

Original Article

A Study of Comparative Effects of Textual Enhancement Techniques on Iranian EFL Learners' Vocabulary Noticing

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Abstract

Research on second language acquisition generally suggests that input needs to be noticed before turning into the intake. Therefore, the current paper explored the comparative effects of textual enhancement on Iranian EFL learners' vocabulary noticing. Thirty students from an intact class of general English course participated in this study. During the semester, an extended paragraph from which 18 target words were perceptually enhanced using boldfacing and Emoji stickers or were left untouched was distributed to the participants using the smartphone Telegram application. After 45 minutes, they received a set of post-reading vocabulary questions through Telegram and were asked to type the answers and send them back to the examiner. The results of Repeated Measures ANOVA indicated that both textual enhancement techniques had a significantly positive effect on their vocabulary noticing. The paper discusses the findings and implications for both EFL teachers and language learning materials developers.

Keywords: Boldface, Emoji, Input Enhancement, Textual Enhancement, Vocabulary Noticing

1. Introduction

Vocabulary, as the basic building block of any language, tends to constitute a central part of the second language (L2) teaching, learning, and assessment (Nation, 2013; Schmitt, 2010). As an alternate to grammar-based approaches, proponents of the lexical approach in the 1980s and 1990s insisted that lexically-empowered L2 learners can successfully get their messages across in communicational settings even without having a good command of syntax or grammar (Lewis, 1993; Willis & Willis, 1989). The lexical approach essentially relies on the premise that it is the lexis that lies at the heart of any language, and thus it's learning. Lewis (1993) maintained that L2 production is the process of getting together ready-made chunks appropriate for interactive opportunities. L2 teachers and course designers also have long been questing for efficient and novel teaching methods to incorporate essential vocabulary in instructional materials. It also seems that L2 learners normally notice the vocabulary of the target language, and hence, "they are thus first driven to make form-meaning connections that are lexical in nature" (VanPatten & Williams, 2015, p. 115). Acknowledged significance of vocabulary instruction motivated content designers to develop language learning textbooks rich in lexis. This movement, further, in and of itself, led to the emergence of theories tapping into cognitive processes through which learners' attention can be directed towards features of the L2 words.

Towards the end of the twentieth century, Krashen (1977) put forth the Input Hypothesis which postulates that humans acquire languages by receiving comprehensible input; input that is neither too much higher ($i+2$), nor too much lower ($i-1$) than learners' current language proficiency. Worded another way, input is deemed comprehensible, he argues, so long as it is tailored slightly beyond the receiver's (L2 learner's) current command of language ($i+1$). However, McLaughlin (1987) criticizes Krashen's notion of comprehensible input and contends that L2 learners substantially fail to benefit from vast chunks of input they are exposed to. He emphatically argues the single most important factor contributing to acquisition is providing people with understandable messages or technically called comprehensible input. We acquire language when people understand the input they receive, what counts is what is said, not how it's said.

Schmidt (1990) reasoned that failure to understand input arises from learners' low sensitivity to the features of the input in question, or as he put it, their failure to notice salient features of the input they receive. He (1990), thus, posited *The Noticing Hypothesis*

(NH) accounting for the major role of the saliency of the input in learning languages. The underlying assumption behind Schmidt's (NH) is that an efficient way to enhance L2 learning is to stimulate and foster input processing for form and meaning within texts (Han et al., 2008). Gass (2003) contends that attention and noticing are decisive underpinnings that mediate between communication and acquisition; therefore, attention and learning cannot and should not be disassociated. Added to that is the argument that L2 learners are often exposed to an overwhelming load of input to be processed, or otherwise, it might go unnoticed. Being noticed as "the necessary and sufficient condition for the conversion of input into intake" (Schmidt, 1993, p. 209), arguably, rests on activation of some kind of attentional devices to sort this load through (VanPatten & Williams, 2015) and to enable learners to tune in a portion of the input they receive (Gass, 2003).

The foregoing assumptions and assertions provoked investigations (e.g., Doughty 1998; Izumi, 2002; Williams, 1999) and counterarguments over the years. Research generally recognizes noticing as a prerequisite for acquisition but it cannot guarantee it. For L2 learners to internalize the input to which they are exposed and ultimately acquire, they need to be able to initially perceive, later store, and ultimately apply the salient information (Han et al., 2008; Smith, 1991). This noticing of saliency in input entails, as implied above, an active engagement of the processors or L2 learners. When they are treated as passive recipients of the input they are exposed to, no learning might ensue. Learners ought to actively respond and attach value to any piece of information for actual learning to take place (Anwar & Sohail, 2014), and when interactional competence development is the aim, they should also be given chances to perceive, receive, respond, and question communicatively (Madadi & Rezvani, 2019).

In line with the tenets of NH, Smith (1991) later set forth The Input Enhancement (IE) hypothesis claiming to drive learners' attention towards saliency of visual and aural properties of input, which he hypothesized would lead to noticing and ultimately learning. It is cogently argued that to turn input into intake an important condition must be met (Schmidt, 1990, 2001), that is, L2 learners need to consciously notice a target item within a text before it is acquired. In an attempt to conceptualize the IE hypothesis into pedagogical practices, Smith (1993) further proposed some *Textual Enhancement* (TE) techniques. They are a set of typographical means making input more salient to learners, for example in reading, through underlining, boldfacing, italicizing, capitalizing, and color-coding. By

and large, TE has provoked a large body of research in L2 learning (e.g., Alanen, 1995; Balcom & Bouffard, 2015; Doughty, 1991; Izumi, 2002; Jourdenais, et al., 1995; Lee, 2007; Leow, 2001).

Today, technology has permeated every facet of modern human life and has opened up a new pathway for the widespread use of Computer Assisted Language Learning (CALL) and Mobile Assisted Language Learning (MALL). This has made a dramatic shift in the organization of traditional language teaching classrooms, which has provided L2 learners with an array of opportunities to exploit technologically integrated language materials. Moreover, language classes tend growingly to integrate more personal computers (PCs and Laptops) and digital assistants to help learners with their classroom activities. In parallel developments, L2 teachers have also accommodated smartphones in their teaching profession because of their portability and connectivity, practicality and interactivity in the social milieu, and sensitivity to the immediate context (Klopfer et al., 2002). These assets have led smartphones to receive analytical and theoretical support (Amendum et al., 2011; Eslami & Kung, 2016; Huang & Chuang, 2016; Katshemererwe & Nerbonne, 2015; Madden et al., 2005; Sackes et al., 2011; Taguchi & Sykes 2013; Theodotou, 2010).

The pervasive use of smartphone applications in social interactions and classroom settings, be it real or virtual, increasingly made available new means to get the attention of interactors and to communicate more with fewer tabs. Key among them are Emoji stickers which turned out to become an indispensable and integral part of internet-based interactive smartphone platforms such as Telegram and WhatsApp applications (Chairunnisa & Benedictus, 2017; Ghobadi & Taki, 2018). Emojis originally introduced as funny graphic signs can be used in communication and chats in such applications to make the intended messages more succinctly appealing (Feldman et al., 2019; Konard et al., 2020). They carry emotional and semantic implications such as happiness, sadness, thumps up and down, anger, etc. (Danesi, 2016).

Although the application of TE techniques in language classes and their integration with CALL and MALL technologies has recently begun to gain ground (Han et al., 2008), there is still a paucity of literature on the link between TE and vocabulary noticing with the aid of CALL and MALL technologies. Today, this paucity is profoundly noted as the COVID-19 pandemic has afflicted the entire world in general and education in particular,

making distance education the only viable option for teachers to hold virtual classes using smartphones and social platforms. That is, traditional face-to-face classroom learning has been converted into e-learning classes delivered through desktop computers and smartphones so that the continuity of instruction would not be disrupted (Alahmadi & Alraddadi, 2020).

2. Literature Review

There is a general accord among L2 researchers that input holds a key role in many learning states of affairs, with Krashen's audacious CI serving as a springboard for a vast amount of subsequent research and theoretical analyses (Mclaughlin, 1987). However, the theoretical positions of CI were questioned by several L2 researchers (e.g., Ellis, 1994; Larsen-Freeman & Long, 1991). Although all these researchers generally underscored the positive effect of CI on the process of L2 acquisition, they categorically rejected Krashen's argument that CI is all that L2 learners need to acquire the second language. Some scholars suggested that to facilitate input to effectively become intake and consequently learning, L2 learners need to activate some cognitive attentional resources (Robinson, 1995; Schmidt, 1990, 2001). Likewise, Robinson (1995) maintains that these activated resources would further enhance noticing.

2.1. Noticing and Input Enhancement Hypotheses

The concept of *noticing* gave rise to the emergence of NH, which is defined by Schmidt (1990a, 2001b) as the conscious awareness of features of the target language input; a mediating factor that assigns a reciprocal link between input and learning. One of the earliest empirical studies on NH was undertaken by Schmidt and his associate, Frota (1986), where Schmidt examined his acquisition of Portuguese during his short time reside in Brazil. He made a diary of the input he had noticed through instruction as well as his interactions with the native speakers. Later he compared the two sources of data gathering and found a positive correlation between them. Therefore, Schmidt maintains that there is a positive link between noticing and emergence in production (1990). Later, the NH evolved into another theoretical concept called Input Enhancement (IE). Smith (1991) hypothesized that IE would promote L2 learners' attention to salient features (e.g., word order, parts of words that express tense, agreement, idioms, and slang) of the input. He ascribed L2

learners' failure to benefit from input to their lack of noticing ability as well as poor visual characteristics of the input characterized as saliency and noticeability.

Several empirical studies have provided evidence regarding the positive effects of IE on L2 learning. Kian and Gorgian (2018) examined the effect of two types of attention-raising techniques (i.e., choice and underlining) on the Iranian L2 learners' intake of English connectors. They employed two experimental groups and a control group and the results demonstrated that the underlining and choice IE techniques had a significant effect on the intake of the targeted forms of connectors. In a study similar to the current one, Namaziandost et al. (2020) also explored the impact of IE techniques (i.e., semantic input enhancement, input flooding, and visual input enhancement) on 92 Iranian intermediate EFL learners' vocabulary acquisition. In doing so, they made use of three experimental groups and one control group. The experimental groups were exposed to reading passages containing academic words which were enhanced by either form of IE techniques while the control group was exposed to the reading passages whose academic words were not enhanced. The findings showed a significant gain for the experimental groups compared to the control group regarding academic words.

Although we cited some evidence that IE can positively affect L2 acquisition of certain grammatical features and vocabulary within reading passages yet there have been a few studies where IE suggested otherwise. For instance, Zarei et al (2016) investigated the effects of IE Techniques including, semantic input enhancement, input flooding, and visual input enhancement on female EFL learners' both comprehension and production of lexical collocations. After taking an Examination for the Certificate of Competency in English (ECCE) test the study subjects were assigned into three treatments and one control group. For ten sessions, each treatment group was exposed to reading texts whose lexical collocations were enriched by one of the IE techniques whereas the treatment group received the same passages which were not lexically enriched. The results revealed that the three input enhancement techniques did not produce significant effects on the participants' comprehension or production of lexical collocations.

To replicate Schmidt's (1990) findings, Altman (1990) also conducted a similar study, using data accumulated through her acquisition of Hebrew for five years. Nevertheless, her findings contradicted those of Schmidt's. She argued that although half her verbalization of Hebrew verbs could be accentuated by noticing, it would be almost

difficult to trace the source of the other half, reasoning that they might have turned into intake subconsciously.

Literature shows IE has been mainly limited to the acquisition of vocabulary and grammatical features within passages. However, to the best of our knowledge very few studies have explored the effects of aural IE on listening comprehension, among which we cite one. Cho and Reinders (2013) explored the effects of aural IE on L2 passive structures. The participants were provided with an audiobook to listen to outside of class in which a set of passive structures would be enhanced by turning up the volume slightly or slowing down the speed once the target structures were being readout. Additionally, a control group was tasked to listen to the audiobooks which were not structurally enhanced. The findings demonstrated no significant effect for the enhanced input on the acquisition of L2 passive structures.

The discrepancy in the research findings can be attributed in part to the significance of frequency as well as perceptual saliency in raising the likelihood of input to be noticed and subsequently processed for learning (Okyar & Carkir, 2019; Schmidt, 1990). Another issue that might well have affected the results is the complexity of the enhanced structure; L2 learners are likely to learn simple rules than difficult rules (Kim, 2003; Yip, 1995). That is, if the target rules chosen were of lesser difficulty, the results could be different. Therefore, we hypothesize that participants may have been unable to fully benefit from the enhanced input. Literature on IE generally pursued two broad lines of research. First, what effects IE might have on noticing and learning, which was previously dealt with in detail. And second, how the input could be enhanced. The second line of inspection paved the way for the emergence of another theoretical, as well as operational concept called TE.

2.2. Textual Enhancement

Building on IE, Smith (1993) further proposed some operational definitions, and coined TE techniques, maintaining that they are typographical manipulation of linguistic forms within passages (e.g., italicizing, boldfacing, underlining, etc.) that supposedly accentuate noticing and learning. Soon, the theoretical tenets of TE gained support from researchers in the field (Bishop, 2004; Ghaemi & Golshan, 2017; Jones & Waller, 2017; Kim, 2006; Sarkhosh et al., 2013). It is generally assumed that input, if perceptually made salient by TE techniques, will draw L2 learners' attention to the target features in the texts, and consequently facilitate intake (Simard, 2009).

Several empirical studies have attempted to address the impact of TE techniques on noticing and L2 acquisition. To see whether or not the enhanced items (colored and underlined) would be clicked on more often than unenhanced items and to explore if the enhanced items would positively affect learners' reading comprehension, Bishop (2004) assigned English L2 participants into two groups of experimental, provided with textually enhanced passages, and control, studying regular passages. For both groups, the target items were hyperlinked with glosses in a way that whenever a student clicked on a target word a sequence of words, their definitions would come up on the screen. He found that learners clicked on the target items more frequently than unenhanced items and that the experimental group significantly outperformed their counterparts in terms of text comprehension.

Focusing on idiomatic expressions, Pam and Karimi (2016) also explored the effect of the TE technique on Iranian students' incidental learning. In this pretest-posttest study, the participants were divided into a control and treatment group. Then the treatment group was exposed to idioms presented with four different TE formats, that is, italic, bolded, color-coded, and sticky papers while the control group dealt with common texts with no textually enhanced format, whatsoever. The results demonstrated that the treatment group significantly outperformed the control group, resulting in incidental gains by making use of TE.

In another study, Sarkhosh et al. (2013) examined differential effects of varied TE formats on Iranian L2 learners' intake of type conditional type II. They compared the performance of five different experimental and one control group. Each experimental was exposed to texts containing conditional sentences which were enhanced differently (choice, underline, bold, and italic), while the control group was exposed to entirely unenhanced texts. The results revealed that all experimental groups benefited from the TE techniques while no gain was reported for the control group.

Several scholars also attempted to address the comparative effects of TE techniques by involving various TE formats and several enhancing techniques (for example, TE plus elaboration or instruction). The findings were rather generally supportive of the positive effects of combined TE techniques. For example, Shook (1994), investigated the effects of TE on Spanish learners' intake of Spanish present/perfect and relative pronouns. Making use of two production tasks along with two recognition tasks, he concluded that the participants who were simultaneously exposed to combine formats of TE (capital letters

and bold), reinforced with explicit instruction outperformed their counterparts who were provided by textual enhancement only.

Alanen (1995) also explored the effects of enhanced text (italics) on the acquisition of Finnish structures by recruiting 36 L2 learners of Finnish. She enlisted her participants to initially read the texts to induce meaning and only then attend to the enhanced forms. Through think-aloud protocol and a sentence completion task, she learned that subjects who were exposed to explicit instruction coupled with TE outperformed those who were exposed to TE only. Likewise, Kim (2006) compared the effects of TE only, and TE coupled with lexical elaboration. The results pointed to the superiority of the TE combined with lexical elaboration compared with TE only as the participants gained a better target form recognition.

To investigate the comparative effects of, explicit instruction versus explicit instruction combined with textual and aural input enhancement on teaching lexical items (restaurant context) for Turkish L2 learners of English, Jones et al. (2017), conducted a study using contrast and an experimental group. The former group was exposed to explicit instruction only, while the latter had explicit instruction coupled with textual and aural input enhancement. The study reported significantly larger gains for the experimental group.

Although the literature tends to support the positive effects of TE on noticing and intake (i.e, Alanen, 1995; Jones et al., 2017; Kim, 2006; Shook, 1994), there have been a few studies that reported no (Leow, 1997; Leow et al., 2003) or even negative impacts (Leow, 2001; Overstreet, 1998) of TE on comprehension and learning. For example, Leow (1997) compared the effects of two TE formats namely underlined and bold letters on the intake and comprehension of L2 learners of Spanish. He administered a multiple-choice recognition task and a short-answer comprehension task. His findings revealed that none of the TE techniques in his study displayed any significant effects on intake or comprehension. Likewise, Lew et al. (2003) made use of think-aloud protocols to examine the effects of textual enhancement on noticing. They recruited seventy-two junior college students and had them read an enhanced or unenhanced text with either the present perfect or present subjunctive forms. Through an immediate recognition and comprehension task, their performances were analyzed and the results demonstrated no significant gains for the enhanced input compared to unenhanced input.

Overstreet (1998) also studied the connection between TE and content familiarity on the one hand and acquisition and comprehension in L2 on the other. He provided the adult participants with differing combinations of content familiarity and TE formats including boldfaced, capital letters, underlined, as well as different font types. He further divided the participants into four groups. The first one was provided with enhanced text with familiar content, the second one with unenhanced text with familiar content, the third one with enhanced text with unfamiliar content, and the fourth group with unenhanced text with unfamiliar content. He required them to take a comprehension task in Spanish and a production task along with a recognition task to measure their acquisition. The findings suggested that TE yielded no statistically significant effects on the participants' comprehension. In addition, content familiarity did not produce significant gains on acquisition. He also concluded that perceptually salient forms played a debilitating role by diverging learners' attention from comprehension and form processing.

Leow (2001) explored the effects of TE on learners' acquisition and comprehension of texts of Spanish imperatives. The participants were 38 L2 learners of Spanish. They were asked to perform a multiple-choice recognition task, a fill out the blanks as a production task. Moreover, they were required to think aloud. Leow's findings showed no positive causal relationship between TE and acquisition. Like Overstreet (1998) cited above, Leow concluded that input enhancement might act as a barrier, distracting learners' attention as they are attempting to engage with the textual material.

To the best of our knowledge, there has been relatively little research on the link between typical TE techniques (e.g., boldfaced, italic, etc.) and vocabulary learning through the means of technologically driven language programs such as CALL and MALL. In particular, research on comparative effects of TE techniques on noticing and learning has remained scant and silent. As far as MALL is concerned, there has been unprecedented prevalence and use of Emoji stickers in social platforms such as Telegram and WhatsApp. Emoji stickers are the most popular form of digital expression by far, with 2.3 trillion messages sent with Emojis only in 2016 (Emogi Research Team, 2016). This motivated us to study Emoji stickers as a new form of textually enhanced technique, and integrate it into our study as an independent variable and compare its effectiveness with that of traditional TE techniques, that is, Bold-faced. It is worth mentioning that this paper was undertaken in the wake of the COVID-19 outbreak across the world which affected learners worldwide.

“By the end of March 2020, over 180 countries closed down their schools, affecting 87.4% of learners” (David et al., 2020, p. 2). This led to a rapid proliferation of online education which gave rise to the use of smartphones among teachers and learners.

This paper describes a study, investigating the comparative effects of TE formats (boldface and Emoji) on L2 vocabulary noticing through the means of smartphones. More specifically, this study is guided by the following research questions:

1. Do TE (bold-face and emoji) and neutral formatting significantly affect vocabulary noticing of the EFL learners in the context of MALL?
2. If yes, which format makes the most statistically significant impact on EFL learners' vocabulary noticing in the context of MALL?

3. Methodology

3.1 The Pilot Study

Prior to embarking upon conducting the main study, a small-scale pilot study was launched. The attending population was comprised of 40 EFL learners with characteristics similar to those of the target population. The aim of the pilot study was two-folded. First, the study teacher sought to identify potential administrative problems including the application of smartphones, internet service, and time management. Second, the study teacher aimed to choose an optimal form of measuring instrument for the sake of face and content validity. For this reason, a sample of a reading text accompanied by a post-reading question, namely a bi-directional production task was first submitted to a panel of experts including two TEFL Ph.D. holders from the University of Yasouj, Iran. They were completely aware of the aims of the current study. They were asked to check for the appearance and content of the reading text along with the post-reading question format. After reviewing the text and its follow-up questions, and matching the content with the raised research questions, the experts confirmed the overall relevance of the reading text to the question items. Next, the study teacher distributed the reading texts among the participants. The reading text and the post-reading questions were in Microsoft Word 2010 format, and they were transferred to the participants' smartphones via the Telegram application. One problem identified was the organization and layout of the reading paragraph changed. Therefore, we decided to transform the Word files into PDF format.

3.2. Participants and Sampling Technique

The sample of the main study included 30 M.A university students majoring in diverse master-level fields of study including civil engineering, mathematics, sociology, and agricultural engineering at a university in Iran. They all took the General English course after they were identified as lower intermediate on an English placement test annually given by the university. The descriptive information of the participants is shown in table 1.

Table 1.

Descriptive Statistics for the Study Participants

Major	Number	Perc	cumulative percentage
Civil Engineering	8		26/7
Mathematics	8		53/3
Sociology	9	30	83/3
Ag. En	5		100
Total	30	100	----

3.3. Research Instrument

The materials involved verbatim paragraphs from *General English through interaction for university students* (Rezvani & Zamani, 2017). Every session a paragraph (see appendix A) of the book was selected, textually enhanced, and distributed via smartphones to tap into the participants' vocabulary noticing by incorporating two different TE techniques (boldface and Emoji). In addition to textually enhanced words, a few unenhanced words (neutral) were also targeted in the text as a frame of comparison to boldface and Emoji formats.

The final draft comprised a reading text containing a long reading paragraph where 18 textually enhanced words with the same range of difficulty were targeted by the teacher and later equally distributed to three parts of speech namely Verb (N=6), Noun (N=6), and Adjective (N=6). Moreover, care was taken to ensure that all the 18 parts of speech were also equally distributed to both TE techniques (boldface and Emoji) along with the textually unenhanced (neutral) words. All the 18 targeted words were immediately followed by both their English synonyms and Farsi equivalents within parenthesis. For example, observe (see, مشاهده کردن /məʊfɑ:hede kærdæn/). This was followed by a teacher-

made bi-directional post-test production task (see appendix B) where only 9 words out of the initial 18 targeted words were selected and later used as the stem in the post-reading production test. Subsequently, the subjects were required to provide either an English synonym or a Farsi equivalent for the stems. For instance, based on the text, what is the English or Farsi equivalent to the word *observe*?

3.4. Data Collection Procedure

Informed consent for cooperation was obtained from all of the participants before the study began. After explaining the procedure of the study to the participants, they were asked to bring their smartphones to the class. It was ensured that all of the smartphones were connected to the Internet provided by the university and that the participants knew how to use the Telegram platform. The data collection procedure entailed two phases. During phase 1, the PDF reading texts were transferred to the participants' smartphones. Later, the researcher had the participants read the text using the Telegram application while they were provided with no explicit reading instructions. The reading task took them up to ten minutes. Forty-five minutes later, after they got engaged in their routine classwork, in the second phase, the PDF post-reading question files were sent to the participants' smartphones again. We deliberately extended the interval between the two phases to reduce the remembering and working memory effect. When the questions were shared, the participants were asked to answer them by typing via smartphones either an English synonym or a Farsi equivalent which had already been provided in the reading prompt. The post-reading task took the participants around six minutes on average. Once the participants finished answering the post-reading test, through their smartphones, they sent back the PDF files to the teacher for further analysis. The same procedure was followed throughout twelve sessions, resulting in twelve tests for each participant. At the end of the treatment, 12 tests were collected for every participant.

3.5. Data Analysis Procedure

To analyze and interpret the data, repeated-measures ANOVA followed by Tukey's post-hoc test was employed, through Statistical Packages for Social Sciences (SPSS version 26). The repeated-measures ANOVA was used to see if the obtained mean scores

of the variables of interest were statistically significant over twelve sessions. Tukey’s post-hoc test was also run to identify where the mean differences among the variables lied.

4. Results

The descriptive statistics of the three techniques are shown in Table 2. There were mean score differences among the three techniques of boldface (1.98), Emoji (1.87), and neutral (1.40). The mean indices of both TE techniques (boldface & Emoji) were found to be descriptively larger than that of the neutral formatting.

Table 2.

Results for Descriptive Statistics for the Three Techniques

Dependent Variables	Number of Sessions	Number of Students	Mean	Max	Std.
Boldface	12	30	1.98	3	0.34
Emoji	12	30	1.87	3	0.36
Neutral	12	30	1.40	2.8	0.33

To test the statistical difference among the three techniques, and to evaluate the assumptions of homogeneity of variance within and between the subjects, we first examined Machiavellian Sphericity (Field, 2009; Pallant, 2007). The test result summarized in Table 3 indicated that the assumptions were met and it is statistically feasible to run the repeated measures of ANOVA.

Table 3.

Machiavellian Sphericity

Epsilon			Sig.	df	Approx. Chi-Square	Mauchly’sW	Measure	Within Subjects
Greenhouse-Geisser	Huynh-Feldt	Lower-bound						
0.72	1.00	0.091	0.55	65	63.67	0.08	B E N	Time
0.65	0.89	0.091	0.27	65	72.26	0.06		
0.69	0.94	0.091	0.50	65	65	0.07		

Since the mean differences of the within and between techniques were statistically significant (Table 4), we proceeded to see where these mean differences lie employing a post-hoc Tukey test (Pallant, 2007). The results are reported in Table 5.

Table 4.

Analysis of Variance Within and Between Techniques

Source	Sum of Squares	Df	Mean of Squares	F	Significance	Degree of effect
Within techniques	60.12	22	2.73	4.11	0.001	0.09
Error	636.61	0.96	0.66	-	-	-
Between techniques	66.52	27	33.26	22.42	0.001	0.35
Error	123.56	87	1.42	-	-	-

The results of a post-hoc Tukey test shown in Table 5 demonstrate that the mean difference between boldface and Emoji techniques was not statistically significant ($M = 0.11$, $p > .05$). However, it was suggested that the mean differences between both boldface and neutral ($M = 0.57$, $p < .05$) and Emoji and neutral ($M = 0.46$, $p < .05$) were statistically significant. Thus, it can be inferred that both TE techniques resulted in significantly higher vocabulary gains than neutral formatting. The participants' overall performance is shown in the following figure.

Table 5.

Post-Hoc Tukey Test for the Three Techniques

95% Confidence Interval	Level of significance	Mean Difference	Std. Error	Independent Variable
-8.05	4.9	0.445	0.11	Emoji Boldface
-17.05	-8.95	0.001	0.57	Boldface Neutral
-13.05	-4.95	0.001	0.46	Neutral Emoji

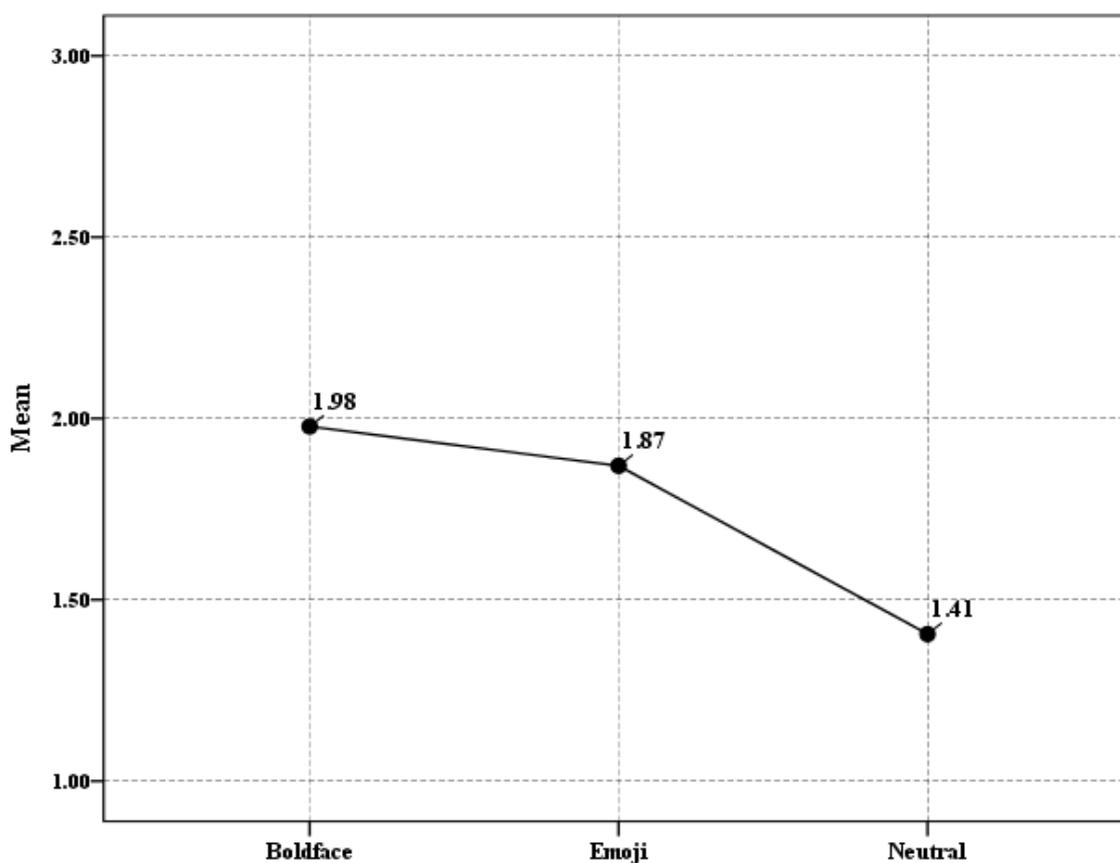


Figure 1. Comparison of the mean index for the three techniques

5. Discussion

The current study aimed to investigate the comparative impact of two TE techniques (boldface and Emoji) along with neutral formatting on EFL Learners' vocabulary noticing. In so doing, the Telegram application was used and the subjects' cumulative performance over 12 sessions was analyzed using a repeated-measures ANOVA. In response to the first research question, the results indicated that both TE techniques had significantly positive effects on EFL learners' vocabulary noticing, while the neutral formatting did not yield such an effect. It is generally acknowledged in the literature that TE formatting affects noticing and ultimately learning of various aspects of L2 (Ghaemi & Fazilatfar, 2014; Jahan & Kormos, 2015; Jones & Waller, 2017; Khoshnevis & Mikaeli, 2014; LaBrozzi, 2014; Rassaei, 2014; Tahmouresi et al, 2015).

What underpins the supportive results lies in Schmidt's (2001) argument that deliberately manipulating salient features of the target forms within texts will increase learners' attention to those forms. In the same way, findings of the current study demonstrate that TE techniques made the presence and distribution of the target words

throughout the reading texts perceptually salient to the readers. What we infer is that TE might have acted as a catalyst for increasing the participants' sensitivity and awareness about the content being read which ultimately resulted in learning. Learning is postulated to have levels (Anderson & Krothwhole, 2001), and given the design of the study, it might not be sensible to claim for the depth of learning. However, with more certainty, we concur with Gass (2003) that for learning to take place, L2 input should be first noticed and related to the existing knowledge. Thus, it can be posited that TE facilitates comprehension which is a prerequisite for reading and learning. It follows, then, that when target parts within texts are visually enhanced, readers' attention will be attracted, their comprehension will be promoted and in turn, their language and content learning will be enhanced. Potential links between noticing (recognition and comprehension) and learning/acquisition can be conceived in light of theories of cognitive psychology. As noted in the introduction the theoretical underpinnings of the NH necessitate some degree of conscious awareness (attention) of formal features rather than global awareness of the input in question. Schmidt elaborates on the concept of awareness by introducing awareness at the level of understanding which is argued to be higher than the level of noticing (Chapelle, 2013). These contentions are also consistent with Bloom's (1956) taxonomy of *educational learning objectives* which, as well, underscores the significant role of noticing and attention in the learning process by arguing that true learning requires true understanding which requires sufficient noticing and attention.

As was mentioned before, the results of this study were analyzed during the Covid-19 pandemic, the aftermath of which has been extensive use of CALL and MALL technology at schools and higher education institutes worldwide. Evidence is abundant regarding the positive impact of MALL technology on promoting L2 learners' vocabulary learning and acquisition (e.g., Ghaemi & Golashan, 2017; Kennedy & Levy 2008). Mobile digital assistants (i.e., smartphones, palmtops, PDAs, and tablet PCs) have been indispensable in people's everyday communicative purposes. The younger generation, in particular, is already accustomed to using smartphones for exchanging messages via popular social networks such as Email, online chat rooms, WhatsApp, and Telegram. A large part of messages to be texted are semantically and pragmatically transferred or enhanced through Emoji stickers. Therefore, the effectiveness of Emoji in catching the attention of the participants did not surprise us as this study was conducted in a MALL

context where the participants are typically accustomed to frequently using Emoji in text messages.

The widespread use of Emoji in the digital assistant's text communication and the use of boldfacing already extensive in use in typing applications motivated us to compare their relative effects on the participants' noticing by raising a second question. The post-hoc Tukey test results as reported above indicated that both boldface and Emoji TEs were effective in attracting learners' noticing to salient features of the texts.

We think that there are two main arguments why both TE techniques equally improved the participants' performance on the tests. First, we reason that the effectiveness of boldface in enhancing the participants' noticing might be accounted for by a common strategy employed in instructional materials to boldface important parts. Boldfacing is usually meant to attract the attention of readers and through experience readers including L2 learners know that when a text part is boldfaced, the added feature induces them that it needs their extra attention. Thus, in this study, the participants noticed the targeted words enhanced by boldfacing and as a result, their performance on such words was positively affected.

A second argument is concerned with the particular Emoji format employed in the present research. We made use of backhand index finger pointing right  and backhand index finger pointing left  to visually enhance the significance and presence of the target words. These Emoji stickers are customarily used to draw attention to a preceding or following part in texts which made it of widespread appeal among social network users (Danesi, 2017). That is, the social network users employ index Emoji to emphasize the denotative aspect of their messages where ambiguity and connotative meanings are potentially misleading (Danesi, 2017). In the same way, the index finger Emoji used in the current research was found to be effective in triggering learners' attention and noticing the target words within the passages.

6. Conclusion

The present study aimed at exploring the Iranian EFL learners' noticing concerning the visual input they received. In so doing, they were exposed to reading passages whose targeted words were perceptually enhanced through TE techniques (boldface and index finger Emoji stickers). The results of the repeated measures of ANOVA indicated that both

TE techniques positively affected the participants' noticing. Therefore, the findings concur with studies that advocated the efficiency of TE techniques in triggering L2 learners' noticing (Bishop, 2004; Ghaemi & Golshan, 2017).

This study might have several pedagogical implications for teachers and language learning materials developers. It broadly and collectively supported Schmidt's NH (1990), Smith's IE hypothesis (1991), and Smith's TE techniques (1993) that input enhancement effectively promotes L2 learners' noticing and possibly learning. Accordingly, language learning materials developers should be aware of the significance of IE and make efforts to maximally exploit the typographical techniques such as boldfacing and Emoji stickers in instructional materials. Particularly, during the COVID-19 pandemic lockdown where the physical activity of schools and universities has been disrupted and teachers have had no physical presence in the teaching process, the need for perceptually enhanced materials has become even more acute for L2 learners who are supposed to take control of their learning through social networks.

The study findings also encourage EFL teachers to enhance instructional materials in favor of forms or lexis of interest. This is particularly advantageous when L2 learners cannot themselves expend time on every single aspect of a text. They might employ various conventional TE techniques like underlining and highlighting for hard-copy materials or in the context of CALL they can alternatively exploit diverse functionalities and assets increasingly available in digital assistants and applications. The perceptually salient constituents would catch students' attention and through noticing, implicit or explicit, their intake and learning will be promoted or they will be more prepared for further teaching. Teachers can also get their students to enhance the instructional materials based on their learning interests or significance.

This study was limited in several ways. Because of practical constraints we were not able to use a true experimental design involving a comparison group. We could not also take into account other relevant variables such as age, subject matter, and reading strategies among others. In this study, we also employed a test to collect quantitative data. Future research might design experimental research studying more variables or investigate the cognitive processes underlying noticing and its relation to intake and learning through using qualitative approaches like think-aloud protocol analysis.

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Appendix A

A sample of a paragraph from “General English through Interaction for University Students”

For centuries (every hundred years, قرن), people have been playing kicking games with a ball. The game of soccer developed from some of these early games. The English probably gave soccer its name and its first set of rules. In European countries, soccer is called football or association (federation, فدراسیون) football. Some people believe that the name “soccer” came from “assoc.,” an abbreviation for the word association. Others believe (think, اعتقاد داشتن) that the name came from the high socks that the players wear. Organized (coordinated, سازمان یافته) soccer games began in 1863. In soccer, two teams of eleven players try to kick or head the ball into their opponents’ (competitor, حریف) goal. The goalie, who tries to keep the ball out of the goal, is the only player on the field who is allowed (permitted, اجازه داشتن) to touch the ball with his or her hands. The other players must use their feet, heads, and bodies to control the ball. Every four years, soccer teams around the world compete (contest, رقابت کردن) for the World Cup. Brazil is the home of many great soccer players, including the most famous (well-known, مشهور) player of all, Pele. With his fast footwork, dazzling (sensational, خیره کننده) speed, and great scoring ability, Pele played for many years in Brazil.

Appendix B

A sample of a teacher's made post-reading bi-directional production task.

A. Based on the text, provide each target word from the sentences below with its English or Farsi equivalents.

1. Based on the text, what is the English or Farsi equivalent to the word “compete”?
2. Based on the text, what is the English or Farsi equivalent to the word “dazzling”?
3. Based on the text, what is the English or Farsi equivalent to the word “believe”?
4. Based on the text, what is the English or Farsi equivalent to the word “organized”?
5. Based on the text, what is the English or Farsi equivalent to the word “century”?
6. Based on the text, what is the English or Farsi equivalent to the word “allowed”?
7. Based on the text, what is the English or Farsi equivalent to the word “famous”?
8. Based on the text, what is the English or Farsi equivalent to the word “opponent”?
9. Based on the text, what is the English or Farsi equivalent to the word “association”?