Research Paper

Towards the Construction and Validation of a Learners' Online Reading Engagement (LORE) Scale: A Case of Iranian EFL Teachers and Learners

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Abstract

With the advent of advanced technology, a substantial proportion of reading takes place online. Reading engagement is an important factor that makes considerable contributions to reading comprehension. However, there is no valid and reliable measure for assessing learners' online reading engagement. Accordingly, this study constructed and validated a scale to gauge LORE. Initially, 20 EFL learners and 20 teachers were interviewed, and based on the results of thematic analysis and extant components in the literature, an initial draft of the LORE was prepared. This draft became subject to expert opinion in a panel composed of three PhD holders in TEFL. Afterward, the scale was distributed to 335 learners. The results of exploratory factor analysis (EFA) and Cronbach's Alpha yielded satisfactory psychometric properties for the 21-item scale consisting of six factors, including affective, behavioral, cognitive, linguistic, agentic, and social dimensions. The analysis of aggregate means revealed that learners were highly engaged in behavioral and affective aspects and moderately engaged in the cognitive and agentic facets, but they had low levels of engagement in linguistic and social dimensions. Based on the results, the scale can be safely used to measure EFL learners' online reading engagement. Moreover, it is recommended that EFL teachers take measures to foster learners' linguistic and social engagement.

Keywords: Engagement dimensions, EFL learners, Online reading, Online reading engagement, Reading engagement

ساخت و اعتبارسنجی مقیاس مشغولیت درمهارت خواندن آنلاین(LORE): مطالعه تحقیقاتی درباره زبان آموزان و معلمان زبان انگلیسی در ایران

با ظهور فناوری پیشرفته، تعداد قابل توجهی از خواندن به صورت آنلاین انجام می‌شود. مشغولیت درمهارت خواندن یک عامل مهمی است که به طور قابل توجهی به درک خواندن کمک می‌کند. با این حال، هیچ مقیاس اندازه‌گیری معتبر و قابل اطمینان برای ارزیابی مشغولیت در مهارت خواندن آنلاین یادگیرندگان وجود ندارد. بنابراین، این تحقیق یک مقیاس برای اندازه‌گیری LORE تهیه و اعتبارسنجی کرده است . ابتدا، ۲۰ زبان آموز به عنوان زبان خارجی (EFL) و ۲۰ معلم مورد مصاحبه قرار گرفتند و بر اساس نتایج تحلیل موضوعی و مؤلفه‌های موجود در تحقیقات گذشته، یک پیشنهاد اولیه از LORE تهیه شد. این پیشنهاد تحت نظارت تخصصی سه نفردارنده مدرک دکترا در آموزش زبان انگلیسی مورد بررسی قرار گرفت. سپس، این مقیاس ارزیابی بین ۳۳۵ زبان آموز توزیع شد. نتایج تحلیل عاملی اکتشافی (EFA) و آلفای کرونباخ نتایج روان‌سنجی مطلوبی برای مقیاس ۲۱ موردی با شش عامل از جمله بُعدهای احساسی، رفتاری، شناختی، زبانی، عاملی و اجتماعی ارائه داد. تجزیه و تحلیل میانگین‌های تجمعی نشان داد که زبان آموزان در بُعدهای رفتاری و احساسی بسیار مشغول بودند، در بُعدهای شناختی و عاملی به طور متوسط مشغول بودند، اما در بُعدهای زبانی و اجتماعی سطح پایینی از مشغولیت را داشتند. بر اساس نتایج، این مقیاس اندازه گیری می‌تواند با اطمینان برای اندازه‌گیری مشغولیت مهارت خواندن آنلاین یادگیرندگان زبان انگلیسی به عنوان زبان خارجی استفاده شود. علاوه بر این، توصیه می‌شود که معلمان زبان انگلیسی اقداماتی برای تقویت مشغولیت زبانی و اجتماعی یادگیرندگان انجام دهند.

کلمات کلیدی: مشغولیت در مهارت خواندن، خواندن آنلاین، یادگیرندگان زبان انگلیسی به عنوان زبان خارجی، بُعدهای مشغولیت، مشغولیت در مهارت خواندن آنلاین

Introduction

Reading is a pivotal skill for human development as success in this skill underlies the effective development of individuals in the modern technology-oriented society (Gao, 2023; Lin et al., 2021, 2023). However, reading is a multi-dimensional skill that poses numerous challenges for learners in English Language Teaching (ELT) contexts (Fecteau, 1999; Li & Clariana, 2019). A review of the increasing bulk of recent investigations (e.g., Anggraini et al., 2022; Jose, 2021; Patra et al., 2022) demonstrates that a substantial amount of reading for EFL learners takes place online via computers and mobile phones. One of the important dimensions of reading is learners' engagement (Lin et al., 2021; Steenberg et al., 2021). Overall, there is a consensus among literacy researchers that engagement contributes significantly to literacy development and achievement (Afflerbach & Harrison, 2017; Guthrie et al., 2012; O'Brien & Dillon, 2014; Schiefele et al., 2012). Drawing on the research findings, more researchers are seeking to gain new insights into reading engagement; indeed, they aim to demonstrate the important contributions of reading engagement to reading achievement (e.g., Kirby et al., 2011; Taboada et al., 2013).

Research on reading engagement is considered an essential area of investigation as the findings can bring about multiple benefits associated with reading comprehension (Guthrie, 2008; Steenberg et al., 2021; Unrau & Quirk, 2014). However, the review of literature portrays a lack of consensus in regard to the conceptualization of reading engagement (e.g., Almasi & McKeown, 1996; Luyten et al., 2008; Pintrich & Degroot, 1990). More specifically, the review of the literature shows that there is no valid and reliable instrument for measuring EFL learners' ORE. Thus, studies seeking to develop the construct of reading engagement in general and ORE in particular can lay the foundation for a more robust conceptualization of this construct. Additionally, the development of a learners' online reading engagement (LORE) measure can provide EFL teachers with an instrument to gauge their LORE and assist learners in developing their reading skills.

Literature Review

Online Reading

Having mastery over online reading is deemed essential for taking part in 21st-century communities in terms of both personal and occupational aspects (Rimi, 2019). Individuals should be equipped with online reading skills in order to successfully use information communication technologies (ICTs) in their lives (Zhang et al., 2013). Reading is construed to be a top priority in almost all educational contexts (Leonard et al., 2021; Tegmark et al., 2022). Reading comprehension, characterized as a complex, multidimensional (Cartwright & Duke, 2019), dynamic (Dole et al., 1991), and interactive skill (Rumelhart, 1977) encompasses a multitude of aspects including the linguistic (Prior et al., 2014; Qian, 2002; Zhang, 2012), cognitive (e.g., Ballenghein et al., 2020; Miller, 2015; Mitchell, 1982), metacognitive (Block, 2004), affective (Barber et al., 2016; Daher et al., 2021; Izati et al., 2021; Karimova & Csapó, 2021), motivational (Schiefele et al., 2012), agentic (Cervetti, 2019), and engagement (Cockroft & Atkinson, 2017; Lin et al., 2021; Steenberg et al., 2021) facets. Decidedly, the multidimensionality of reading poses challenges for L2 readers in EFL settings (Block, 1992; Li & Clariana, 2019).

The challenges of reading become even more convoluted in online reading due to the existence of hypertext (Hahnel et al., 2022; Jose, 2021), multimedia (Jian, 2022), and hypermedia (Faghfouri & Mohammadi, 2022; Neugebauer et al., 2022; Zumbach & Mohraz, 2008), which bear relations with navigational steps (Salmerón et al., 2018) and temporal aspects (Naumann & Goldhammer, 2017) of reading comprehension excreting influences on readers' reading behavior (Hahnel et al., 2022). Therefore, research into online reading in an attempt to assist EFL learners in managing the associated challenges with online reading is warranted. Such research is particularly important as developing online reading skills is regarded as a necessity to function

competently in diverse educational and occupational settings (Evanovich & Scott, 2022; Naumann, 2015; Rimi, 2019).

As Leu et al. (2004) contend, there must be some modifications to our interpretations of comprehension processes, decoding, and what can be considered literacy activities to mirror the strategies used by readers and authors to figure out or respond to reading online texts. An increasing volume of studies has examined the factors that differentiate conventional literacy from new literacy activities, the importance of new literacy (Leu et al., 2007), the skills and the competence required for online reading skills (Chang, 2005; Singhal, 1999), and variables influencing online reading comprehension (Warschauer, 1999). Overall, recent studies show that instructional technologies are opening up new opportunities for reading engagement; however, as pointed out by scholars (e.g., Lee & Wu, 2012; Mangen & van der Weel, 2016; Wu, 2014), more research should be carried out to paint a comprehensive picture of how these recent technologies can influence reading engagement.

Reading Engagement
Reading engagement used to be considered a form of self-involvement; that is, it was deemed as a personal commitment an individual makes to obtain meaning while reading (Nystrand & Gamoran, 1991). Some scholars (e.g., Meece et al., 1988; Pintrich & Schrauben, 1992) have characterized such a deep involvement as cognitive engagement. Meece et al. (1988) explain cognitive engagement as a construct made up of several strategies, including metacognitive and self-regulatory ones. Consequently, reading engagement was previously characterized as a cognitive construct. This means that learners' cognition is at play while they can regulate their attention, which enables them to make a connection between newly obtained information and existing knowledge. They can also monitor their own comprehension (Almasi & McKeown, 1996). However, it is worth noting that one cannot explain reading engagement comprehensively by only drawing on cognitive factors. Indeed, readers are cognitively more active during reading if they see themselves as capable (i.e., self-efficacious), highly motivated, driven intrinsically, and when they find their reading task exciting and important (Pintrich & Degroot, 1990).

Based on some studies (e.g., Fredricks et al., 2004; Guthrie & Cox, 2001; Luyten et al., 2008), reading engagement can be divided into affective or emotional dimensions, which has come to be called affective engagement or emotional engagement. Notably, given the measurement limitations, some investigations have presented a simplified version of reading engagement, characterizing it as a set of behavioral factors. The participants' accounts of the time they devote to reading in class or at home have been described as an indicator of reading engagement (Guthrie et al., 2001). Alternatively, the extent to which students are exposed to print (i.e., print exposure) (Mol & Bus, 2011), as well as the reading amount (Guthrie et al., 1999; Schaffner et al., 2013) have also been used as indicators of reading engagement.

As Fredricks et al. (2004) note, many attempts have been made recently to provide the theoretical foundations for a three-component model of reading engagement, namely, behavioral, emotional, and cognitive. Besides these two- or three-component models, as mentioned by Reschly and Christenson (2006), some scholars have developed engagement models constituting four components (i.e., academic, behavioral, cognitive, and psychological), or alternatively academic, social, cognitive, and affective constructs. More recently, scholars (e.g., Cook et al., 2020; Finn & Zimmer, 2012; Guthrie & Klauda, 2015; Guthrie et al., 2012; Huo & Cho, 2020; Ivey & Johnston, 2015; Singh & Ballantyne, 2012) have characterized engagement as having behavioral, cognitive, affective, agentic, social, and linguistic dimensions.

When it comes to reading, several indicators can be identified that indicate behavioral engagement. The following are the main indicators: learners' self-report on time devoted to reading, the amount of effort extended, as well as persistence, and instructors' observations of

learners' reading behaviors (Guthrie et al., 2012). Normally, behavioral engagement can manifest in the behaviors associated with the learning process and the activities done in school; moreover, as pointed out by King (2020), it involves participation in class or extracurricular activities. In the context of reading, cognitive engagement requires the individual's desire to expend the mental effort to figure out texts and carry out difficult tasks. Guthrie et al. (2012) described cognitive engagement as allocating thoughtful energy required to work out complicated ideas to move on beyond the minimal requirement (Finn & Zimmer, 2012); moreover, cognitive engagement has been characterized as the individual's degree of investment in learning (Fredricks et al., 2004; Ahmadi & Nasr, 2022).

Affective engagement is concerned with emotional states and internal feelings that drive a learner to engage in a learning activity, task, or experience. Indeed, it has to do with desirable or undesirable emotional responses emanating from an event, action, or condition (Cook et al., 2020). Positive affective engagement improves learners' motives to take part in learning tasks and school, driving them to invest energy (Cook et al., 2020). Social engagement is defined by Finn and Zimmer (2012) as the degree of seriousness a student shows to follow the classroom rules of behavior. Yet, social engagement has nothing to do with the impact of social practices or contexts on readers. Indeed, as agentic beings, readers engage in mutual interactions with both the characters inside books, as well as with themselves and with others (Ivey & Johnston, 2013); therefore, one can view reading-related social engagement as tools for constructing selves with contextual elements. In Ivey and Johnston's (2015) view, social engagement is characterized as a sort of collective transformative endeavor where social and cultural systems impact and are impacted by readers' development.

Agentic engagement pertains to the proactive and participatory approach adopted by students in pursuing their learning endeavors by attending to their individual needs and demands (Reeve & Tseng, 2011). As expounded by Reeve and Tseng, agentic engagement is associated with the degree to which a learner actively contributes to the progression of the educational process they are engaged in (e.g., posing queries, expressing preferences, and articulating their wants and needs to the instructor). Linguistic engagement refers to the extent to which students intentionally concentrate on processing linguistic features in the text to enhance their language skills (Arndt, 2023; Burke, 2020; Singh & Ballantyne, 2012). Thus, linguistic engagement pertains directly to the improvement of language skills as a result of focusing on the linguistic features of the text.

As the review of the literature and extant empirical studies depicts, no study has thus far developed and validated a LORE instrument to measure ORE. Accordingly, this study sought to uncover the LORE components among EFL learners and establish the reliability of the constructed instrument. To this aim, the following research questions were formulated:

RQ1: What are the components of the LORE construct in the Iranian intermediate EFL learner population?

RQ2: Does the researcher's developed model of LORE possess acceptable internal consistency indices?

Method

Participants

The initial participants, selected based on convenience sampling, consisted of 515 Iranian EFL learners studying English at the intermediate proficiency level at 10 language institutes located across the country. They were within the age range of 18 to 50 and from both male (232) and female (183) learners. These learners were given a Preliminary English Test (PET), and based on the results, 335 were chosen. Moreover, 20 EFL teachers who had experience teaching reading online were also invited to take part in semi-structured interviews. Six of these teachers had

teaching experiences of 1 to 5 years, and the remaining eight had teaching experiences of more than 5 years. Additionally, three Ph.D. holders in TEFL, with more than 20 years of teaching and teacher education experience each, participated in the study as experts to review the interview questions and the items in different drafts of the LORE scale. Furthermore, a research assistant helped in the qualitative data analysis phase to establish the reliability of the data analysis.

Instruments

Preliminary English Test (PET). PET was used to ensure the selection of homogeneous participants in terms of overall language proficiency. This test is suitable for the intermediate level. It consists of 4 parts and measures all 4 language skills (speaking, writing, reading, and listening) during 2 hours. PET was administered to the initial 515 learners, and 335 whose scores fell within the range of +/-one standard deviation from the mean were chosen. Out of the 335 learners, 172 were female, and 163 were male learners.

Semi-structured Interviews. Semi-structured interviews were conducted with 20 learners and 20 teachers to collect qualitative data for developing the item pool for the LORES. To this end, two sets of semi-structured interview questions were developed. The interview questions were prepared drawing on the extant theoretical and empirical literature related to online reading (e.g., Anggraini et al., 2022; Castek et al., 2011; Jose, 2021; Leu et al., 2007), engagement (e.g., Finn & Zimmer, 2012; Pintrich & Schrauben, 1992; Reeve, 2013; Reeve & Tseng, 2011), and reading engagement in conventional (e.g., Cockroft & Atkinson, 2017; Evanovich & Scott, 2022; Steenberg et al., 2021; Taboada et al., 2013; Unrau & Quirk, 2014) and online settings (e.g., Gao, 2023; Lee & Wu, 2012; Naumann, 2015; Wu, 2014). Subsequent to formulating the initial questionnaire, it underwent scrutiny and refinement by a panel of experts within the realm of applied linguistics, including three Ph.D. holders specializing in TEFL. Following that, the questions were piloted on five learner and five teacher participants to remove any ambiguities in regard to content and enhance clarity and readability.

Procedure

Initially, PET was administered to 515 EFL learners at the intermediate level, and based on the results, 335 whose scores fell within the range of +/-one standard deviation from the mean were selected. Then, two sets of semi-structured interview questions were developed for learners and teachers. There were 14 questions in the initial list. Questions seven *(To what extent do you pay attention to the new grammar and vocabulary when reading online texts? Please explain), 12 (To what extent have online reading activities improved your other language skills such as writing and speaking? Please explain.),* and 14 (*To what extent do online reading activities help improve your vocabulary and grammar? Please explain.*) were merged into one question (*To what extent have online reading activities helped you improve your grammar, vocabulary, writing, and speaking? Please explain.)* based on expert panels' comments. *Moreover, questions 9 (To what extent do you express your likes and dislikes when doing online reading activities? Please explain.)* and 10 *(To what extent do you express preferences and opinions for online reading activities? Please explain.)* were combined into one question *(To what extent do you express your interest, preferences, and opinions for online reading activities? Please explain.).* There were 11 semi-structured interview questions on the list. The questions for the teachers were the modified version of the questions for learners. Upon preparing the questions, 20 learners, selected randomly from among the 335 learners, were interviewed. Moreover, 20 teachers were also interviewed. The interviews were conducted both face-to-face and online via Telegram based on the participants' preferences. To encourage the learners and teachers to take part in the interviews, two collections of books for learning English and improving English language teaching

techniques were used as incentives. The interviews for learners were conducted in Persian as they did not have the required level of proficiency for responding to the interview questions. As for the teachers, they were given the choice between Persian and English, and most of them opted for Persian. However, only a few (3 teachers) preferred to answer the interview questions in English. Each interview lasted approximately 40 minutes to 50 minutes, and the recorded dialogue during the interview sessions was transcribed verbatim. Following that, the contents from the interviews were scrutinized in accordance with the six phases of qualitative data analysis outlined by Braun and Clarke (2006). These stages encompass 1) acquainting oneself with the data, 2) formulating initial codes, 3) identifying themes, 4) reviewing themes, 5) defining and labeling the themes, and ultimately 6) composing the final report (Braun & Clarke, 2006). In line with Hsieh and Shannon (2005), a research assistant helped with the thematic analysis to ensure the reliability of the analysis. In order to accomplish this, the interview transcripts were individually perused multiple times by both the primary investigator and the research assistant to attain a comprehensive understanding of the data. Concurrently, initial impressions of the data were documented, and relevant notes were taken. Subsequently, the data underwent coding, categorization, and condensation in a meaningful manner. Any discrepancies between the outcomes of the primary researcher and those of the assistant were deliberated upon and resolved. Moreover, a reliability coefficient of 0.89 was computed based on Holsti's (1969) measure of agreement, indicating a satisfactory level of consistency between the two data analyzers. To ensure credibility, member checking, as advocated by Nassaji (2020), was implemented by discussing the results of the analysis with five learner and five teacher participants to provide assurance that the interpretations had been made in an appropriate manner. The analysis of the results demonstrated 18 themes that fit into the six components of engagement in the literature. Table 1 displays the results of the thematic analysis along with the frequencies, percentages, and relevant components.

Table 1
Results of Thematic Analysis and Their Corresponding Frequencies, Percentages, and Relevant Components

No	Themes	Relevant Components	Frequency and Percentage for Learners (out of 20 interviewees)	Frequency and Percentage for Teachers (out of 20 interviewees)
1	Paying attention to the content	Behavioral	18 (90%)	14 (70%)
2	Paying attention to the links	Behavioral	18 (90%)	15 (75%)
3	Paying attention to the teacher	Behavioral	17 (85%)	13 (65%)
4	Reviewing the texts	Cognitive	16 (80%)	12 (60%)
5	Making connections between reading sections	Cognitive	16 (80%)	12 (60%)
6	Applying reading strategies	Cognitive	15 (75%)	13 (65%)
7	Applying strategies for new vocabulary	Cognitive	15 (75%)	12 (60%)
8	Curiosity	Affective	17 (85%)	18 (90%)
9	Positive feelings	Affective	16 (80%)	17 (85%)
10	Enjoyment	Affective	17 (85%)	16 (80%)
11	Interest	Affective	16 (80%)	15 (75%)
12	Expressing preferences	Agentic	14 (70%)	15 (75%)
13	Making suggestions	Agentic	15 (75%)	16 (80%)
14	Asking questions	Agentic	19 (95%)	18 (90%)
15	Online discussions	Social	13 (65%)	13 (65%)

16	Collaboration	Social	12 (60%)	13 (65%)
17	Improving other language skills	Linguistic	16 (80%)	18 (90%)
18	Online resources	Linguistic	14 (70%)	10 (50%)

Based on the results of the thematic analysis, an initial pool of 28 items was prepared. The first draft consisted of 6 items for the behavioral, 6 items for the cognitive, and 4 items for each of the affective, agentic, social, and linguistic dimensions of ORE. This first draft was submitted to the panel of experts. Based on their comments, item 3 *(When the teacher introduces the online reading activity, I pay attention carefully)* was discarded due to having overlapping content with item 5 (*I pay careful attention to the teacher's instructions for doing online reading activities).* Moreover, item 11 *(I go over the online reading texts once in a while to ensure complete understanding.)* was excluded because of having shared content with item 7 (*When doing online reading texts, I sometimes stop and review the text to make sure that I have understood the text correctly).* In a similar manner, item 20 *(I let the teacher know what I like or dislike about online reading activities and tasks.)* was removed, and item 17 *(I tell the teacher about my preferences for online reading contents and tasks)* was kept. Therefore, the finalized draft of the scale, after addressing the expert panel's comments, contained 25 items. The items were provided with five Likert-type alternatives: Strongly disagree, Disagree, neither agree nor disagree, Agree, and Strongly agree, with values from 1 to 5, respectively. As such, the maximum overall score obtainable from this scale could be 125, and the minimum score could be 25, with the higher score indicating more ORE. This scale was then distributed to the 335 selected learners. Out of the 335 learners, only 312 returned the scale. Following this, an Exploratory Factor Analysis (EFA) was conducted to identify the components of the scale. Cronbach's Alpha was utilized to assess the overall reliability of the scale and its extracted components.

Results

Results of Exploratory Factor Analysis (EFA)

To run EFA, initially, the factorability of the data was inspected via KMO index and Bartlett's test. The respective results are presented in Table 2.

Table 2
Bartlett's Test and KMO Index Results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.423
Bartlett's Test of Sphericity	Approx. Chi-Square	10762.881
	df	300
	Sig.	.000

As shown in Table 2, the KMO value is .432. Accordingly, the 25-item LORE scale can be reduced to fewer factors and the sample size is adequate for this purpose. Additionally, the Bartlett's significance test is .00 which is lower than .05. Thus, running factor analysis is appropriate. Next, it was necessary to determine the percentage of variance for each item by inspecting the covariance rate. Table 3 shows the covariance rate for each item.

Table 3
Covariance of the LORE Scale Items

No	Percentage of variance extracted
Item 1 Behavioral	.908
Item 2 Behavioral	.879

Item 3 Behavioral	.906
Item 4 Behavioral	.940
Item 5 Behavioral	**.048**
Item 1 Cognitive	.823
Item 2 Cognitive	.913
Item 3 Cognitive	.893
Item 4 Cognitive	.916
Item 5 Cognitive	**.018**
Item 1 Affective	.938
Item 2 Affective	.930
Item 3 Affective	.927
Item 4 Affective	.881
Item 1 Agentic	.729
Item 2 Agentic	.672
Item 3 Agentic	.982
Item 1 Social	.909
Item 2 Social	.764
Item 3 Social	.958
Item 4 Social	**.013**
Item 1 Linguistic	.933
Item 2 Linguistic	.889
Item 3 Linguistic	.919
Item 4 Linguistic	**.010**

As presented in Table 3, four items, including item 5 behavioral, item 5 cognitive, item 4 social, and item 4 linguistic, have variances of less than 50%. Thus, these four items were discarded from the EFA process (Pallant, 2010). Determining the percentage of the total variance of the items explained by each factor is the next step. For this purpose, three methods, the eigenvalues method, Cumulative Variance, and Scree plot, were inspected. Table 4 shows the eigenvalues and cumulative variance of extracted factors.

Table 4
Eigenvalues and Cumulative Variance of Extracted Factors

Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
1	4.257	20.271	20.271	4.257	20.271	20.271	3.809
2	3.893	18.536	38.807	3.893	18.536	38.807	3.964
3	3.091	14.717	53.525	3.091	14.717	53.525	3.530
4	2.750	13.097	66.622	2.750	13.097	66.622	2.703
5	2.470	11.761	78.383	2.470	11.761	78.383	2.394
6	2.179	10.376	88.760	2.179	10.376	88.760	2.581
7	.754	3.591	92.351				
8	.557	2.655	95.005				

9	.305	1.454	96.459
10	.181	.860	97.319
11	.131	.622	97.942
12	.105	.502	98.444
13	.099	.470	98.913
14	.067	.320	99.234
15	.044	.209	99.443
16	.038	.183	99.625
17	.030	.142	99.768
18	.021	.100	99.868
19	.014	.068	99.936
20	.012	.057	99.993
21	.001	.007	100.000

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

As presented in Table 4, six factors, with eigenvalues of more than one, have been extracted with a cumulative variance of 88.76, indicating that almost 89% of the variance of the variables can be explained by these factors. Also, as shown in Figure 1, a sudden fall of the Scree plot can be observed after six factors, which is an indication of the confirmation of the six-factor solution.
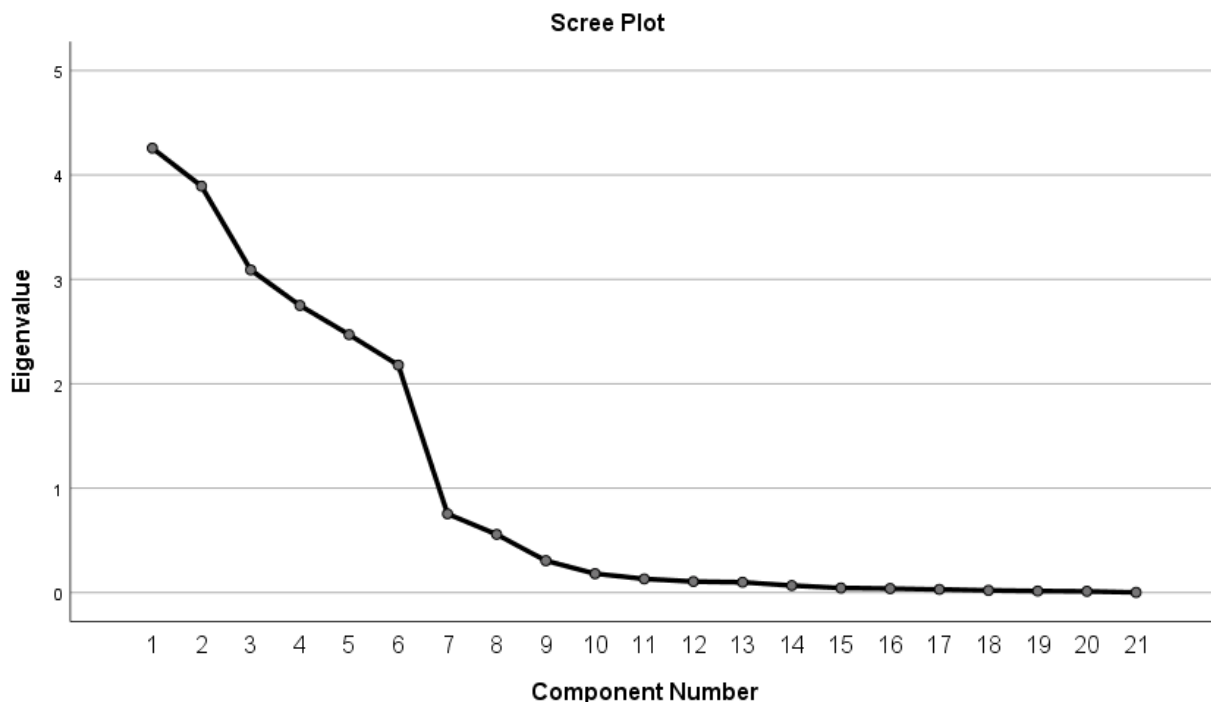
Figure 1
Scree plot of the LORE scale

Tale 5 shows the structure matrix for the items and their relevant components.

Table 5

Structure Matrix for the Items and the Relevant Components

Items	Components 1	2	3	4	5	6
Item 1 Affective	.96					
Item 2 Affective	.96					
Item 3 Affective	.96					
Item 4 Affective	.92					
Item 4 Behavioral		.96				
Item 1 Behavioral		.95				
Item 3 Behavioral		.94				
Item 2 Behavioral		.93				
Item 4 Cognitive			.95			
Item 2 Cognitive			.95			
Item 3 Cognitive			.94			
Item 1 Cognitive			.86			
Item 1 Linguistic				.96		
Item 3 Linguistic				.95		
Item 2 Linguistic				.91		
Item 3 Agentic					.99	
Item 1 Agentic					.85	
Item 2 Agentic					.81	
Item 3 Social						.97
Item I Social						.93
Item 2 Social						.79

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

As Table 5 portrays, four items are loaded on factor 1 (Affective), four items on factor 2 (Behavioral), four items on factor 3 (Cognitive), three items on factor 4 (Linguistic), three items on factor 5 (Agentic), and three items on factor 6 (Social).
To establish the reliability of the LORE scale and its six extracted factors, Cronbach's Alpha was applied. Table 6 presents the respective results.

Table 6
Cronbach's Alpha Results for the LORE and the Extracted Factors

Factors and the Total Scale	N of Items	Cronbach's Alpha
Factor 1 (Affective)	4	.92
Factor 2 (Behavioral)	4	.94
Factor 3 (Cognitive)	4	.88
Factor 4 (Linguistic)	3	.89
Factor 5 (Agentic)	3	.93
Factor 6 (Social)	3	.86
Total LORE	21	.81

As illustrated in Table 6, all reliability indices surpassed the threshold of .70, thereby being deemed satisfactory.

Table 7 displays the sums, means, and aggregate means for the individual items and components of LORE.

Table 7

Sums, Means, and Aggregate Means for the Individual Items and Components of LORE

Components	Items	Sum	Mean
Behavioral	I pay careful attention to links provided in online texts when doing the reading activities.	1272.00	4.07
	I do online reading activities attentively.	1265.00	4.05
	I study online reading texts and do the online reading tasks very seriously.	1260.00	4.03
	I pay careful attention to the teacher's instructions for doing online reading activities.	1242.00	3.98
Aggregate Means		1259.75	**4.03**
Affective	I am interested in doing online reading activities because I can learn new things.	1094.00	3.50
	I have a positive feeling about online reading activities.	1064.00	3.41
	I find online reading enjoyable.	1057.00	3.38
	I am curious about the content of online reading texts the teacher introduces.	1052.00	3.37
Aggregate Means		1066.75	**3.41**
Cognitive	When doing online reading texts, I sometimes stop and review the text to make sure that I have understood the text correctly.	959.00	3.07
	When doing online reading texts, I think about the strategies I used previously and apply the effective ones again.	921.00	2.95
	I make connections among different parts of the online text to understand the whole text.	921.00	2.95
	When I face difficulties in understanding online reading texts, I use the links in the texts to help me understand better.	912.00	2.92
Aggregate Means		928.25	**2.97**
Agentic	I make suggestions about the online reading content and tasks.	885.00	2.83
	When doing online reading activities, I ask the teacher questions to understand what to do.	871.00	2.79
	I tell the teacher about my preferences for online reading content and tasks.	870.00	2.78
Aggregate Means		875.33	**2.80**
Linguistic	I check the meaning of new vocabulary when reading online texts.	755.00	2.41
	Online reading has improved my other language skills, such as writing and speaking.	751.00	2.40
	I notice the new grammar when reading online texts.	707.00	2.26
Aggregate Means		737.66	**2.36**

Social	I participate in online discussions related to online reading activities.	762.00	2.44
	I feel interested in reading online texts when I know others are also reading the same material.	744.00	2.38
	I value the opinions and insights of other classmates when reading online texts.	692.00	2.21
Aggregate Means		732.66	**2.34**

As indicated in the above table, the aggregate means of the behavioral, affective, cognitive, agentic, linguistic, and social aspects of LORE equaled 4.03, 3.41, 2.97, 2.80, 2.36, and 2.34, respectively. This indicates that Iranian EFL learners are highly engaged in online reading in behavioral and affective aspects, moderately engaged in the cognitive and agentic facets, and comparatively have low levels of engagement in linguistic and social dimensions.

Discussion

This study aimed to develop and validate a scale to measure LORE. The results of EFA and Cronbach's Alpha yielded satisfactory psychometric properties for the 21-item scale consisting of six factors, including affective, behavioral, cognitive, linguistic, agentic, and social dimensions. The analysis of aggregate means revealed that learners were highly engaged in behavioral and affective aspects and moderately engaged in the cognitive and agentic facets, but they had low levels of engagement in linguistic and social dimensions.

The behavioral dimension of the ORE scale contained items focusing on attention as the main element in behavioral engagement. Careful attention to the reading activities, the provided links, and the teacher's instructions constituted the core of the items for behavioral engagement in online reading. Such results echo the findings of previous investigations (e.g., Cockroft & Atkinson, 2017; Evanovich & Scott, 2022; Naumann, 2015) concerning the importance of attention in general and attention to links and teacher's instructions as elements associated with engagement in reading. The results of the study indicating the high level of behavioral engagement suggest that behavioral engagement is possibly the most important facet of engagement for EFL learners in online environments. Behavioral engagement entails more persistence and attention to the reading task, which can render more reading comprehension (Guthrie et al., 2012; King, 2020; Schaffner et al., 2013). The affective facet of the ORE scale encompassed items in which interest, positive feelings, enjoyment, and curiosity were reflected. Such results corroborate the findings of extant empirical studies (e.g., Barber et al., 2016; Daher et al., 2021; Izati et al., 2021; Karimova & Csapó, 2021) showing associations between these elements and engagement in general and reading engagement in particular. Additionally, the results showcasing the affective aspect of ORE as the second most important dimension of ORE reveal the pivotal role of affect and emotions in regard to ORE. The affective or emotional component of reading engagement can contribute to developing reading skills through positive emotions experienced at the time of reading (Cook et al., 2020; Finn & Zimmer, 2012; Karimova & Csapó, 2021).

The cognitive component of the ORE scale constituted items highlighting reading strategies, reviewing, making connections, and using the links in the texts. These results substantiate the findings of previous investigations (e.g., Ballenghein et al., 2020; Lin et al., 2023; Miller, 2015) concerning the importance of learning strategies having connections with cognitive reading engagement. The results of this study respecting the moderate engagement of learners with the cognitive dimension suggest learners may not possess sufficient knowledge in relation to the

strategies and/or their implementation in online reading. The agentic aspect of the ORE scale consisted of items focusing on making suggestions, asking questions, and expressing preferences. These findings confirm the results of previous research (e.g., Reeve, 2013; Reeve & Tseng, 2011; Vaughn et al., 2020) concerning the pivotal role of such elements in agentic engagement. Learners' moderate level of agentic engagement can possibly have roots in the Eastern culture in which the study was conducted, as in such cultures, teachers are considered to have a somehow authoritative teaching style, which may put constraints on learners' tendency to express their preferences or talk about their likes and dislikes.

The linguistic component of ORE included items focusing on learning vocabulary, grammar, and the influence of online reading on other language skills such as writing and speaking. Such results support the findings of previous investigations (e.g., Arndt, 2023; Burke, 2020; Singh & Ballantyne, 2012) in regard to the important role of learners' consideration of different language features in relation to linguistic engagement. However, it is noteworthy that learners scored low in the linguistic dimension of engagement, which could possibly be attributed to their inadequate level of awareness concerning the interconnection of different language skills and components. The social facet of ORE constituted items focusing on participation in online discussions, liking the idea that others are also reading the same reading content online, and valuing the opinions of other classmates when reading online texts. These results are supported by the findings of research (e.g., Ivey & Johnston, 2013, 2015) with respect to the important role of participation in social activities embedded in reading as contributing factors to social engagement in reading. However, it should be noted that learners scored lowest in the social facet of engagement as compared with other dimensions. The reason behind the low level of social engagement in online reading could possibly be the nature of the online learning environment in which interactions transpire in a virtual setting.

Conclusion

Overall, the findings of the current study confirmed and were supported by the previous theoretical standpoints and empirical investigations in relation to engagement in general and reading engagement in particular. The constructed and validated scale in this study can be used to measure LORE in an attempt to design intervention programs to develop EFL learners' reading skills development. Moreover, the results can enhance EFL teachers' awareness concerning the multi-dimensionality of ORE, constituting six factors. Additionally, it is recommended that EFL teachers take measures to foster learners' linguistic and social engagement, as these two dimensions scored the lowest in comparison with other ORE facets. EFL teacher educators can also use the results of this study to promote EFL teachers' consciousness in regard to different dimensions of ORE.

Although the results of the current study revealed six components for ORE, further investigations are required to shed light on the other latent components of ORE that could not be uncovered in this study. Further investigations are also encouraged to inspect the validity and reliability of the developed scale in other contexts, as this study was carried out in an Eastern culture and an EFL setting. Future studies may plan interventions to explore the effect of fostering ORE on EFL learners' reading comprehension. Furthermore, future research may probe into the associations between ORE and other reading-related variables such as reading enjoyment, reading strategy use, and reading self-efficacy.

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