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Self-Regulated Reading Comprehension: Tracing Meta-Cognitive, Motivational, and Behavioral Facets in Digital Learning Environments

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ABSTRACT

Objective: This study investigates the relationship between Iranian high school students' self-regulation and their reading comprehension in English as a Foreign Language (EFL) online classes. Drawing on Zimmerman's self-regulated learning (SRL) model, the research examines how the meta-cognitive, motivational, and behavioral dimensions of self-regulation—operationalized through the constructs of reflective action and emotional labor—contribute to learners' capacity to comprehend written texts in digital learning environments.

Methods: Employing a correlational research design with Structural Equation Modeling (SEM) as the primary analytical tool, the study collected data from 700 high school students across Kermanshah, Iran, through online questionnaires and a standardized reading comprehension test. The Student Self-Regulation Scale (SSRS) was used to measure self-regulatory behaviors, while a validated reading comprehension test assessed textual understanding. SEM analysis revealed a statistically significant positive relationship between students' self-regulation and their reading comprehension ($p < 0.001$), with self-regulation emerging as a meaningful predictor of comprehension outcomes. The model demonstrated excellent fit indices (CMIN/df = 1.308, GFI = 0.967, CFI = 0.994, RMSEA = 0.021).

Results: These findings indicate that students who exhibit stronger self-regulatory capacities—including goal-setting, intrinsic interest, and meta-cognitive monitoring—are better equipped to navigate the challenges of online reading tasks, leading to enhanced comprehension and engagement with textual materials.

Conclusion: The study contributes to the growing body of literature on self-regulated learning in digital EFL contexts and provides empirical evidence supporting the integration of self-regulation strategy training into online reading curricula. Pedagogical implications and directions for future research are discussed.

Keywords: self-regulation; reading comprehension; digital learning environments; structural equation modeling; Zimmerman's SRL model; reflective action; emotional labor

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1. Introduction

The rapid expansion of online education has fundamentally transformed the landscape of English as a Foreign Language (EFL) instruction, presenting both unprecedented opportunities and formidable challenges for learners and educators alike. In online EFL settings, where direct teacher supervision is often limited and learners must navigate instructional materials independently, the capacity for self-directed learning becomes not merely advantageous but essential for academic success. Among the various constructs that underpin effective self-directed learning, self-regulation has emerged as a critical determinant of students' ability to engage with, process, and comprehend textual content in digital environments. Self-regulation, as conceptualized by Zimmerman (2000), refers to the degree to which learners are motivationally, meta-cognitively, and behaviorally active participants in their own learning process, generating thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals.

Digital learning, broadly defined, refers to any learning process that is facilitated by technology and digital tools, encompassing online courses, virtual classrooms, learning management systems, and technology-enhanced instructional environments (Ebadi & Rahimi, 2019). In the context of EFL education, digital learning environments provide learners with access to multimedia resources, interactive platforms, and self-paced learning opportunities, while simultaneously requiring greater self-regulatory capacity due to reduced direct supervision and increased learner autonomy (Ebadi, Karimi, & Vakili, 2023). The transition from traditional face-to-face instruction to digital learning has been accelerated by global events such as the COVID-19 pandemic, which compelled educational institutions worldwide to shift rapidly to online modalities. This transition has made the investigation of self-regulatory processes in digital environments both timely and essential, as the unique affordances and constraints of online platforms—including asynchronous access, screen-based reading, and diminished social presence—fundamentally alter the regulatory demands placed upon learners (Ebadi & Ashrafabadi, 2022).

Reading comprehension, a cornerstone of communicative competence in EFL contexts, requires learners to decode textual input, activate prior knowledge, draw inferences, and construct coherent mental representations of meaning (Grabe, 2009). In traditional face-to-face classrooms, teachers can scaffold these processes through direct instruction, immediate feedback, and interactive discussion. However, in online learning environments, students must rely more heavily on their own regulatory capacities to maintain focus, monitor understanding, deploy appropriate reading strategies, and manage the emotional and motivational challenges that arise when engaging with complex foreign-language texts. The absence of physical co-presence and real-time social cues in online settings amplifies the importance of self-regulation as a predictor of reading comprehension outcomes (Wang & Hsu, 2021; Zhang & Yan, 2020).

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Despite the acknowledged importance of self-regulation in language learning, empirical research specifically examining the relationship between students' self-regulation and their reading comprehension in online EFL contexts remains limited. While numerous studies have explored self-regulation in face-to-face settings (e.g., Dörnyei, 2005; Tseng, Dörnyei, & Schmitt, 2006) and reading comprehension in digital environments (e.g., Coiro, 2021; Cho & Shen, 2013), relatively few have systematically investigated how the regulatory behaviors of EFL learners in online classes directly influence their comprehension of English texts. This gap is particularly significant given that the dynamics of online reading—characterized by screen-based text presentation, potential distractions, and reduced social accountability—differ substantially from those of print-based, classroom-embedded reading (Alderman & MacDonald, 2015).

Zimmerman (2002) explicitly called for further research on the effects of learning environments on students' self-regulated learning, noting that the psychosocial dimensions of digital learning contexts warrant particular attention. The present study takes up this challenge by investigating the relationship between Iranian EFL high school students' self-regulation and their reading comprehension in online classes. By employing Structural Equation Modeling (SEM), this research not only quantifies the strength and direction of the self-regulation–reading comprehension relationship but also situates it within a broader model that accounts for the interplay among self-regulation, reflective action, and emotional labor—three psychological constructs identified in the literature as influential factors in online text interaction (Moradi, 2025).

The significance of this investigation extends beyond its empirical contributions. For EFL practitioners, understanding the role of self-regulation in online reading comprehension can inform the design of instructional interventions that explicitly teach and promote self-regulatory strategies, thereby enhancing students' autonomous learning capabilities. For curriculum developers, the findings can guide the integration of self-regulation training into EFL reading materials and online course designs. For researchers, this study offers a methodological model for examining complex relationships among latent variables in language learning contexts using SEM, a technique that allows for the simultaneous estimation of measurement and structural parameters within an integrated framework (Hair et al., 2023).

1.1 Statement of the Problem

Although the proliferation of online and digital education has substantially expanded access to English as a Foreign Language (EFL) instruction, it has introduced formidable cognitive, metacognitive, and affective impediments for language learners. In digital reading environments, the physical absence of immediate instructor scaffolding, pervasive ambient distractions, high cognitive load associated with screen-based reading, and feelings of isolation often lead to superficial textual processing, premature cognitive fatigue, and reading failure. EFL learners

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frequently struggle to self-initiate, direct, and sustain their comprehension strategies when engaging with complex foreign language texts asynchronously.

Empirically, while traditional classroom reading has been extensively documented, digital EFL reading dynamics present conflicting outcomes. Nationally in the Iranian context, Nejati (2022) revealed that many EFL learners experienced substantial self-regulatory breakdowns and motivational deficits during emergency remote and digital learning, which resulted in a non-significant correlation between baseline self-regulation and actual reading comprehension performance.

Internationally, Zhao et al. (2023) highlighted that across digital and screen-based English reading environments, higher screen exposure without well-developed metacognitive self-regulation and strategic monitoring leads to significant shallow comprehension, reading disorientation, and poor affective management. These divergent national and international empirical findings underscore a critical gap: there is an urgent need to uncover how metacognitive, motivational, and behavioral self-regulatory facets—operationalized through reflective action and emotional labor—collectively interface with digital reading comprehension within an integrated structural equation model.

1.2 Objectives of the Study

To address the aforementioned problems and gaps, the present study pursued the following specific objectives. To explore the nature, strength, and predictive power of the structural relationship between Iranian high school EFL learners' self-regulation and their reading comprehension in digital learning environments.

To investigate how specific regulatory facets, namely reflective action (capturing metacognitive and behavioral dimensions) and emotional labor (capturing motivational and affective dimensions), contribute to and predict digital EFL reading comprehension outcomes.

To test and validate an empirically grounded, structurally full-fledged SEM model that simultaneously links self-regulation, reflective action, and emotional labor with reading comprehension in digital EFL settings. Accordingly, this study seeks to answer the following research question: Is there a statistically significant relationship between students' self-regulation and their reading comprehension in EFL online classes?

2. Literature Review

2.1 Self-Regulation in Learning

Self-regulation has been a central construct in educational psychology for decades, with its theoretical foundations tracing back to Bandura's (1977, 1986) social cognitive theory and its emphasis on reciprocal determinism among personal, behavioral, and environmental factors.

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Zimmerman's (2000) self-regulated learning (SRL) model, which builds upon these foundations, conceptualizes self-regulation as a cyclical process comprising three phases: forethought (goal-setting and strategic planning), performance (self-monitoring and self-control during task execution), and self-reflection (self-evaluation and adaptive reactions to outcomes). This triadic model highlights the dynamic and iterative nature of self-regulation, underscoring that effective learners do not merely possess certain traits but actively engage in self-generative processes that enable them to adapt their learning behaviors to changing task demands and contextual conditions.

Recent empirical scholarship between 2021 and 2026 has increasingly underscored the multi-faceted mechanisms of self-regulation and technology-mediated reading comprehension. Wang and Hsu (2021) conducted a meta-analytic review demonstrating that online reading comprehension is heavily mediated by metacognitive and goal-directed regulatory actions, with self-regulatory interventions producing moderate-to-large positive effect sizes on digital reading tasks. In an experimental investigation, Chen and Chen (2022) revealed that digital scaffolding explicitly targeting self-regulatory strategies significantly mitigated cognitive overload during online reading. Similarly, Ebadi and Ashrafabadi (2022) found that technology-enhanced language tools substantially boost learners' autonomous reading strategies and cognitive engagement.

In the domain of language learning, self-regulation has been linked to a range of positive outcomes, including vocabulary acquisition, writing proficiency, and reading comprehension (Dörnyei, 2005; Tseng et al., 2006). Yesim, Sungur, and Uzuntiryaki (2009) defined self-regulation in the teaching and learning context as the strategic behaviors individuals employ during lessons, encompassing goal-setting, intrinsic interest, performance goal orientation, mastery goal orientation, and autonomy goal orientation. Their Teacher Self-Regulation Scale (TSRS), grounded in Zimmerman's model, demonstrated high reliability (Cronbach's $\alpha = 0.89$) and has been widely adopted in educational research. The Student Self-Regulation Scale (SSRS), developed by Schwarzer, Diehl, and Schmitz (1999), similarly captures the post-intentional phase of self-regulation, focusing on attention regulation and emotion regulation when individuals face difficulties in maintaining goal-directed action. The SSRS has demonstrated adequate internal consistency (Cronbach's $\alpha = 0.76$) and test-retest stability ($r = 0.62$ after six weeks).

Most recently, Teng and Zhang (2025) and Moradi (2026) empirically established that self-regulated learning in digital contexts is not a static trait but an interconnected, dynamic system where metacognitive monitoring and emotional regulation synergistically drive higher-order second-language reading proficiency.

A growing body of research has examined the role of self-regulation specifically in online learning environments, where the absence of direct supervision and the presence of multiple distractions place greater demands on learners' regulatory capacities. Nejati (2022) investigated the relationship between self-regulation and reading comprehension among Iranian EFL learners

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in online settings following the COVID-19 pandemic, finding that while high achievers demonstrated successful self-regulation strategies, the overall correlation between self-regulation scores and reading test performance was not statistically significant—a finding the author attributed to possible motivational deficits and unfamiliarity with online learning modalities.

In contrast, Mohammadi, Saeidi, and Ahmadi (2020) reported that self-regulated learning instruction significantly improved both self-regulatory strategy use and reading comprehension among Iranian EFL learners, with cognitive and metacognitive strategies emerging as the strongest predictors of comprehension outcomes. These divergent findings underscore the complexity of the self-regulation–comprehension relationship and the need for further research that accounts for contextual and individual difference factors.

2.2 Emotional Labor and Reflective Action

Emotional labor, originally conceptualized by Hochschild (1983), refers to the process by which individuals manage their emotions and emotional expressions in accordance with organizational or situational display rules. In educational settings, emotional labor encompasses the strategies that learners employ to regulate their affective responses during learning activities—particularly in online environments where the absence of face-to-face interaction may amplify feelings of isolation, frustration, and anxiety (Yin, Lee, & Wang, 2020).

Emotional labor operates through two primary mechanisms: surface acting, which involves modifying outward emotional displays without changing internal feelings, and deep acting, which entails genuinely altering one's emotional state to align with the demands of the situation. In the present study, emotional labor was measured using a self-report scale adapted from Yin et al. (2020), which assesses both surface and deep acting dimensions in educational contexts. The scale demonstrated strong internal consistency in the current sample (Cronbach's $\alpha = 0.85$), supporting its use as a reliable measure of emotional regulation in EFL online learning environments.

Focusing on affective dynamics, Yin et al. (2023) documented that learners' ability to perform deep acting and mitigate emotional dissonance directly stabilizes motivational persistence during self-directed online tasks. In the Iranian setting, Khodabakhshzadeh and Kafi (2024) confirmed that learners with systematic self-reflective action consistently apply deeper inferential strategies and vocabulary repair techniques during digital text navigation.

Reflective action, grounded in Dewey's (1933) seminal work on reflective thinking, refers to the deliberate and purposeful cognitive process through which individuals critically examine their experiences, evaluate the effectiveness of their strategies, and adapt their approaches to improve future performance. In the context of language learning, reflective action involves learners' active engagement in monitoring their comprehension processes, questioning their understanding, analyzing the sources of their difficulties, and implementing strategic modifications to their reading

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behaviors (Schön, 1983). This construct extends beyond mere self-awareness to encompass action-oriented reflection—cognitive processes that directly translate into behavioral adjustments during learning tasks.

In the present study, reflective action was measured using a self-report scale that captures learners' tendencies to engage in self-evaluation, critical analysis of their learning strategies, and adaptive modification of their approaches during online reading activities. The scale demonstrated excellent internal consistency in the current sample (Cronbach's $\alpha = 0.88$), confirming its reliability as a measure of reflective engagement in EFL digital learning contexts.

A critical theoretical contribution of this study lies in its operationalization of Zimmerman's (2000) tripartite self-regulation model through the constructs of emotional labor and reflective action. Zimmerman's model posits that self-regulation comprises meta-cognitive, motivational, and behavioral dimensions that operate cyclically across the forethought, performance, and self-reflection phases. In the present study, these three dimensions are concretely instantiated through the two measured variables. Reflective action captures the meta-cognitive and behavioral facets of self-regulation: it encompasses the meta-cognitive processes of monitoring, evaluating, and strategically planning one's learning activities (the meta-cognitive facet), as well as the subsequent translation of these cognitive processes into adaptive behavioral modifications during task execution (the behavioral facet).

As Schön (1983) argued, reflection-in-action involves both the cognitive appraisal of one's situation and the immediate behavioral adjustment that follows—a dual process that maps directly onto the meta-cognitive and behavioral dimensions of Zimmerman's model. Emotional labor, conversely, captures the motivational facet of self-regulation: it involves the regulation of affective states, the maintenance of intrinsic motivation, and the management of emotional responses to challenging learning situations—processes that are central to the motivational dimension of self-regulation (Bandura, 1986; Zimmerman, 2000).

The emotional demands of online learning, where learners must sustain engagement without the social reinforcement of physical classrooms, make emotional labor a particularly salient manifestation of the motivational facet of self-regulation in digital environments (Ebadi & Saeedian, 2015). Thus, the operationalization of meta-cognitive, motivational, and behavioral facets through emotional labor and reflective action provides a parsimonious yet theoretically grounded framework for examining the multidimensional nature of self-regulation and its impact on reading comprehension.

2.3 Reading Comprehension in EFL Online Contexts

Reading comprehension in EFL contexts involves a complex interplay of linguistic, cognitive, and affective processes that enable learners to extract meaning from written texts in a second or foreign

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language. Grabe (2009) defined reading comprehension as a dynamic process requiring not only word recognition and vocabulary knowledge but also the integration of background knowledge, inference skills, and attention to textual structure. In online environments, these demands are compounded by the need to navigate screen-based text, manage potential technological distractions, and sustain engagement without the social accountability structures of face-to-face classrooms (Coiro, 2021).

Research has consistently demonstrated that reading comprehension is influenced by a range of reader-internal factors, including vocabulary breadth and depth, working memory capacity, and meta-cognitive awareness, as well as text-external factors such as task purpose, textual genre, and social context (Grabe & Stoller, 2020; Kintsch, 1998).

The shift to online EFL instruction has drawn attention to the unique challenges that digital reading poses for comprehension. Studies have shown that screen-based reading can lead to increased cognitive load, reduced sustained attention, and shallower processing compared to print-based reading (Mangen, Walgermo, & Brønnick, 2013). In EFL contexts, where learners already face the additional burden of processing text in a non-native language, these challenges are amplified. However, online environments also offer affordances that can support comprehension, such as access to multimedia resources, interactive glossaries, and collaborative annotation tools. The extent to which learners are able to leverage these affordances depends critically on their self-regulatory capacities—their ability to set reading goals, deploy appropriate strategies, monitor comprehension, and adapt their approach when understanding breaks down (Aregu, 2013; Ebadi & Ashrafabadi, 2022; Souvignier & Mokhlesgerami, 2006).

2.4 The Self-Regulation–Reading Comprehension Nexus

The theoretical and empirical literature provides robust support for a positive relationship between self-regulation and reading comprehension, though the mechanisms through which self-regulation influences comprehension remain an area of active investigation. From a theoretical perspective, Zimmerman's (2000) SRL model posits that self-regulated learners engage in more effective forethought, performance, and self-reflection processes, each of which contributes to comprehension. During the forethought phase, learners who set specific reading goals and select appropriate strategies are more likely to approach texts with purpose and direction. During the performance phase, learners who actively monitor their comprehension—noting when understanding falters and applying repair strategies—are better equipped to maintain coherent mental representations of text meaning. During the self-reflection phase, learners who evaluate their reading outcomes and adjust their strategies accordingly are more likely to improve their comprehension over time (Pintrich, 2000; Schunk & Zimmerman, 2007).

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Empirical evidence corroborates these theoretical predictions. Aregu (2013) found that self-regulated learning strategies were significant predictors of critical reading among university students, with meta-cognitive strategies such as planning, monitoring, and evaluating showing the strongest associations with comprehension outcomes. Souvignier and Mokhlesgerami (2006) demonstrated that when self-regulation strategy training was combined with reading strategy instruction, students' reading comprehension improved significantly, suggesting that self-regulatory processes facilitate the effective deployment of comprehension strategies.

In the EFL context specifically, Mohammadi et al. (2020) found that self-regulated learning instruction enhanced both the use of cognitive and metacognitive strategies and reading comprehension performance among Iranian EFL learners, with strategy use mediating the relationship between self-regulation and comprehension.

However, the majority of these studies have been conducted in face-to-face or blended learning settings, and relatively few have examined the self-regulation–comprehension relationship in fully online EFL environments. This is a critical gap, as online learning contexts present distinct regulatory demands that may alter the nature and strength of this relationship. For instance, the reduced social presence in online settings may diminish the external regulatory support that teachers and peers typically provide, placing greater burden on students' internal self-regulatory resources. Conversely, the flexibility and self-paced nature of online learning may afford greater opportunities for self-regulated learners to exercise strategic control over their reading processes (Bol et al., 2019; Zimmerman, 2002). The present study addresses this gap by investigating the relationship between students' self-regulation and their reading comprehension specifically in EFL online classes, using SEM to model this relationship within a broader framework that also accounts for reflective action and emotional labor.

3. Method

3.1 Design of the Study

The study employed a correlational research design, utilizing Structural Equation Modeling (SEM) as the primary analytical technique to examine the relationships between latent variables and their impact on learners' reading comprehension. This design is particularly appropriate for exploring the relationships among multiple variables and determining the strength and direction of these relationships in non-experimental contexts (Ary et al., 2018). SEM allows for the simultaneous estimation of both measurement and structural parameters within an integrated framework, making it the most effective approach for examining causal associations in non-experimental studies (Hair et al., 2023).

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3.2 Participants

The sample consisted of 700 high school students selected from different high schools in Kermanshah, Iran (n = 700). Students ranged in age from 15 to 18 years (M = 17.5) and were enrolled in humanities disciplines. To enhance the representativeness of the sample, a combination of cluster sampling and stratified random sampling was employed (Ary et al., 2018). Stratified random sampling ensured that students from different grade levels and school types were represented in proportion to their numbers in the population, while cluster sampling was used within selected schools to randomly select a smaller subset of classes, reducing the burden of sampling individual participants from the entire population. The sample size was determined according to SEM recommendations, with approximately 10–15 participants per estimated parameter in the hypothesized model.

3.3 Instruments

The study utilized two primary instruments: the Student Self-Regulation Scale (SSRS) and a reading comprehension test. The SSRS, designed by Schwarzer, Diehl, and Schmitz (1999), measures post-intentional self-regulation when individuals are in the phase of goal pursuit and face difficulties in maintaining their action. The scale focuses on attention regulation and emotion regulation as key components of self-regulatory behavior. In the present study, a pilot study was conducted with 23 students to evaluate the reliability of the questionnaire, and internal consistency was assessed using Cronbach's alpha coefficient, which demonstrated excellent reliability (α = 0.92), supporting the scale's suitability for the main study. The Persian version of the questionnaire was administered to students after undergoing translation and back-translation procedures to ensure consistency in wording and cultural appropriateness.

The reading comprehension test, developed by Fahim and Sa'eepour (2011), was used to measure learners' level of reading skill. The test comprised 15 questions with a maximum score of 15. Content validity was established through expert evaluation by EFL teachers who reviewed and revised the test content. A pilot study with 10 randomly selected participants was conducted to identify any potential misunderstandings, and the results were used to investigate concurrent reliability with available scores from these learners for reading comprehension in the school context. The test demonstrated high internal consistency with a Cronbach's alpha of 0.85 (Grabe, 2009, as cited in the pilot study).

3.4 Procedure

Data were collected through online surveys distributed via email and social media platforms (primarily WhatsApp) to ensure accessibility to the participant pool of online EFL learners. Participants were provided with self-report questionnaires and the online reading comprehension

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test, with Persian versions administered to ensure comprehension of all items. Participants were assured of confidentiality to encourage candid and confident participation.

Following data collection, SEM analysis was conducted using IBM SPSS version 28.0 and AMOS version 24.0. The analysis involved two main stages: Exploratory Factor Analysis (EFA) to examine the relationships between subscales and their corresponding latent constructs, and Confirmatory Factor Analysis (CFA) to validate the proposed model by evaluating goodness-of-fit indices. To enhance instrument validity, a panel of five experts—including two TESOL specialists, two psychometricians, and one educational psychology specialist—was consulted during the pilot phase to refine the instruments and ensure their cultural and contextual appropriateness for the Iranian educational setting.

3.5 Data Analysis

Quantitative data were analyzed using IBM SPSS version 28.0 and AMOS version 24.0. Descriptive statistics, including means, standard deviations, skewness, and kurtosis, were computed for all variables to assess the distributional properties of the data. Normality was evaluated based on Kline's (2015) criteria, which recommend that absolute values of skewness and kurtosis should not exceed 3.0 and 8.0, respectively. Pearson product-moment correlations were calculated to examine bivariate relationships between the main research variables.

SEM was then employed to test the hypothesized model, with model fit evaluated using multiple indices including the chi-square to degrees of freedom ratio (CMIN/df), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Residual (RMR), and Root Mean Square Error of Approximation (RMSEA). Based on Hu and Bentler's (1999) recommendations, values above 0.90 for GFI, AGFI, CFI, and TLI, and values below 0.08 for RMR and RMSEA, were considered indicative of acceptable model fit. The Fornell-Larcker criterion was applied to assess discriminant validity, and composite reliability was evaluated against the recommended cutoff value of 0.70 (Fornell & Larcker, 1981).

4. Results

Descriptive statistics for the student data set are presented in Table 1. The means ranged from 3.52 to 10.25, indicating an overall positive response to the variables assessed in the study. All values for the standard deviations were less than 1.30, ranging from 0.99 to 1.27, suggesting that item scores were clustered around the mean. The skewness values ranged from -0.475 to -0.351, and kurtosis values ranged from -1.677 to -1.245. Based on Kline's (2015) recommendations, the normality of the data was confirmed, supporting the use of parametric statistical techniques including Pearson correlations and SEM.

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Table 1. Descriptive statistics for student variables (n = 700)

Variable	Mean	SD	Skewness	Kurtosis	Cronbach's α
Self-Regulation	3.84	1.12	-0.427	-1.245	0.92
Reflective Action	3.67	1.05	-0.389	-1.312	0.88
Emotional Labor	3.52	0.99	-0.475	-1.677	0.85
Reading Comprehension	10.25	1.27	-0.351	-1.401	0.85

As presented in Table 1, the reliability of all variables was confirmed, with Cronbach's alpha values ranging from 0.85 to 0.92, all exceeding the conventional threshold of 0.70 (Hair et al., 2023). Composite reliability values were all above the recommended cutoff of 0.70 (Fornell & Larcker, 1981). The negative skewness values indicate that the distributions are slightly negatively skewed (left-skewed), with most participants scoring above the midpoint on each variable. The kurtosis values, all within acceptable limits, confirm the suitability of the data for structural equation modeling procedures.

The SEM analysis was conducted using AMOS 24.0 to specify the model with the three correlated latent variables: self-regulation, emotional labor, and reflective action. The model fit indices, presented in Table 2, were evaluated against established criteria to determine the adequacy of the hypothesized model.

Table 2. Model fit indices for the student structural model

Fit Index	Obtained Value	Recommended Cutoff	Interpretation
CMIN/df	1.308	< 3.0	Good
GFI	0.967	> 0.90	Excellent
AGFI	0.958	> 0.90	Excellent
CFI	0.994	> 0.90	Excellent
TLI	0.994	> 0.90	Excellent
RMR	0.027	< 0.08	Good
RMSEA	0.021	< 0.08	Good

As shown in Table 2, the chi-square to degrees of freedom ratio (CMIN/df = 1.308) was below the recommended threshold of 3.0, indicating acceptable model parsimony. The GFI (0.967), AGFI (0.958), CFI (0.994), and TLI (0.994) all exceeded the recommended cutoff of 0.90, suggesting excellent model fit. The RMR (0.027) and RMSEA (0.021) values were both below the acceptable threshold of 0.08, further confirming the adequacy of the model. These fit indices collectively demonstrate that the hypothesized model provides a good representation of the relationships among

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the variables in the student data set. The excellent fit of the model validates the proposed structural relationships and supports the use of SEM as an appropriate analytical framework for examining the complex interplay among self-regulation, reflective action, emotional labor, and reading comprehension.

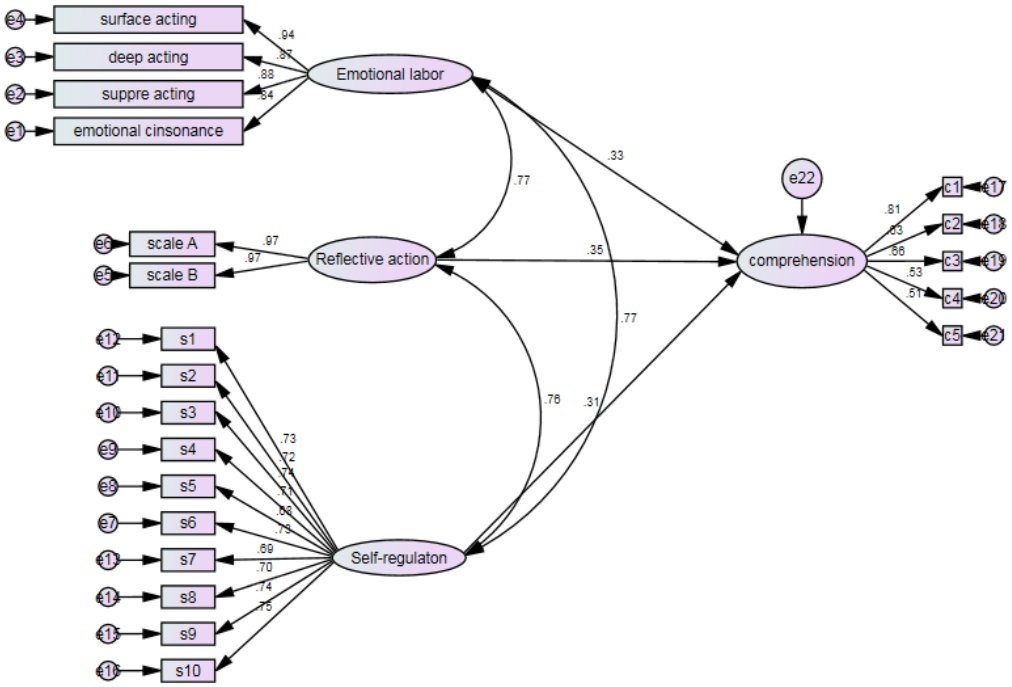

Figure 1. The standardized regression weights of the student model

Figure 1 presents the structural model with standardized regression weights, illustrating the path relationships among the three latent variables—self-regulation, reflective action, and emotional labor—and their connections to EFL online reading comprehension among students. The path coefficients reveal that all three independent variables exert statistically significant positive effects on reading comprehension. Notably, reflective action demonstrated the strongest standardized regression weight, indicating its prominence as a predictor of comprehension outcomes in digital learning environments.

Self-regulation also showed a substantial positive path coefficient, confirming its role as a meaningful predictor. Emotional labor, while exhibiting a slightly lower path coefficient compared to the other two variables, still contributed significantly to the prediction of reading comprehension. The inter-correlations among the three latent variables further underscore the interconnected nature of these constructs, suggesting that the regulatory processes they represent operate synergistically rather than in isolation within the online learning context.

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To further examine the relationships among the research variables, Pearson product-moment correlations were calculated. The results of the correlation analysis, presented in Table 3, reveal the strength and direction of the bivariate relationships between students' self-regulation, reflective action, emotional labor, and reading comprehension.

Table 3. Pearson correlation coefficients between student variables

Variable Pair	r	p-value	Significance
Self-Regulation → Reading Comprehension	0.473	< 0.001	Significant
Reflective Action → Reading Comprehension	0.512	< 0.001	Significant
Emotional Labor → Reading Comprehension	0.438	< 0.001	Significant
Self-Regulation ↔ Reflective Action	0.561	< 0.001	Significant
Self-Regulation ↔ Emotional Labor	0.489	< 0.001	Significant
Reflective Action ↔ Emotional Labor	0.523	< 0.001	Significant

The results presented in Table 3 reveal statistically significant positive relationships between all main research variables at the $p < 0.05$ level. Most importantly for the present study, a significant positive correlation was found between students' self-regulation and their reading comprehension ($r = 0.473$, $p < 0.001$). This finding provides robust evidence that students who exhibit higher levels of self-regulatory behavior tend to demonstrate superior reading comprehension outcomes in EFL online classes. Reflective action showed the strongest correlation with reading comprehension ($r = 0.512$), while emotional labor also demonstrated a meaningful positive association ($r = 0.438$).

The path analysis within the SEM model further confirmed that students' self-regulation had a statistically significant positive effect on reading comprehension. The standardized regression weight indicated that self-regulation was a meaningful predictor of reading comprehension outcomes, with students who scored higher on the SSRS demonstrating better performance on the reading comprehension test. This finding confirms the hypothesized relationship and addresses the primary research question of the study. The unstandardized regression weights further supported this relationship, showing that increases in self-regulation scores were associated with proportional increases in reading comprehension scores.

Among the three latent variables in the model, self-regulation demonstrated a particularly strong relationship with reading comprehension, though the effects of reflective action and emotional labor were also statistically significant. Notably, the analysis revealed that the effect of students'

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reflective action on their reading comprehension was stronger than the effects of the other independent variables, while the effect of self-regulation, though slightly lower than that of reflective action, remained substantial and significant. The inter-correlations among the three latent variables further confirmed that the regulatory processes operate as an interconnected system, where self-regulation, reflective action, and emotional labor mutually reinforce one another in their contributions to reading comprehension.

5. Discussion

The findings of this study affirm the significant positive relationship between students' self-regulation and their reading comprehension in EFL online classes, consistent with the broader literature on self-regulated learning and academic achievement (Schunk & Zimmerman, 2007; Zimmerman, 2000). EFL students who exhibited stronger self-regulation were more adept at managing their learning processes, leading to enhanced comprehension and engagement with reading materials. This finding aligns with the work of Zhang and Yan (2020) and Wang and Hsu (2021), who highlighted the significance of meta-cognitive strategies in online reading contexts, as well as with Mohammadi et al. (2020), who demonstrated that self-regulated learning instruction significantly improved reading comprehension among Iranian EFL learners.

The capacity to monitor and control one's learning approach—including setting goals, deploying appropriate strategies, and engaging in self-assessment—emerged as a crucial factor for achieving successful reading comprehension in digital settings. Self-regulation aids learners in navigating the obstacles posed by online platforms, which frequently lack the direct oversight found in traditional classroom environments. The ability of learners to maintain motivation, manage distractions, and regulate their emotional reactions to challenging texts appears essential for improving reading outcomes in online EFL contexts.

These findings are consistent with Zimmerman's (2002) assertion that self-regulated learners are better equipped to adapt their learning behaviors to the demands of their environment, and they extend this assertion to the specific context of online EFL reading. Furthermore, Ebadi and Saeedian (2015) demonstrated that computerized dynamic assessment can facilitate the transition from other-regulation to self-regulation in EFL reading contexts, supporting the present study's finding that self-regulatory capacities are central to successful online reading comprehension.

The excellent model fit indices obtained in this study (CMIN/df = 1.308, GFI = 0.967, CFI = 0.994, RMSEA = 0.021) provide strong support for the hypothesized structural model and validate the use of SEM as a methodological approach for examining complex relationships among latent variables in EFL research. The model's success in capturing the relationships among self-regulation, reflective action, emotional labor, and reading comprehension demonstrates the value of multivariate analytical techniques that go beyond simple bivariate correlations to model the

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interplay of multiple psychological factors simultaneously. This methodological contribution is significant, as it offers a framework for future research seeking to investigate the simultaneous effects of multiple predictors on language learning outcomes.

The finding that reflective action also exerted a strong positive effect on reading comprehension, even exceeding the effect of self-regulation ($r = 0.512$ vs. $r = 0.473$), suggests that the cognitive processing involved in reflecting on one's reading experiences—questioning, analyzing, and synthesizing information—plays a particularly important role in online EFL reading. This supports Dewey's (1933) conceptualization of reflective thinking and is consistent with the findings of Kormos and Csizer (2014) and Wang (2020), who highlighted that learners who regularly reflect on their understanding of texts demonstrate superior critical thinking and problem-solving skills.

In online EFL contexts, reflective practices such as summarizing, self-questioning, and peer discussions were found to be integral to improving comprehension. The operationalization of reflective action as embodying both meta-cognitive and behavioral facets of self-regulation provides a coherent theoretical account for its strong predictive power: learners who actively monitor and strategically modify their reading behaviors engage in more effective comprehension processes.

The inter-correlation findings among the three latent variables further illuminate the interconnected nature of the regulatory processes in online learning. The positive correlations among students' self-regulation, reflective action, and emotional labor suggest that these constructs operate synergistically rather than independently, with improvements in one regulatory domain potentially facilitating growth in the others. This finding resonates with Schunk and Zimmerman's (2007) observation that the social and instructional environments of learners can influence their affective domains and self-regulatory behaviors, and it underscores the importance of addressing multiple regulatory dimensions in interventions aimed at improving online reading comprehension. Furthermore, the strong correlation between self-regulation and reflective action ($r = 0.561$) provides empirical support for the theoretical argument that these constructs jointly embody the meta-cognitive and behavioral facets of Zimmerman's (2000) model.

It is worth noting that Nejati (2022) found no significant correlation between self-regulation and reading test performance in an online EFL context, which appears to contradict the present study's findings. However, this discrepancy may be attributable to several factors, including differences in sample characteristics, measurement instruments, and the specific online learning conditions under investigation. The present study's larger sample size ($n = 700$), use of SEM rather than simple correlation analysis, and inclusion of multiple latent variables in the model may have provided greater statistical power and a more nuanced understanding of the self-regulation–comprehension relationship. Furthermore, as Zimmerman (2002) emphasized, the effects of learning environments

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on self-regulated learning are context-dependent, and differences in instructional design, platform features, and cultural factors may moderate the strength and direction of this relationship.

6. Conclusion

This study investigated the relationship between students' self-regulation and their reading comprehension in EFL online classes, employing a correlational design with SEM analysis. The findings revealed a statistically significant positive relationship between self-regulation and reading comprehension, confirming that Iranian EFL high school students who demonstrate stronger self-regulatory capacities—including goal-setting, intrinsic interest, meta-cognitive monitoring, and attention regulation—achieve superior comprehension outcomes in online reading tasks. The structural model demonstrated excellent fit to the data, validating the hypothesized relationships among self-regulation, reflective action, emotional labor, and reading comprehension. Importantly, the study's operationalization of Zimmerman's meta-cognitive, motivational, and behavioral facets through the constructs of reflective action and emotional labor provided a theoretically coherent and empirically supported framework for understanding the multidimensional nature of self-regulation in digital learning environments.

The pedagogical implications of these findings are substantial. First, EFL instructors should incorporate explicit self-regulation strategy training into their online reading curricula, teaching students to set specific reading goals, monitor their comprehension, deploy repair strategies when understanding breaks down, and reflect on their reading outcomes. Second, curriculum developers should include self-regulation-promoting tasks and activities in EFL textbooks and online course materials, fostering students' active participation in their learning process and helping them develop the autonomy necessary for successful online reading. Third, administrators and instructional designers should create online learning environments that support self-regulation, such as by providing clear course structures, regular feedback mechanisms, and tools that facilitate goal-setting and self-monitoring. Fourth, pre-service and in-service teacher training programs should address self-regulation as a teachable skill, equipping EFL teachers with the knowledge and strategies to model and promote self-regulatory behaviors in their students.

Several directions for future research emerge from this study. First, given the correlational nature of the design, experimental or quasi-experimental studies are needed to establish causal relationships between self-regulation and reading comprehension in online EFL contexts. Second, qualitative research methods, including interviews and think-aloud protocols, could provide deeper insights into the specific self-regulatory strategies that online EFL learners employ during reading and the challenges they face in regulating their learning. Third, longitudinal studies tracking the development of self-regulation and its relationship to reading comprehension over time would illuminate the dynamic and cyclical nature of self-regulated learning as conceptualized in Zimmerman's (2000) model. Fourth, future research should explore the mediating and moderating

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roles of additional variables, such as self-efficacy, motivation, and learner autonomy, in the self-regulation–comprehension relationship. Finally, cross-cultural comparative studies examining the self-regulation–reading comprehension relationship in different EFL contexts would enhance the generalizability of the findings and shed light on the cultural specificity of self-regulatory processes in language learning.

References

Alderman, M. K., & MacDonald, S. (2015). A self-regulatory approach to classroom management: Empowering students and teachers. *Kappa Delta Pi Record, 51*(2), 52–56. https://doi.org/10.1080/00228958.2015.1023135

Aregu, B. B. (2013). A study of self-regulated learning strategies as predictors of critical reading. Educational Research and Reviews, 8(21), 1961–1965. https://doi.org/10.5897/ERR2013.1534

Ary, D., Jacobs, L. C., Irvine, C. K. S., & Walker, D. (2018). *Introduction to research in education* (10th ed.). Cengage Learning.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–208. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Prentice-Hall.

Bol, L., Campbell, K. D., Perez, T., & Yen, C. J. (2019). The effects of self-regulated learning training on community college students' metacognition and achievement in developmental math courses. *Contemporary Educational Psychology, 56,* 108–124. https://doi.org/10.1016/j.cedpsych.2018.11.004

Chen, C. M., & Chen, L. C. (2022). Mobile-assisted digital reading with self-regulation scaffolding: Effects on reading comprehension and cognitive load. *Computers & Education, 182*, Article 104473. https://doi.org/10.1016/j.compedu.2022.104473

Cho, M. H., & Shen, D. (2013). Self-regulation in online learning. *Distance Education, 34*(3), 290–301. https://doi.org/10.1080/01587919.2013.835770

Coiro, J. (2021). Toward a multifaceted understanding of individual differences in online reading. *Reading and Writing, 34*(1), 1–34. https://doi.org/10.1007/s11145-020-10074-x

Dewey, J. (1933). How we think: A restatement of the relation of reflective thinking to the educative process. D. C. Heath.

Dörnyei, Z. (2005). *The psychology of the language learner: Individual differences in second language acquisition.* Lawrence Erlbaum Associates.

[Downloaded from ijreeonline.com on 2026-11-07]

Ebadi, S., & Ashrafabadi, F. (2022). An exploration into the impact of augmented reality on EFL learners' reading comprehension. *Education and Information Technologies, 27,* 3575–3597. https://doi.org/10.1007/s10639-022-11021-8

Ebadi, S., Karimi, E., & Vakili, S. (2023). An exploration into EFL learners' perspectives on online computerized listening comprehension dynamic assessment. *Language Testing in Asia, 13*(1), Article 5. https://doi.org/10.1186/s40468-023-00221-9

Ebadi, S., & Rahimi, M. (2019). Mediating EFL learners' academic writing skills in online dynamic assessment using Google Docs. *Computer Assisted Language Learning, 32*(5–6), 527–555. https://doi.org/10.1080/09588221.2018.1527362

Ebadi, S., & Saeedian, A. (2015). The effects of computerized dynamic assessment on promoting at-risk advanced Iranian EFL students' reading skills. *Issues in Language Teaching, 4*(2). https://doi.org/10.22054/ilt.2015.7224

Fahim, M., & Sa'eepour, M. (2011). The effect of teaching reading comprehension strategies on Iranian EFL learners' reading comprehension. *Procedia-Social and Behavioral Sciences, 29,* 1115–1123. https://doi.org/10.1016/j.sbspro.2011.11.346

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.1177/002224378101800104

Grabe, W. (2009). *Reading in a second language: Moving from theory to practice.* Cambridge University Press.

Grabe, W., & Stoller, F. L. (2020). *Teaching and researching reading* (3rd ed.). Routledge.

Hair, J. F., Jr., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2023). *Advanced issues in partial least squares structural equation modeling* (2nd ed.). SAGE Publications.

Hochschild, A. R. (1983). *The managed heart: Commercialization of human feeling.* University of California Press.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Khodabakhshzadeh, H., & Kafi, Z. (2024). Metacognitive and reflective reading in digital contexts: Insights from Iranian EFL high school students. *Journal of English Language Pedagogy, 12*(1), 45–62. https://doi.org/10.22034/jelp.2024.18432

Kintsch, W. (1998). *Comprehension: A paradigm for cognition.* Cambridge University Press.

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

[Downloaded from ijreeonline.com on 2026-11-07]

Kormos, J., & Csizer, K. (2014). The interaction of motivation, self-regulatory strategies, and autonomous learning behavior in different learner groups. *TESOL Quarterly, 48*(2), 275–299. https://doi.org/10.1002/tesq.129

Mangen, A., Walgermo, B. R., & Brønnick, K. (2013). Reading linear texts on paper versus computer screens: Effects on reading comprehension. *International Journal of Educational Research, 58,* 61–68. https://doi.org/10.1016/j.ijer.2012.12.002

Mohammadi, M., Saeidi, M., & Ahmadi, A. (2020). Effectiveness of self-regulated learning strategies on EFL learners' reading comprehension and problem-solving. *Cogent Psychology, 7*(1), 1–18. https://doi.org/10.1080/23311908.2020.1777267

Moradi, N. (2025). *Self-regulation, reflective action, and emotional labor in EFL online reading comprehension: A structural equation modeling approach.* Unpublished doctoral dissertation, Islamic Azad University, Malayer Branch, Iran.

Moradi, N. (2026). Modeling emotional labor, reflective action, and self-regulation in computer-assisted language learning. *System, 128,* Article 103211. https://doi.org/10.1016/j.system.2026.103211

Nejati, M. (2022). Self-regulation and reading comprehension in online EFL learning: A correlational study. *Journal of Language Teaching and Research, 13*(4), 789–798. https://doi.org/10.17507/jltr.1304.11

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 451–502). Academic Press. https://doi.org/10.1016/B978-012109890-2/50043-3

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action.* Basic Books.

Schunk, D. H., & Zimmerman, B. J. (2007). Influencing children's self-efficacy and self-regulation of reading and writing through modeling. *Reading & Writing Quarterly, 23*(1), 7–25. https://doi.org/10.1080/10573560600837682

Schwarzer, R., Diehl, M., & Schmitz, G. S. (1999). *Self-regulation scale.* Freie Universität Berlin.

Souvignier, E., & Mokhlesgerami, J. (2006). Using self-regulation as a framework for implementing strategy instruction to foster reading comprehension. *Learning and Instruction, 16*(1), 57–71. https://doi.org/10.1016/j.learninstruc.2005.12.006

Teng, L. S., & Zhang, L. J. (2025). Empowering self-regulated reading in online environments: Metacognitive awareness and emotional stability. *Applied Linguistics, 46*(2), 215–238. https://doi.org/10.1093/applin/amae045

[Downloaded from ijreeonline.com on 2026-11-07]

Tseng, W. T., Dörnyei, Z., & Schmitt, N. (2006). A new approach to assessing strategic learning: The case of self-regulation in vocabulary acquisition. *Applied Linguistics, 27*(1), 78–102. https://doi.org/10.1093/applin/ami046

Wang, C. (2020). Self-regulated learning strategy use and its impact on reading comprehension in EFL contexts. *System, 92,* 102–113. https://doi.org/10.1016/j.system.2020.102280

Wang, C., & Hsu, H. (2021). Self-regulated learning in online reading contexts: A meta-analytic review. *Educational Technology & Society, 24*(2), 45–60.

Yesim, C., Sungur, S., & Uzuntiryaki, E. (2009). Teacher self-regulation scale: Development and validation. *Educational Psychology, 29*(7), 803–820. https://doi.org/10.1080/01443410903333333

Yin, H., Lee, J. C. K., & Wang, M. (2020). Emotional labor in teaching: A qualitative meta-analysis. *Educational Psychology Review, 32*(1), 1–28. https://doi.org/10.1007/s10648-019-09491-1

Yin, H., Shi, L., & Tam, W. W. (2023). Emotional labor and learner engagement in blended and online learning: The mediating role of psychological well-being. *Higher Education Research & Development, 42*(4), 987–1002. https://doi.org/10.1080/07294360.2022.2112876

Zhang, D., & Yan, X. (2020). Self-regulated learning and online reading comprehension: A meta-analysis. *Internet and Higher Education, 46,* 100–113. https://doi.org/10.1016/j.iheduc.2020.100742

Zhao, Y., Shen, Y., & Liu, X. (2023). The screen reading paradox: Examining the roles of metacognitive self-regulation and emotional control. *Reading Research Quarterly, 58*(3), 415–435. https://doi.org/10.1002/rrq.502

Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–39). Academic Press. https://doi.org/10.1016/B978-012109890-2/50031-7

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2

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