether this is more effective than DTG. This study seeks to fill critical gaps in the literature by comparing the efficacy of dynamic textual and auditory glossing on vocabulary acquisition among novice EFL learners. This approach aims to illuminate which glossing format may be more beneficial for vocabulary retention and comprehension and potentially inform pedagogical practices in second language instruction. Therefore, the following research questions were formulated:

- RQ1: Does mobile-mediated DTG have a significant impact on enhancing novice (elementary proficiency level) EFL learners' vocabulary learning?
- RQ2: Does mobile-mediated DAG have a significant impact on enhancing novice (elementary proficiency level) EFL learners' vocabulary learning?
- RQ3: Which type of dynamic glossing (textual/ auditory) is more effective in enhancing EFL learners' L2 vocabulary learning?

By investigating these questions, the research seeks not only to contribute to the existing body of knowledge on vocabulary acquisition but also to offer practical implications for EFL educators looking to implement dynamic glossing strategies effectively.

Participants

The study initially included 85 learners enrolled at a language institute. All participants completed a DIALANG test (<http://dialangweb.lancaster.ac.uk/>), to ensure homogeneity and confirm their proficiency at the A2 level (elementary proficiency defined by the Common European Framework of Reference for Languages, CEFR). Out of the initial sample, 75 female learners (aged 18–22) met the criteria and were included in the final sample. Their educational backgrounds varied, including mainly high school students and undergraduates from various fields. All learners identified as novice EFL learners, with less than one year of English study and limited exposure to the language outside formal instruction. Informed consent was obtained from all participants prior to the study, ensuring confidentiality and anonymity throughout the research process.

Design

This study employed a quasi-experimental design utilizing a pretest, two posttests, and two delayed posttests. Participants were divided into three groups through simple randomization: no gloss, DTG, and DAG. Each group consisted of 25 participants. A vocabulary pretest was administered prior to the intervention sessions to identify unfamiliar target words. Subsequently, participants engaged in ten treatment sessions which was part of their extracurricular activity for ten days. Two immediate posttests were administered, followed by two delayed posttests after two weeks to assess vocabulary retention. The validity of the tests was established through expert reviews and piloting, with Cronbach's alpha indicating good reliability (pretest: 0.97; posttest: 0.86).

Treatment materials

All participants received identical teaching materials, including ten reading passages from the A2-level book "Select Reading" (Lee, 2012), each containing two to five unfamiliar words. Each text was scheduled to be instructed during a single session, and this process lasted for ten days. These materials were distributed to the participants over the same time period through the WhatsApp application, enabling immediate access and interaction.

Procedure

Participants were selected using the DIALANG test to confirm A2 proficiency. Next, a vocabulary pretest was given to establish target words for the study. Following that, participants were randomly divided into three groups: dynamic textual group, dynamic auditory group, and no gloss group. Each group received a reading passage daily via WhatsApp application for ten days.

The DTG group received textual gloss prompts through messages. The DAG

group received auditory prompts through voice messages following the same structure as the DTG group. The control group was instructed through the conventional method, which involved individually reading the passages and sending the meanings of the highlighted words to the instructor. Finally, all the groups participated in two immediate and two delayed posttests in order to measure their vocabulary achievement following the different instructional techniques. The detailed procedure of the treatment sessions in each group is elaborated in the following sections.

Dynamic textual and auditory gloss groups

Each day, participants of the dynamic gloss groups received a reading passage from the instructor via the WhatsApp application. Learners were instructed in advance to read the passages and send the definitions of the highlighted words back to the instructor. If they were unsure of the definitions, they were asked to send the highlighted words to the instructor for clarification. At this stage, the process of mediation began and the learners received the first prompt to aid their understanding. The only difference between the DTG and DAG group was regarding the form of mediations that they had received. In the DTG group, the learners received the mediations through text messages while the DAG group received the same mediations through voice messages. If a participant could not provide a correct definition, they received mediational prompts up to four times. After the fourth prompt, if the learner was still unable to send the correct definition, the instructor provided the correct definition to the learner. To reduce the chance of random guessing, learners were not presented with options to choose from.

Control group

Each day, participants in the control group received the same reading texts as those in the other groups. They had to read the same texts but did not have the opportunity to receive any glossing supports. They were encouraged to make interpretations independently without assistance from the instructor.

All interactions took place within the same time frame. Participants were encouraged to engage actively with the material and were reminded to review the texts and their responses regularly.

List of mediational prompts

The mediational prompts employed in both glossing groups aimed to stimulate critical thinking and promote deeper understanding of vocabulary. The prompts in the textual groups were sent through text messages while they were sent through voice messages to the auditory groups. The structure for the prompts was as follows:

1. First Prompt: When a participant submitted a highlighted word without

providing its definition, the instructor responded with a prompt that encouraged the learner to think critically about the term and read that sentence one more time.

2. Second Prompt: If the learner responded again without a correct definition, the instructor provided a more specific hint.

3. Third Prompt: If the learner still struggled, the instructor would guide them further by asking a leading question that provides clues for the meaning of the word.

4. Fourth Prompt: If the definition remained elusive, the instructor would use the target word in a more transparent context.

5. Final Definition: After four unsuccessful prompts, the instructor then provided the accurate definition of the highlighted word.

Instruments

The following instruments were utilized for conducting this study:

1. DIALANG Placement test. To ensure the participants were homogeneous and to meet the requirements of the study, the DIALANG test was employed. This online assessment test consists of multiple-choice questions and is designed to provide immediate feedback on learners' language abilities. The test results helped to ensure that participants were appropriately matched based on their proficiency levels.

Participants were administered the DIALANG placement vocabulary test at the beginning of the study and before the treatment sessions to ensure their homogeneity and to validate their A2 proficiency.

2. Vocabulary Pretest. A vocabulary test consisting of 80 items was administered as the pretest in this study. Participants were required to write the definitions of the words in either Persian or English. Ultimately, 27 words that were unfamiliar to the learners were selected as target vocabulary items. The items were piloted with a separate group of learners to establish their validity and reliability (Cronbach's $\alpha = 0.97$). The items were also reviewed by language experts to ensure construct validity.

3. Vocabulary Posttests. Two kinds of tests were administered in each posttest: the first one was designed for measuring the participants' productive knowledge and second one was for assessing their receptive knowledge. These tests were also piloted with a separate group of learners to ensure their validity and reliability. The items which were included in the test were carefully selected to align with the participants' level (A2). Reliability was measured by using

Cronbach's alpha, which achieved a good reliability of 0.86. In order to ensure construct validity, the tests were reviewed by language experts.

One day after the completion of treatment sessions, participants were given both tests as immediate posttests. Two weeks after that, two delayed posttests were administered to evaluate whether any improvements occurred following the treatments.

In the immediate and delayed posttests designed for measuring learners' productive knowledge, participants received two reading passages with blank sections. All the target words were extracted from these passages, and the Persian equivalents of those words were provided in parentheses. Additionally, cues including the number of letters in each word and the first letter were included. Participants were required to write the English equivalents of the target words in parentheses. In the other posttests, participants were provided with a list of vocabulary words. They were asked to write the definitions of those words in either their first language (L1) or second language (L2).

4. WhatsApp Application. The WhatsApp application was used for sending passages to the learners and sending the required instructions, hints, and prompts. This application was used because of its accessibility and convenience for the learners which enables them to engage with the materials anytime and anywhere. It also allows for quick feedback, and interaction between the learners and instructions.

Data collection

To evaluate the effectiveness of different dynamic glossing conditions, a pretest and four posttests were administered. The vocabulary pretest was designed to find the words which were unfamiliar to the learners. After treatment sessions, two immediate and two delayed posttests were administered to measure the participants' vocabulary achievement. All the scores were calculated and then analyzed to determine the effectiveness of dynamic textual and auditory glossing interventions and to assess possible vocabulary acquisition among the groups.

By using the DIALANG placement test, along with the vocabulary pretest and posttest, we were able to gain a comprehensive understanding of the impact that dynamic textual and auditory glossing had on L2 vocabulary learning. This systematic approach could enhance the reliability and validity of the results obtained from this study.

Data analysis

Data were analyzed using appropriate statistical techniques, including one-way ANOVAs to compare the vocabulary learning outcomes and examine the differences among the three groups. After that, a Tukey's post-hoc analysis was run to explore significant differences between individual groups and to find the exact place of differences among the three groups. This method allowed us to have

an insightful examination of the effectiveness of dynamic textual and auditory glossing on L2 vocabulary learning, and provides a basis for understanding the role of these two dynamic glossing methods in language acquisition.

Results

This study aimed to examine the impact of two glossing conditions i.e. DTG and DAG on L2 vocabulary learning among novice EFL learners. To assess significant differences in participants’ achievement across the groups, one-way ANOVAs were run followed by Tukey’s post-hoc analysis to pinpoint specific differences between the groups.

Table 1 presents the descriptive statistics of immediate and delayed post-tests regarding receptive and productive vocabulary tasks. According to these tables, the mean scores indicate that the DTG group achieved the highest mean scores, followed closely by the DAG group, while the control group had notably lower scores.

Table 1. Descriptive statistics for receptive and productive vocabulary tasks

	n	Posttest mean		Delayed posttest mean	
		Receptive vocabulary	Vocabulary production	Receptive vocabulary	Vocabulary production
Control	25	7.24	6.80	5.24	5.28
Textual	25	20.08	19.52	16.60	17.04
Audio	25	18.44	18.28	16.56	16.80

As the table demonstrates, there are observed differences among the groups which were further analyzed through one-way ANOVAs.

One-way ANOVA results

The results of the one-way ANOVA indicated significant differences among the groups for both receptive and productive vocabulary tasks in both immediate and delayed posttests. For the immediate receptive vocabulary task, the ANOVA revealed a significant difference, $F(2,72) = 130.30, p < .001$, with the large effect size (eta squared = 0.79). The delayed receptive vocabulary task also showed a significant difference among the groups, $F(2,72) = 136.63, p < .001$, with a large effect size (eta squared = 0.75). Table 2 presents the results of one-way ANOVAs regarding immediate and delayed posttest of the receptive vocabulary task.

Table 2. One-way ANOVA regarding receptive vocabulary task on posttest and delayed posttest

	Sum of squares		Df	Mean square		F	Sig	
	Posttest	Delayed posttest		Posttest	Delayed posttest		Posttest	Delayed posttest
Between Groups	2441.62	2143.28	2	1220.81	1071.64	130.30	0.000	0.000
Within Groups	674.56	564.72	72	9.36	7.84			
Total	3116.18	2708.00	74					

Similarly, one-way ANOVA results of the immediate productive vocabulary task indicated a significant difference, $F(2, 72) = 157.74, p < .001$ with eta squared = 0.81. For the delayed productive vocabulary task, the results confirmed significant differences among the groups, $F(2, 72) = 148.39, p < .001$, with eta squared = 0.80. Table 3 presents the results of the productive vocabulary task regarding immediate and delayed posttest.

Table 3. One-way ANOVA regarding productive vocabulary task on immediate and delayed posttest

	Sum of squares		Df	Mean square		F	Sig	
	Posttest	Delayed posttest		Posttest	Delayed posttest		Posttest	Delayed posttest
Between Groups	2459.38	2258.88	2	1229.69	1129.44	157.74	0.000	0.000
Within Groups	561.28	548.00	72	7.79	7.61			
Total	3020.66	2806.88	74					

These analyses confirm significant differences among the groups ($p < .001$) for all tasks. Consequently, Tukey's post-hoc comparisons were conducted to identify specific intergroup differences. The results, summarized in Table 4, illustrate that both the DTG and DAG groups significantly outperformed the control group across both vocabulary tasks.

Table 4. Post-hoc Tukey results

		Posttest		Delayed posttest	
		Receptive vocabulary	Vocabulary production	Receptive vocabulary	Vocabulary production
Control	Textual	0/00	0/00	0/00	0/00
	Audio	0/00	0/00	0/00	0/00
Textual	Control	0/00	0/00	0/00	0/00
	Audio	0.14	0.26	0.99	0.94
Audio	Control	0/00	0/00	0/00	0/00
	Textual	0.14	0.26	0.99	0.94

In conclusion, the results highlight the efficacy of both dynamic textual and auditory glossing as effective tools for improving L2 vocabulary acquisition. These findings indicate that educators can confidently implement either method to support learners’ vocabulary development. By systematically demonstrating these differences and their implications, the study contributes to the understanding of how dynamic glossing conditions can enhance vocabulary learning among EFL learners.

Discussion

The present study investigated the comparative effects of DTG and DAG on vocabulary acquisition among novice EFL learners. The findings reveal significant insights into the effectiveness of these glossing modalities for enhancing vocabulary retention and comprehension. This discussion synthesizes the results, contextualizes them within existing literature, and explores implications for language pedagogy, organized into three key subthemes: theoretical implications, instructional implications, and limitations.

Theoretical implications

The results indicate that both DTG and DAG significantly enhance vocabulary acquisition, as evidenced by participants in both glossing conditions outperforming those in the no-gloss control group. Importantly, the results show that neither method is superior; rather, each offers unique advantages that cater to diverse learning preferences. This aligns with previous research indicating the value of glossing techniques (Alcaraz-Marmol, 2021; Ko, 2012; Rassaei, 2020, 2023). The effectiveness of dynamic glossing can be understood through several established theories: Zone of Proximal Development (Vygotsky, 1978b), Input Hypothesis (Krashen, 1992), Cognitive Load Theory (Sweller, 1994), and Noticing Hypothesis (Schmidt, 1990).

The effectiveness of dynamic glossing can be linked to Vygotsky’s notion of the Zone of Proximal Development (ZPD). In dynamic glossing sessions, learners receive a series of mediational prompts that range from implicit to

explicit, which guide them toward successful vocabulary acquisition. This type of graduated assistance aligns with contemporary pedagogical strategies that emphasize interactive, learner-centered approaches. Furthermore, analysis of the delayed posttest results revealed that the dynamic glossing groups not only outperformed the control group but also demonstrated substantial retention of vocabulary knowledge over time. This reinforces the idea that dynamic glossing promotes not only immediate vocabulary acquisition but also midterm retention, highlighting its potential as a valuable instructional strategy in language learning environments. This emphasizes the dual benefits of immediate vocabulary acquisition and midterm retention, highlighting the potential of dynamic glossing as an instructional strategy in language learning environments. Therefore, both dynamic textual and auditory glossing have proven to be effective tools for vocabulary acquisition among novice EFL learners. Rather than viewing one approach as superior to the other, it is essential to recognize the complementary nature of these modalities. By understanding the unique contributions of each method, educators can create a more inclusive and effective learning environment that maximizes vocabulary acquisition and supports overall language development. Emphasizing a balanced approach that leverages both textual and auditory explainer glosses may ultimately enrich learners' experiences and outcomes in their language learning journeys.

Moreover, this dynamic glossing approach also resonates with Krashen's Input Hypothesis (1992), which posits that comprehensible input is crucial for language acquisition. Our findings indicate that learners who engaged with dynamic glossing demonstrated significantly improved comprehension and vocabulary retention compared to those who relied on static glosses. This enhancement suggests that when glossing features provide contextualized linguistic support, they help learners encounter language input that is slightly above their current proficiency level ($i+1$), thereby facilitating language development. Moreover, dynamic glossing supports Swain's Output Hypothesis (1985), which emphasizes the importance of language production in acquiring a new language. By encouraging learners to engage more deeply with the text through note-taking, summarizing, or producing questions related to glossed terms, dynamic glossing acts as a catalyst for reflective output that reinforces learning. This reciprocal interaction between glossed input and learner output can foster a more holistic learning environment within CALL frameworks. In addition to these theories, frameworks related to task-based language learning highlight the significance of engaging learners in authentic tasks. Dynamic glossing can be integrated into task-based activities within CALL environments, allowing learners to use glosses strategically as they navigate real-world texts. This practical application can enhance both their reading skills and their ability to understand the nuances of language use within specific contexts.

Dynamic glossing can be linked to other theories as well. Dual Coding Theory (Paivio, 1991) suggests that verbal and non-verbal information improves memory retention. Dynamic glossing uses this principle by adding textual or auditory glossing to the learning environment and helping learners process and remember new vocabulary and grammar more effectively. Cognitive Load

Theory (Sweller, 1994) also plays a crucial role, as it highlights the need to manage the cognitive demands placed on learners. Dynamic glossing helps to reduce cognitive overload by presenting information clearly and briefly, breaking complex language into manageable segments. Lastly, the Noticing Hypothesis (Schmidt, 1990) underscores the importance of learners being aware of specific linguistic features in their input. Through dynamic glossing, attention is drawn to vocabulary and even grammar, which can enhance understanding and retention.

These frameworks underscore the efficacy of both glossing modalities and emphasize the role of scaffolding in vocabulary acquisition.

Instructional implications

The implications for EFL instructional methodologies are substantial. The study advocates for integrating dynamic glossing techniques into vocabulary instruction, particularly in mobile-assisted learning environments. Employing a multimodal approach that includes both textual and auditory elements can cater to diverse learning styles, thereby increasing engagement and motivation. Integrating glossing into vocabulary instruction can create more interactive learning experiences. Educators should employ a multimodal approach that incorporates both textual and auditory elements, enhancing engagement and accommodating varied learning styles. Such integration aligns with dual coding theory (Paivio, 1991), positing that multiple forms of input can optimize learning outcomes. Additionally, by allowing learners to engage actively with the material through note-taking, summarizing, or producing questions related to glossed terms, dynamic glossing promotes reflective output that reinforces learning. This mutual interaction enhances comprehension and facilitates long-term retention of vocabulary. Professional development programs could assist educators in implementing dynamic glossing strategies effectively, thereby enhancing instructional effectiveness and student outcomes. Importantly, these techniques should be incorporated within a broader curriculum that includes interactive activities and task-based approaches, maximizing pedagogical benefits while accommodating varying learner preferences.

While previous studies emphasize that L2 vocabulary learning through reading often demands additional instructional support (Maynard et al., 2010; Scott et al., 2012; Sonbul & Schmitt, 2010), our study reinforces the assertion that dedicating time to clarifying word meanings through dynamic glossing not only enhances reading comprehension but also facilitates vocabulary retention. Importantly, our examination of the equivalency between DTG and DAG raises critical considerations: while both methods provide effective scaffolding for vocabulary learning, the lack of significant differences between DTG and DAG indicates that educators can choose either method based on learners' preferences and available resources. This flexibility in instructional strategy allows for a tailored approach that addresses the specific needs of novice learners. Additionally, integrating dynamism into glossing aligns with contemporary

pedagogical strategies that prioritize interactive, learner-centered approaches, reinforcing that vocabulary acquisition is contextual and collaborative.



Limitations and future research directions

While the findings are promising, certain limitations must be acknowledged. The relatively small sample size of novice learners from a single context may limit the generalizability of the results. Future research should aim to include larger and more diverse samples across various educational settings and cultural backgrounds to validate these findings. Furthermore, while this study primarily assessed immediate and delayed vocabulary retention, it is crucial for subsequent research to investigate the effects of dynamic glossing on other language skills, such as speaking and writing proficiency. Exploring the interplay between dynamic glossing and learner autonomy could provide additional insights into how these techniques enhance vocabulary acquisition in broader contexts.

Concluding remarks

This study underscores the potential of DTG and DAG as effective pedagogical tools for vocabulary acquisition among novice EFL learners. By recognizing their complementary nature, educators can create more engaging learning experiences that foster language development. This research sets a foundation for further investigation into dynamic methods in diverse educational contexts, emphasizing the need for innovative approaches in language instruction.

Conclusion

This study investigated the effectiveness of dynamic textual and auditory glossing as strategies for enhancing vocabulary acquisition among novice EFL learners. The findings demonstrate that both glossing techniques significantly improve vocabulary retention and comprehension, highlighting their effectiveness compared to traditional methods. Notably, this research represents one of the first comparative analyses of DTG and DAG within the context of novice EFL learners in Iran, marking a significant contribution to the field.

The pedagogical implications of this study suggest that educators can effectively integrate these dynamic glossing techniques into their instructional designs, fostering more engaging and interactive learning environments. By leveraging technology-enhanced instructional strategies, EFL educators can provide immediate feedback and support that enhances vocabulary acquisition and comprehension. This approach is particularly beneficial in under-resourced EFL settings, where traditional methods may fall short.

The theoretical implications extend to the literature on SLA, indicating that dynamic glossing can create richer educational experiences tailored to the needs of novice learners. Such integration supports a more interactive learning

atmosphere that encourages engagement, thereby addressing gaps in vocabulary comprehension and retention.

The findings should be viewed in the light of some limitations, including exploring the efficacy of dynamic glossing across other language competences, adapting glossing techniques utilizing artificial intelligence, and conducting qualitative studies that investigate learners' perceptions and experiences with various glossing strategies. Longitudinal studies could further clarify the long-term effects of dynamic glossing on vocabulary acquisition and overall language proficiency.

In conclusion, this research underscores the transformative potential of dynamic glossing as an innovative instructional strategy for vocabulary acquisition in EFL contexts. By embracing these techniques, educators can significantly enhance language learning outcomes, contributing to more effective and engaging language education practices. The study advocates for a broader recognition of dynamic glossing's role in digital pedagogy and its significance in modern second language acquisition frameworks.

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