

The Comparative Effects of Digitally vs. Print Enhanced Modalities on the Incidental Acquisition of English Prepositions through Extensive Reading

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ABSTRACT

The acquisition of prepositions has been notoriously challenging for those who are learning English as a foreign language (EFL). Meanwhile, it has been suggested that applying extensive reading can be a beneficial approach since such instructional strategy draws learners' attention to the target forms through incidental learning. The current study attempted to investigate the comparative effects of different extensive reading enhancement modalities on the incidental acquisition of simple prepositions. Sixty-six Iranian adolescent EFL students divided into three groups of digitally-enhanced extensive reading, print-enhanced extensive reading, and control were recruited. Over a nine-week period, the experimental groups participated in an engineered extensive reading program during the last thirty minutes of their classes (two sessions per week). They completed two graded readers from the Oxford Bookworms series and during each session, orally summarized four pages to encourage meaningful use of the target prepositions, thereby consolidating their contextualized exposure during reading. The control group received no such intervention. An immediate and a delayed post-test were administered following the intervention, revealing that the print-enhanced group outperformed the control group on both the immediate and delayed post-tests. However, the differences between the digitally enhanced group and the other two groups did not turn out significant. The experiment showed that the physical medium of extensive reading can be a considerable variable for the incidental acquisition of prepositions as low-salience grammatical features, with findings indicating the superiority of print materials enhanced by strategic typography.

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Introduction

There is no denying that the acquisition of English prepositions is a notoriously problematic aspect of English language grammar for non-native speakers, particularly for those whose first language (L1) employs a different prepositional system. In other words, it is claimed that while prepositions have been acknowledged as crucial components that contribute to overall linguistic proficiency and are often a source of persistent errors among second language (L2) learners, their usage has remained surprisingly complex even long after other elements of English language have been mastered (Gass & Selinker, 2008; James, 1998). In respect of the difficulty of acquiring English prepositions, the complexity of their usage can convey different meanings depending on the context, making them difficult to master (Sinclair, 1991). Given this unpredictable nature, understanding how learners can effectively acquire them becomes imperative for pedagogical practices. In recent years, extensive reading (ER) has gained considerable traction in the field of English Language Teaching (ELT), recognized for its potential to enhance vocabulary acquisition, comprehension, and grammatical accuracy (Bamford & Day, 2004; Pigada & Smith, 2006). This approach emphasizes reading for pleasure, allowing learners to encounter language in rich, contextual environments that promote incidental learning (Schmidt, 1994). Recent studies have further underscored the significance of input mode and textual enhancement in language acquisition (Baleghizadeh & Mohajer, 2025; Jung et al., 2025; Vu & Peters, 2023). While meta-analytic evidence suggests potential cognitive advantages for paper-based reading (Clinton, 2019), the role of digital enhancement in learning specific forms such as prepositions requires more empirical focus.

The emergence of digital technology has further transformed the landscape of ER, offering unique advantages for language acquisition, including immediate access to contextual support and interactive features that can engage learners in novel ways. Research comparing digitally-enhanced versus print-enhanced ER reveals distinct characteristics that can influence learning outcomes, particularly in relation to the incidental acquisition of grammatical structures such as prepositions (Song & Sardegna, 2014). While digital platforms may facilitate better engagement through multimedia tools, print materials have been shown to enhance memory retention and reduce distractions. The present study thus aimed to explore the comparative effects of digitally enhanced and print-enhanced ER on the incidental acquisition and retention of simple prepositions among Iranian elementary-level adolescent learners.

While previous research has highlighted the merits of ER, particularly in incidental learning contexts, the comparative benefits of various reading formats have not been thoroughly explored, especially regarding their efficacy in teaching complex grammatical structures such as prepositions (Bamford & Day, 2004; Pigada & Smith, 2006). Furthermore, recent empirical research has demonstrated that reading serves as a highly effective mode of input for incidental learning, often yielding results comparable to other audiovisual modes (Feng & Webb, 2019). A good deal of research has attempted to explore the role of ER on the acquisition of vocabulary and grammar among second language learners; however, few have investigated the effectiveness of enhancement techniques and strategies on the acquisition of simple prepositions. Specifically, there is a lack of empirical evidence that captures how enhancement across modalities may differently influence learners' mastery of prepositions (Song & Sardegna, 2014). The present study attempted to address this gap by systematically comparing the effects of digital enhancement and print enhancement strategies in ER as far as short- and long-term retention of simple prepositions are concerned.

The significance of this study lies in its potential to reshape instructional approaches in English language classrooms, particularly as the focus of grammar teaching shifts from a teacher-centered to a learner-centered perspective. Since English as a foreign language (EFL) learners often struggle with the accurate use of grammatical structures, implementing materials and techniques that naturally draw attention to these elements can be especially illuminating. Consequently, the results of this research could contribute to clarifying how different reading modalities facilitate incidental acquisition of prepositions, offering valuable insights for material developers and educators. By identifying the specific medium-based characteristics that enhance learning, teachers can make more informed decisions regarding the resources used in their curriculum. Furthermore, the findings may offer pedagogical illumination for lower-level adolescent learners who struggle to master the nuances of English prepositions in their speech and writing, ultimately empowering them to overcome common errors. From a broader perspective, this study contributes to the field of Instructed Second Language Acquisition (ISLA) by addressing the paucity of research on prepositional acquisition through diverse ER modalities. Based on the background outlined earlier, the following research questions will guide the current study:

(1) How do digitally enhanced versus print enhanced modalities in extensive reading affect the acquisition of simple prepositions by Iranian adolescent EFL learners?

(2) Do the above input enhancement modalities influence the long-term retention of simple prepositions across digitally versus print enhanced contexts?

Literature Review

Theoretical Framework: Extensive Reading

Extensive reading has long been established as a cornerstone of effective language pedagogy, particularly for fostering incidental language acquisition. Unlike intensive reading, which focuses on linguistic deconstruction, ER emphasizes exposure to large volumes of comprehensible input, a concept central to language acquisition theory. This pedagogical shift is rooted in the belief that language proficiency, including the mastery of complex structures like prepositions, can be enhanced through pleasurable and meaningful engagement with texts (Bamford & Day, 2004; Day, 2015; Krashen, 1982; Pigada & Smith, 2006).

Empirical evidence consistently supports the efficacy of ER. For instance, Xenia and Anjani (2022) demonstrated that even short-term exposure to an ER course—where students engaged in self-selected reading and vocabulary journaling—led to significant improvements in the incidental learning of prepositions such as "in," "on," and "at." Their findings underscore the importance of "noticing" and "producing" linguistic forms within a contextualized environment. Similarly, Song and Sardegna (2014) observed that an enhanced ER instruction group outperformed regular instruction groups in identifying and using prepositions. Their research highlighted that not only does ER consolidate vocabulary knowledge, but also develops a learner's "intuition" for grammatical collocations, a critical factor for mastering the unpredictable nature of English prepositions. In an Iranian context, Mahdavi Resketi and Bagheri (2014) explored the impact of ER on the acquisition of phrasal verbs among adult female Persian-speaking learners. Their results indicated that texts enriched with target forms, combined with post-reading activities like oral reports and summaries, significantly boosted incidental acquisition compared to traditional instruction.

Digital- vs. Print-based Extensive Reading

The transition from traditional print to digital reading environments has introduced new variables into the ER equation. As digital tools become ubiquitous, researchers have sought to compare how modality affects

comprehension and retention. Neijens and Voorveld (2018) examined the differences between tablet-based digital replicas and printed newspapers, finding that while reading styles remained similar, recall of news was slightly lower for digital users, particularly those with lower "digital innovativeness." This suggests that cognitive load and disorientation may play a role in digital reading. However, digital platforms also offer unique affordances. Baradaran and Hanifehzadeh (2013) demonstrated that electronic short stories, enriched with multimedia features such as audio and animations, could outdo traditional print in enhancing reading comprehension among Iranian EFL learners. These conflicting findings highlight the need for further research, especially regarding how these modalities influence the acquisition of specific grammatical elements that continue to complicate learners.

Beyond general comprehension outcomes, modality differences may be particularly relevant for low-salience grammatical forms such as prepositions. Prepositions are typically short, unstressed function words that carry limited lexical weight and are therefore less perceptually salient in running text. Research on screen reading suggests that digital environments may encourage faster reading patterns and reduced attention to fine-grained linguistic detail, a phenomenon often referred to as the "screen inferiority effect" (Delgado et al., 2018). Meta-analytic findings indicate that comprehension performance is frequently lower on screens than in print, especially when careful processing of textual details is required. Because prepositions rely heavily on subtle form–meaning mappings, they may be especially vulnerable to being overlooked in screen-based reading contexts. This theoretical intersection between modality and low-salience grammatical features provides a specific rationale for examining how digital and print ER may differentially impact prepositional acquisition.

Challenges in the Acquisition of Prepositions

Prepositions are arguably one of the most difficult grammatical categories for EFL learners due to their semantic complexity and the occurrence of L1 interference. Sudhakaran (2015) observed through a longitudinal study that even after months of exposure, learners struggle with the nuances of prepositions such as "of" and "with." The influence of the native language is a recurring theme in the literature. For Iraqi learners, Shakir and Yaseen (2015) identified that the Arabic preposition "fii" often leads to errors in internalizing English on the grounds that it maps onto multiple English equivalents. Mitib Altakhaine and Kamal Ibrahim (2019) found that while incidental learning through reading improved the recognition of prepositions,

it often fell short in enhancing production. This highlights a critical pedagogical challenge: how to move learners from passive recognition to active, accurate production. Other researchers, such as Ahmadpour Kasgari et al. (2018), have suggested that electronic metalinguistic feedback can be a valuable tool in this process, offering flexibility and immediate correction. In the Persian–English context, prepositional acquisition presents additional cross-linguistic challenges. Persian prepositional usage does not always map directly onto English equivalents, and certain spatial and abstract relations are encoded differently across the two languages (Mahmoodzadeh, 2012). As a result, learners may rely on L1-based transfer strategies when producing English prepositions, leading to systematic errors. Theoretical accounts of transfer, including the Interpretability Hypothesis (Tsimplici & Dimitrakopoulou, 2007), suggest that function words lacking transparent semantic equivalence across languages are particularly prone to persistent difficulty. Establishing this cross-linguistic dimension is essential for understanding why prepositions may remain resistant to incidental acquisition and why enhanced noticing may be necessary in instructional contexts.

Input Enhancement

The concept of *input enhancement*, introduced by Sharwood Smith (1993), provides a theoretical bridge between meaning-focused reading and form-focused instruction. By making specific linguistic forms more salient — through bolding, underlining, or color-coding— input enhancement aims to trigger deeper "noticing", which Schmidt (1990) identifies as a prerequisite for acquisition. Ellis (2022) and Nassaji (2016) argue that "Focus on Form" (FonF) should occur incidentally during tasks to ensure that learners do not lose sight of meaning while attending to grammar. Despite the wealth of theoretical insights, there remains a lack of consensus on how different reading modalities influence the practical application of these enhancement techniques. While much of the empirical research on textual enhancement has focused on vocabulary learning, the application of enhancement techniques to grammatical features—particularly low-salience function words such as prepositions—remains comparatively underexplored, particularly in relation to modality-based differences in ER contexts.

The Present Study

Despite the body of literature exploring ER and the acquisition of prepositions, several critical gaps remain that necessitate further empirical investigation. First and foremost, while previous studies have separately examined the merits of digital reading formats and traditional print materials, there is a notable paucity of research to provide a direct, systematic comparison of these two modalities within a single experimental framework, particularly regarding their efficacy in facilitating the incidental acquisition of certain structures. This is a significant gap in the contemporary digital age, where the choice of medium may fundamentally alter the cognitive processing of linguistic input. Furthermore, much of the existing research focuses primarily on immediate post-test gains, leaving the long-term retention of grammatical structures acquired through ER largely underexplored. The present study addresses this void by not only comparing digitally- and print-enhanced ER but also by assessing the durability of learning through delayed retention measures. Additionally, by focusing on Iranian elementary-level EFL learners, this research provides localized insights into how input enhancement techniques can be optimized across different media to overcome specific L1 interference challenges. By synthesizing these elements, the current study offers a more comprehensive understanding of the interplay between reading modality, pedagogical enhancement, and grammatical mastery.

Methodology

Participants

In total, the participants were 66 female EFL learners studying at the Iran Language Institute (ILI), a well-known English language school in Iran with multiple branches all across the country. The learners were between 11 and 14 years old and were selected from intact classes, as random assignment to experimental groups was not feasible. Based on their enrollment at ILI, they were divided into three groups: the digital-enhancement extensive reading group (DEER) ($n = 21$), the print-enhanced extensive reading group (PEER) ($n = 21$), and the control group ($n=24$). To clarify the institutional context, the so-called *Race* levels at ILI represent the initial stages of the young adult program. The *Race* levels correspond to the A2 level of the Common European Framework of Reference for Languages (CEFR), according to the ILI's standardized curriculum. To ensure linguistic homogeneity, the

participants were selected on the basis of their previous semester's final grades, confirming that all learners possessed a similar level of proficiency and had successfully met the requirements prior to the study. Due to institutional constraints at ILI, administering an additional placement test for research purposes was not permitted. However, all participants had previously sat standardized institutional placement procedures and were enrolled at the same so-called *Race* level. Their prior semester final grades were used as an additional indicator of proficiency comparability.

Instruments and Materials

Addressing the research questions, a number of instruments and materials were utilized, including a researcher-made test for assessing learners' knowledge of prepositions. These prepositions were established as fundamental, single-word linguistic units (e.g., "in," "on," "at") used to express spatial, temporal, or logical relationships within a sentence (Quirk et al., 1985). The graded readers for the ER activities were from *Oxford Bookworms* (the starter level). The required data for this study was collected through a series of tests, including a post-test and a two-week delayed post-test. Each test comprised 40 multiple-choice previously validated items whose format was adapted from the IRIS Database (<https://www.iris-database.org>). The items were specifically designed to assess the learners' knowledge of simple prepositions from the readings. The test was designed to measure three complementary dimensions of knowledge of simple prepositions: (a) controlled recognition of appropriate prepositions in sentence-level contexts (Part A), (b) contextual interpretation of meaning conveyed by prepositions within sentences (Part B), and (c) accurate structural selection of prepositional forms (Part C). Together, these sections provided a comprehensive assessment of both the form and meaning aspects of prepositional knowledge. The IRIS Database provides research-informed assessment models commonly used in applied linguistics research. To ensure construct alignment, all test items directly corresponded to the target simple prepositions highlighted during the intervention. The graded readers served solely as instructional materials and were not used as assessment instruments. The tests had an identical number of items and were the same in terms of content. The post-test was administered shortly after the intervention to measure immediate comprehension, while the delayed post-test was administered two weeks later to assess the learners' retention of knowledge. Each correct answer was awarded 1 point (See the Appendix).

The internal consistency reliability of the preposition test was assessed using Cronbach's alpha (*Cronbach's α*) coefficient. Although 66 participants took part in the study, the reliability analysis was conducted only on the 60 participants who provided complete response sets. The remaining six cases contained missing responses and were excluded solely from the reliability calculation. However, all 66 participants were retained in the primary statistical analyses, with missing responses treated appropriately under standard analysis of variance (ANOVA) procedures. The results indicated a *Cronbach's α* = .766 for the 40 items on the test, demonstrating an acceptable to good level of internal consistency. Each question on the test was scored as either correct (1) or incorrect (0). Unanswered questions were coded as missing values to ensure that the analysis of the data was based only on participants' actual responses and to avoid misrepresenting their performance. The stories used for the experimental groups were "*Red Roses*" by *Christine Lindop* and "*Drive into Danger*" by *Rosemary Border*. Principal vocabulary and prepositions in the stories were colored and bolded to facilitate incidental learning. The learners in the DEER group engaged with the stories displayed on a large television in their classroom, accompanied by an audio file that allowed learners to hear the narrative while viewing the corresponding text and illustrations. The learners in the PEER group used physical copies of the graded readers and listened to the audio file while following the printed text. The stories in both groups were identical. The control group, however, continued with the traditional ILI curriculum, which consisted of standard grammar drills and textbook-based activities, with no specific ER activities related to the intervention.

Procedure

The data collection was carried out over the course of one semester at the ILI which is a prominent state-affiliated academic institution and the oldest language teaching center in Iran, operating under the auspices of the Ministry of Education. To ensure consistency, the instructional sessions took place during the last 30 minutes of each class, divided into 15 to 20 minutes of reading-while-listening and five to ten minutes for oral summaries. The treatment phase began in the second session of the semester and continued for a total of 18 sessions over a nine-week period with classes held twice a week. The activities for both DEER and PEER groups involved reading four pages per session, completing one story within six sessions. After the initial reading of a story, a seventh session was dedicated to rereading the entire story from the first page to the last to ensure comprehensive understanding

and retention. The titles of graded readers used in both groups were "*Red Roses*" and "*Drive into Danger*" from the Oxford Bookworms series. The prepositions within the readings were highlighted, and challenging words were explained in the page margins.

DEER Group

In this group, the learners engaged with the stories displayed on a large television in their classroom, which was mounted on the front wall next to the whiteboard for clear visibility. The stories were accompanied by an audio file, allowing learners to hear the narrative while viewing the corresponding text. The teacher managed the audio playback, pausing the file to provide necessary explanations if learners encountered difficulties in comprehension. During the last five minutes of the twenty-minute session, students voluntarily gave a brief oral summary of the four pages they had just read. The summaries were intended to provide opportunities for learners to use the target prepositions naturally in meaningful communication. No explicit corrective feedback on grammatical accuracy was provided during these summaries. Furthermore, they did not have any written tasks.

PEER Group

The learners in this group used physical copies of the graded readers. To control for outside exposure, the teacher distributed the books at the beginning of the session and collected them immediately afterward. They listened to the audio file while following along with the printed text of the stories. The teacher also used the pause-and-explain technique in this group to maintain instructional parity. The stories used were identical to those used by the DEER group. Similar to the digital group, students gave a brief oral summary of the four pages they read during the last five minutes of each session to encourage meaningful use of the target prepositions. No explicit corrective feedback on grammatical accuracy was provided. No written tasks were included.

Control Group

The participants in the control group did not receive any ER instruction and continued with the standard ILI curriculum. During the last twenty minutes of each class, they only re-read and practiced short readings from the supplementary exercise book that each student had. This ensured that the

control group received the same amount of reading time, but strictly within their standard syllabus.

Immediate and Delayed Post-tests

Upon completion of the ERphase (after the 18th session), learners in all three groups were given an immediate post-test to measure their short-term recall of prepositions. Approximately two weeks after the post-test, a delayed post-test was given to evaluate their retention over time. During this two-week interval, no additional instruction or exposure to the target prepositions was provided.

Results

The primary objective of the current endeavor was to investigate the effects of two ER interventions, digital versus print-based, on the short- and long-term retention of simple prepositions among Iranian elementary EFL learners. To achieve this, the study compared the performance of these two experimental groups against a control group that received no intervention. The findings presented here are derived from the data collected through both an immediate and a delayed post-test administered to all participants following the intervention phase. The statistical procedures were performed with a standard significance level of $p < .05$ applied to all inferential tests.

An initial examination of the data involved assessing the normality of the distribution of scores for all three groups on both the immediate and delayed post-tests. This was done using the Kolmogorov-Smirnov and Shapiro-Wilk tests, as is standard practice for evaluating data normality. The results revealed non-significant values ($p > .05$) for all groups on both post-tests (see Table 1). This finding confirms that the score distributions were approximately normal, which is a fundamental assumption for the use of parametric statistical tests such as the one-way between-groups ANOVA.

Table 1.
Tests of Normality

Test	Kolmogorov-Smirnov (Sig.)	Shapiro-Wilk (Sig.)
Immediate post-test	.179	.408
Delayed post-test	.200	.952

In addition to normality, the assumption of homogeneity of variances was also assessed. A Levene's Test for Equality of Variances (Table 2) was administered to confirm this assumption for the one-way between-groups

ANOVA. For the immediate post-test, the Levene's test returned a non-significant result ($p = .127$), and similarly, for the delayed post-test, a non-significant outcome was produced ($p = .373$). These results indicate that the variances were not significantly different across the three groups, thus satisfying the homogeneity of variance assumption.

Table 2.

Homogeneity of Variances (Levene's Test)

Test	Levene's Statistic	Sig.
Immediate post-test	2.135	.127
Delayed post-test	1.001	.373

Immediate Post-test Analysis

An overview of the performance of all participants on the immediate post-test is provided through descriptive statistics. As shown in the descriptive data (Table 3), the PEER group ($N = 21$) achieved the highest mean score ($M = 22.33$, $SD = 4.33$), indicating a substantial level of gain. The digital-based group ($N = 21$) had a lower mean score ($M = 19.10$, $SD = 4.89$) while the control group ($N = 24$) exhibited the lowest performance ($M = 16.29$, $SD = 6.80$). These findings suggest that both intervention groups outperformed the control group by a significant margin.

Table 3.

Descriptive Statistics for the Immediate Post-test Scores

Group	N	Mean	SD	95% Confidence Interval
PEER	21	22.33	4.328	20.36 – 24.30
DEER	21	19.10	4.898	16.87 – 21.32
Control	24	16.29	6.798	13.42 – 19.16

To determine if the observed differences were statistically significant, a one-way ANOVA was performed (Table 4). The ANOVA results revealed a significant difference among the three groups, $F(2, 63) = 6.716$, $p = .002$, with a large effect size ($partial\ eta\ squared = .176$).

Table 4.

One-way between-groups ANOVA for Immediate Post-test Scores

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	408.823	2	204.412	6.716	.002
Within Groups	1917.435	63	30.435		
Total	2326.258	65			

To pinpoint specific inter-group differences, Tukey's HSD comparisons were conducted (see Table 5). The analysis revealed a significant difference between the print-based and control groups ($p = .001$). In contrast and importantly, the differences between the PEER and DEER groups ($p = .147$) and the DEER and control groups ($p = .213$) did not turn out to be significant.

Table 5.

Post Hoc Tukey's HSD Comparisons for Immediate Post-test Scores

(I) Group	(J) Group	Mean Difference	Sig.
PEER	DEER	3.23	.147
PEER	Control	6.04	.001
DEER	Control	2.81	.213

Delayed Post-test Analysis

To assess long-term retention, a delayed post-test was administered two weeks after the intervention. The PEER group once again secured the highest mean score ($M = 20.10$, $SD = 5.16$), while the DEER group's mean fell to $M = 16.43$ and the control group's mean to $M = 14.63$ (Table 6).

Table 6.

Descriptive Statistics for the Delayed Post-test Scores

Group	N	Mean	SD	95% Confidence Interval
PEER	21	20.10	5.157	17.74 – 22.44
DEER	21	16.43	5.095	14.10 – 18.75
Control	24	14.63	6.996	11.67 – 17.75

As illustrated by Table 7, a one-way ANOVA indicated a statistically significant difference among the three groups on the delayed post-test, $F(2, 63) = 4.967$, $p = .010$.

Table 7.

One-way between-groups ANOVA for Delayed Post-test Scores

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	343.180	2	171.590	4.967	.010
Within Groups	2176.577	63	34.549		
Total	2519.758	65			

Tukey's HSD comparisons (Table 8) revealed a statistically significant difference between the PEER group and the control group ($p = .008$). In contrast, the differences between PEER and DEER groups ($p = .115$) and between DEER and control groups ($p = .563$) were not significant.

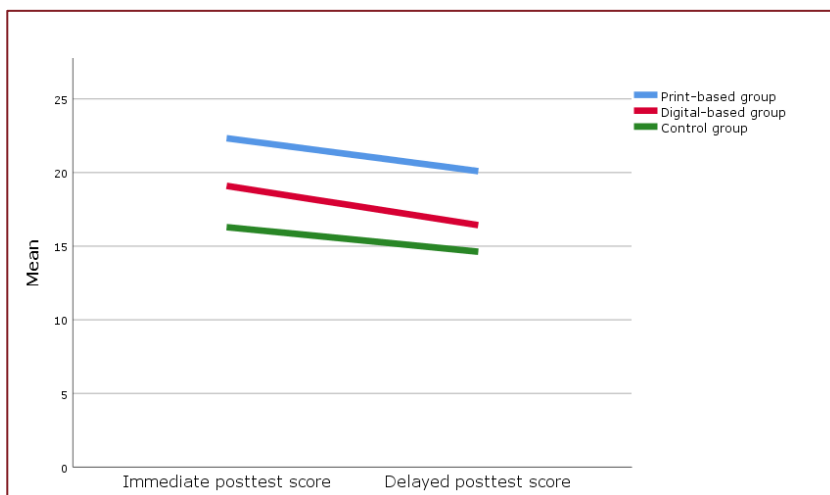
Table 8.*Post Hoc Tukey's HSD Comparisons for Delayed Post-test Scores*

(I) Group	(J) Group	Mean Difference	Sig.
PEER	DEER	3.67	.115
PEER	Control	5.47	.008
DEER	Control	1.80	.563

The overall findings confirm that the print-based group achieved the highest performance on both occasions. A downward trend is seen for all groups from immediate to delayed post-test, suggesting that all participants incurred retention loss during the two-week interval. However, the print-based group's reduction was comparatively negligible, suggesting higher retention whereas a deeper plunge is seen for digital and control groups (see [Figure 1](#)).

Figure 1.

Performances across the immediate and delayed post-tests



These outcomes reinforce the conclusion that print-based ER, combined with input enhancement, produced a measurable advantage on both immediate and delayed occasions, whereas the digital-based format did not demonstrate statistically significant gains over the control condition in neither cases.

Discussion

Regarding the first research question, the results indicated that the PEER group demonstrated a substantial improvement on both the immediate and delayed post-tests. This finding suggests that a print-based approach, even

with analogous input enhancement techniques, may be more effective for the acquisition of specific linguistic features than its digitally based counterpart. The disparity between the two groups' performances may be due to the nature of the grammatical feature and the medium of delivery. The results for the print-based group are consistent with findings from Neijens and Voorveld (2018), who observed better memory and recall for information read in print. This supports the hypothesis that the physical nature of a printed text may reduce cognitive load, allowing learners to focus more deeply on the enhanced forms.

Conversely, the DEER group's lack of significant improvement contrasts with the findings of Baradaran and Hanifehzadeh (2013), who found a positive effect for electronic books on reading comprehension. This discrepancy suggests that while digital formats may be beneficial for general reading comprehension, they may not be as effective for the specific, form-focused task of incidentally acquiring prepositions. Furthermore, the significant improvements in the PEER group, particularly the long-term retention on the delayed post-test, provide crucial support for the concept of Input Enhancement (Sharwood Smith, 1993).

The fact that the present study demonstrated this effect for prepositions, which are often considered less salient, is a valuable contribution. The results align with Xenia and Anjani (2022) and Mitib Altakhaineh and Kamal Ibrahim (2019), who also found ER to be an effective tool for the incidental acquisition of prepositions. That said, the current research suggests a relative advantage for the print modality under the present instructional conditions.

Research comparing the two modalities implies that print environments may facilitate deeper engagement and stronger comprehension outcomes than screen-based reading (Mangen et al., 2013; Singer & Alexander, 2017). The tactile and spatial stability of printed text may support more sustained attention to linguistic detail. Such differences in processing depth may have contributed to more effective consolidation of form-meaning mappings in the print-based condition. It is important to note that the two experimental conditions were designed with instructional parity. Both groups received identical audio support and identical typographical enhancement. The digital texts were displayed on a shared screen controlled by the teacher rather than navigated individually by learners. As a result, the typical multimedia and interactive affordances often associated with digital reading were intentionally downplayed. Therefore, the absence of a statistically significant advantage for the digital group may partly reflect this controlled design, in which the primary variable was medium presentation rather than technological interactivity. The physical act of turning pages and the static

nature of the text may have also contributed to better spatial memory for where information was located on a page, further aiding retention.

Prepositions are often small, unstressed words that do not carry significant semantic meaning on their own. This makes them difficult to notice and acquire incidentally. The fact that typographical enhancement in the print modality was successful highlights the importance of *Noticing* in Second Language Acquisition (SLA) (Schmidt, 1990). The results of the delayed post-test further substantiate the long-term efficacy of the print-based ER approach. Whereas the PEER group demonstrated a noticeable improvement on both the immediate and delayed post-tests, the DEER group showed no such gains. This suggests that a print-based approach, even when employing identical input enhancement techniques, can be more beneficial for the enduring retention of simple prepositions.

The post hoc test results lend support to the conclusion that the print-based condition outperforms the control on both testing occasions. An interesting aspect of the participants' performance was the difficulty encountered with prepositions that do not have a direct equivalent in their L1 (i.e. Persian). The participants transferred the rules of their L1 when using the rules of the L2 under the Interpretability Hypothesis, which proposes that Persian speakers may be expected to have difficulty when using certain English prepositions.

Conclusion

The present study sought to assess the short- and long-term effects of digitally-enhanced versus print-enhanced ER on the incidental acquisition and retention of simple prepositions. The results exhibited that the participants in the PEER group had a significant improvement on both post-tests. It is concluded that the print modality has both short and long-term effects on the incidental acquisition of simple prepositions. In contrast, the digital-based format did not demonstrate significant gain over the control condition. This study showed that the medium of reading may have a significant role in the incidental acquisition of non-salient, functionally complex, and late-acquired grammatical features. In addition, the role of L1 transfer and the Interpretability Hypothesis were obviously observed in the participants' performances.

The findings suggest that the physical medium of ER may influence the incidental acquisition of non-salient grammatical features under controlled instructional conditions. Language teachers and curriculum developers should be cautious about the assumption that digital materials can serve as a simple one-to-one replacement for traditional print-based resources. A

balanced approach that incorporates both print and digital resources is recommended, with a strategic preference for print when the objective is to draw learners' attention to specific, subtle linguistic forms. Moreover, the findings underscore the importance of input enhancement as a valuable technique for promoting noticing. Teachers can actively apply this principle in their classroom by strategically bolding, italicizing, or underlining key grammatical features. Finally, the observed difficulty with prepositions that lack a direct Persian equivalent highlight the need for targeted instruction. Teachers should be aware of these specific points of difficulty and may need to provide focused practice or corrective feedback to supplement incidental learning.

The study was limited by a small sample size ($n = 66$) and a focus on female Iranian learners at a single language institution. One notable methodological issue was the lack of a pretest due to administrative constraints. However, the compensatory element worth noting is that ILI holds strict oral and written placement tests for the applicants which helped establish homogeneity among participants of the current intervention. Furthermore, the intervention primarily addressed simple prepositions, and the two-week delayed post-test period may not have been sufficient to measure true long-term retention.

Future research should consider larger and more diverse populations, as well as a long-term retention period (e.g., six months). Researchers could also investigate the effects of these two modalities on the incidental acquisition of other non-salient features, such as verb tenses, articles, and other morphosyntactic forms. Finally, future research could explore other ways to enhance digital texts such as through interactive tasks or multimedia annotations in order to gauge their impact on noticing and deep processing. As an example, undertaking eye-tracking methodology can be especially illuminating in exploring these nuances further.

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APPENDIX (Preposition post-test consisting of 3 sections)**Part A**

In this section, there are 21 questions. Choose the correct preposition:

1. Anna is sitting _____ the balcony playing her guitar.
a) in b) on c) at d) under
2. Will hears a guitar _____ the apartment.
a) inside b) outside c) over d) between
3. Vicki arrives _____ her car to pick up Anna.
a) by b) with c) in d) of
4. Anna is thinking _____ the young man with the roses.
a) for b) of c) at d) on
5. Will goes _____ the corridor searching for Anna.
a) in b) along c) between d) out
6. Anna is thinking about the young man _____ the roses.
a) in front of b) next to c) with d) behind
7. Will is going _____ the elevator to find Anna.
a) down b) above c) on d) in
8. Vicki is waiting _____ the car for Anna to come outside.
a) under b) above c) in d) on
9. Will is sitting _____ the balcony with his grandmother.
a) at b) on c) in d) over
10. Kim is sitting _____ the truck waiting for Andy.
a) in b) on c) at d) under
11. Andy looks _____ the map to find their route.
a) in b) on c) at d) over
12. They drive _____ the motorway towards Dijon.
a) through b) at c) over d) across

13. Kim is thinking _____ the drugs in the skip.
a) for b) in c) at d) about
14. They arrive _____ the truck stop just before four.
a) at b) in c) on d) to
15. Andy jumps _____ the truck to follow the man.
a) out of b) in c) down d) up
16. Kim puts the gun _____ her bag.
a) at b) on c) in d) over
17. Will is waiting _____ the office for Kim to arrive.
a) in b) on c) at d) under
18. The police are arriving _____ the rubbish dump.
a) in b) at c) on d) to
19. Kim drives _____ the country road to avoid being followed.
a) along b) on c) over d) at
20. They find a quiet place _____ the rubbish dump.
a) at b) in c) on d) under
21. Andy throws the parcel _____ the skip.
a) in b) at c) to d) into

Part B

Choose the best idea for each question:

1. Sentence: Anna goes down in the elevator and steps outside.
Question: Which of the following options best helps us understand the meaning of this sentence?
 a) Anna is in her apartment.
 b) Anna is leaving her apartment.
 c) Anna is afraid of elevators.
 d) Anna is searching the apartment.

2. Sentence: Will thinks of the young woman with the guitar.
Question: Which of the following options best helps us understand the meaning of this sentence?
 a) Will forgets about the young woman.
 b) Will wants to play guitar.
 c) Will wants to know more about her.
 d) Will is thinking about his friend.

3. Sentence: Anna sits on the balcony, playing her guitar.
Question: Which of the following options best helps us understand the meaning of this sentence?
 a) Anna doesn't like her balcony.
 b) Anna is outside her apartment.
 c) Anna is relaxing.
 d) Anna is busy.

4. Sentence: Will arrives in his car at his grandmother's apartment.
Question: Which of the following options best helps us understand the meaning of this sentence?
 a) Will is late for his work.
 b) Will takes the bus.
 c) Will wants to visit someone.
 d) Will lives in the building.

5. Sentence: Will walks along the corridor, looking for Anna.
Question: Which of the following options best helps us understand the meaning of this sentence?
 a) Will is running after his Anna.
 b) Will is searching the apartment.

- c) Will is searching for Anna.
 - d) Will is meeting his friend.
-

6. Sentence: Kim drives away very fast.

Question: Which of the following options best helps us understand the meaning of this sentence?

- a) Kim is scared.
 - b) Kim likes to drive very fast.
 - c) Kim is following someone.
 - d) Kim is late.
-

7. Sentence: Andy throws the parcel of drugs into the skip.

Question: Which of the following options best helps us understand the meaning of this sentence?

- a) Andy wants to keep the drugs safe.
 - b) Andy is trying to hide the drugs.
 - c) Andy is throwing away trash.
 - d) Andy wants to show the drugs to Kim.
-

8. Sentence: Kim gets under the truck to check for oil leaks.

Question: Which of the following options best helps us understand the meaning of this sentence?

- a) Kim is trying to fix the truck.
 - b) Kim is hiding.
 - c) Kim is looking for some sandwiches.
 - d) Kim is scared of someone.
-

9. Sentence: The police arrive at the rubbish dump.

Question: Which of the following options best helps us understand the meaning of this sentence?

- a) The police are there to help Kim and Andy.
 - b) The police are looking for Kim.
 - c) The police are following a bad man.
 - d) The police are running away.
-

Part C

1. Which one is correct?

- a) Anna is thinking about the young man.
 - b) Anna is thinking in the young man.
 - c) Anna is thinking for the young man.
 - d) Anna is thinking on the young man.
-

2. Which one is correct?

- a) Will arrives at the apartment building.
 - b) Will arrives on the apartment building.
 - c) Will arrives for the apartment building.
 - d) Will arrives inside the apartment building.
-

3. Which one is correct?

- a) Anna goes up the elevator.
 - b) Anna goes down in the elevator.
 - c) Anna goes through the elevator.
 - d) Anna goes over the elevator.
-

4. Which one is correct?

- a) Will is sitting in the balcony.
 - b) Will is sitting at the balcony.
 - c) Will is sitting on the balcony.
 - d) Will is sitting by the balcony.
-

5. Which one is correct?

- a) Will walks through the corridor.
 - b) Will walks along the corridor.
 - c) Will walks in the corridor.
 - d) Will walks around the corridor.
-

6. Which one is correct?

- a) Kim is thinking about the drugs.
 - b) Kim is thinking in the drugs.
 - c) Kim is thinking for the drugs.
 - d) Kim is thinking on the drugs.
-

7. Which one is correct?

- a. Andy arrives at the truck stop.
- b. Andy arrives on the truck stop.

- c. Andy arrives for the truck stop.
 - d. Andy arrives inside the truck stop.
-

8. Which one is correct?

- a. Andy is sitting in the truck.
 - b. Andy is sitting at the truck.
 - c. Andy is sitting on the truck.
 - d. Andy is sitting by the truck.
-

9. Which one is correct?

- a. Kim goes up the truck.
 - b. Kim goes down in the truck.
 - c. Kim goes at the truck.
 - d. Kim goes to the truck.
-

10. Which one is correct?

- a) The man at the green shirt follows Andy.
- b) The man in the green shirt follows Andy.
- c) The man on the green shirt follows Andy.
- d) The man with the green shirt follows Andy.