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ORIGINAL RESEARCH PAPER

How Well do Self-Regulation and Engagement Predict Learning outcomes? Exploring Online English Classes in an Iranian University

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ABSTRACT

Background and Objectives: Recognizing the unique requirements of online education is crucial due to its wide spread use. Self-regulation in learning seems essential for this instructional approach, as students and instructors are physically separated. To effectively manage their time, establish goals, and sustain motivation, individuals must adopt practical strategies. Active engagement in the learning process is also vital, requiring students to actively participate, contribute, and engage with instructors and peers. Assessing students' self-regulation and engagement can help educational managers and professors supervise the educational process and implement necessary measures when student participation is lacking. The objective of this study was to investigate how self-regulated learning and engagement contribute to outcomes of leaning as measured in terms of reading comprehension skills of Iranian students in online classrooms.

Materials and Methods: The study investigated research questions using two questionnaires and a test, namely, the Online self-regulation questionnaire (OSQ), the Online Student Engagement Scale (OSE), and the reading part of the Test of English as a Foreign Language. The self-regulation questionnaire had three constructs with 10 items each, while the engagement questionnaire had four constructs with 19 items. These scales were translated into Persian and sent to 345 students. Out of the 287 returned questionnaires, 21 were excluded due to inattention. The remaining 266 responses, along with their test scores, were analyzed statistically. Both the questionnaires and the language test were administered via the LMS in 2022.

Findings: The data underwent a rigorous process of statistical analyses to evaluate reliability, construct validity, and the relationships between variables. These analyses aimed to ensure the accuracy and robustness of the findings. To assess reliability, Cronbach's Alpha coefficients were calculated for three key variables: Engagement, Self-regulation, and Reading. The obtained coefficients were .89, .94, and .86, respectively. These values indicate high levels of internal consistency within each variable, suggesting that the measurement instruments used to assess these constructs were reliable. Construct validity was also examined through Root Mean Square Error of Approximation (RMSEA) values for Engagement, Self-regulation, and Reading. The reported RMSEA values were .08, .07, and .01, respectively. These values fall within an acceptable range, indicating that the measurement models adequately fit the observed data and supported the construct validity of the variables. All three variables (Engagement, Self-regulation, and Reading) exhibited statistically significant t-values, providing strong evidence that students' engagement, self-regulation, and reading ability were deemed satisfactory based on the collected data. The analysis revealed a significant positive correlation between regulatory engagement and reading comprehension. This finding suggests that higher levels of regulatory engagement are associated with better reading comprehension skills among students. Additionally, a regression analysis was conducted to explore the associations between specific factors and reading comprehension. The results indicated that both 'performance' and 'student-student interactions' had strong and positive associations with reading comprehension. The beta coefficients for these variables were 0.25 and 0.21, respectively. This implies that improvements in performance and increased student-student interactions are related to enhanced reading comprehension abilities.

Conclusions: The relationship between regulatory engagement and reading comprehension holds significant implications for educators and policymakers. Understanding this connection is essential to develop effective interventions and instructional approaches aimed at enhancing students' regulatory engagement abilities, ultimately leading to improved reading comprehension outcomes. However, it is important to acknowledge that the study conducted had certain limitations that restricted its scope and prevented a thorough examination of all potential factors influencing reading comprehension skills. To gain a more comprehensive understanding of the topic, future research should explore additional variables beyond regulatory engagement. For instance, considering the influence of cultural background on reading comprehension can provide valuable insights into how diverse learners may approach and interpret texts differently. Similarly, investigating various teaching methods employed in different educational settings can shed light on the effectiveness of specific instructional approaches in promoting reading comprehension. Furthermore, individual cognitive factors such as working memory and attentional control warrant attention in future studies. These cognitive processes play integral roles in reading comprehension, and exploring their impact can help identify strategies to support students with specific cognitive profiles or challenges.

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
66	0	7

مقاله پژوهشی

خود تنظیمی و مشارکت چقدر نتایج یادگیری را پیش‌بینی می‌کنند؟ بررسی کلاس‌های آنلاین انگلیسی در یک دانشگاه ایرانی

رضا نجاتی

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چکیده

پیشینه و اهداف: شناخت الزامات منحصر به فرد آموزش برخط به دلیل گستردگی آن بسیار ضروری است. خودتنظیمی در یادگیری برای این رویکرد آموزشی ضروری است، زیرا دانش آموزان و معلمان از نظر فیزیکی از هم جدا هستند. افراد برای مدیریت موثر زمان خود، ایجاد اهداف و حفظ انگیزه، باید راهبردهای عملی اتخاذ کنند. مشارکت فعال در فرآیند یادگیری نیز مهم است و دانشجویان را ملزم به مشارکت فعال، مشارکت و تعامل با مربیان و همسالان می کند. ارزیابی خودتنظیمی و مشارکت دانشجویان می‌تواند به مدیران و استادان کمک کند تا بر روند آموزشی نظارت کنند و در مواقعی که مشارکت دانشجویان کم است، اقدامات لازم را انجام دهند. این مطالعه با هدف بررسی تأثیر مشارکت و خودتنظیمی یادگیری بر نتایج یادگیری درک مطلب دانشجویان ایرانی در کلاس‌های برخط انجام شده است.

روش‌ها: این پژوهش با استفاده از دو پرسشنامه و یک آزمون انجام شد. از پرسشنامه خودتنظیمی یادگیری، مقیاس مشارکت دانشجویی برخط و بخش خواندن آزمون زبان انگلیسی به عنوان زبان خارجی استفاده شد. پرسشنامه خودتنظیمی دارای سه سازه با ۳۰ گویه و پرسشنامه مشارکت چهار سازه با ۱۹ گویه بود. این مقیاس ها به فارسی ترجمه و برای ۳۴۵ دانشجو ارسال شد. از ۲۸۷ پرسشنامه برگشتی، ۲۱ پرسشنامه به دلیل بی دقتی پاسخ دهندگان حذف شدند. ۲۶۶ پاسخ باقیمانده، همراه با نمره آزمون آزمون آنها، مورد تجزیه و تحلیل آماری قرار گرفت. آزمون درک مطلب و پرسشنامه ها از طریق سامانه آموزش مجازی دانشگاه در پاییز ۱۴۰۱ اجرا شد.

یافته‌ها: برای ارزیابی پایایی، ضرایب آلفای کرونباخ برای سه متغیر کلیدی مشارکت فعال، خودتنظیمی یادگیری و خواندن و درک مطلب محاسبه شد. ضرایب به دست آمده به ترتیب ۰/۸۹، ۰/۹۴ و ۰/۸۶ بود. این مقادیر نشان می‌دهد که ابزار اندازه‌گیری مورد استفاده برای ارزیابی این سازه‌ها قابل اعتماد هستند. روایی سازه نیز از طریق مقادیر ریشه میانگین مربعات خطای تقریب (RMSEA) برای متغیرها بررسی شد. مقادیر RMSEA گزارش شده به ترتیب ۰.۰۸، ۰.۰۷ و ۰.۰۱ بود. این مقادیر در محدوده قابل قبولی قرار می‌گیرند که نشان می‌دهد مدل‌های اندازه‌گیری به اندازه کافی با داده‌های مشاهده‌شده تناسب دارند . هر سه متغیر (مشارکت فعال، خودتنظیمی و خواندن) مقادیر t آماری معنی‌داری را نشان دادند که بر توانی های فراگیران دلالت می کند. رابطه مثبت معناداری بین مشارکت نظارتی و درک مطلب مشاهده شد. این یافته نشان می‌دهد که سطوح بالاتر مشارکت نظارتی با مهارت‌های درک مطلب بهتر در بین دانش‌آموزان مرتبط است. علاوه بر این، تحلیل رگرسیون نشان داد که سازه های «عملکرد» و «تعامل دانشجو-دانشجو» با درک مطلب ارتباط قوی و مثبتی دارند. ضرایب بتا برای این متغیرها به ترتیب ۰.۲۵ و ۰.۲۱ بود. این نشان می‌دهد که بهبود عملکرد و افزایش تعاملات دانشجویان با افزایش توانایی‌های درک مطلب مرتبط است.

نتیجه‌گیری: رابطه بین مشارکت نظارتی و درک مطلب، پیام مهمی برای استادان و مدیران دارد. درک این ارتباط به منظور طراحی برنامه های مؤثر و رویکردهای آموزشی برای افزایش توانایی‌های مشارکت نظارتی دانشجویان ضروری است. با این حال، باید اذعان کنیم که مطالعه انجام شده دارای محدودیت‌های خاصی بود که دامنه آن را محدود

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خواندن و درک مطلب

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می‌کرد و از بررسی کامل همه عوامل مؤثر بر مهارت‌های درک مطلب جلوگیری می‌کرد. برای به دست آوردن درک جامع تر از موضوع، تحقیقات آینده باید متغیرهای اضافی فراتر از مشارکت نظارتی را بررسی کند. برای مثال، در نظر گرفتن تأثیر پیشینه فرهنگی بر درک مطلب می‌تواند بینش‌های ارزشمندی در مورد توانایی خواندن زبان‌آموزان ارائه دهد. به همین ترتیب، بررسی روش‌های تدریس مختلف می‌تواند اثربخشی رویکردهای آموزشی خاص در تقویت مهارت درک مطلب را روشن کند. علاوه بر این، عوامل شناختی فردی مانند حافظه فعال و کنترل توجه نقش مهمی در درک مطلب دارند و بررسی آنها می‌تواند به شناسایی راهبردهایی برای حمایت از دانشجویان کمک کند.

Introduction

After the coronavirus pandemic struck, the education system in Iran quickly adapted to the difficulties by implementing remote teaching techniques. What initially started as a temporary solution has now gained acceptance in the present education system. As online education persists, it is reasonable to admit the unique needs that come with this instructional approach. Self-regulation and engagement in learning are regarded as key factors that can significantly impact the outcomes of the learning process. When it comes to online education, these factors become even more critical.

With the physical separation between students and instructors in online classes, individuals must take practical measures to manage their time, set goals, and stay motivated. Self-regulation becomes crucial as students navigate virtual classrooms, ensuring they stay organized, meet deadlines, and take responsibility for their academic progress [1]. While traditional classroom settings often provide external structures to guide students, remote learning demands an increased focus on personal accountability.

According to King [2], engagement in the learning process is another vital aspect of online education. As students engage with course materials, they need to actively participate, contribute, and interact with their instructors and peers. Unlike face-to-face interactions, virtual classrooms necessitate alternative means of communication and collaboration, such as discussion boards, video conferences, and online forums. Students must employ active learning strategies, such as engaging in meaningful discussions, asking questions, seeking clarification, and sharing ideas, to maximize their understanding and enhance their overall educational experience.

Review of the Related Literature

Self-regulation in learning is considered one of the essential prerequisites for (online) education. Students may face challenges related to self-regulation in online classes. The immediate support and facilitation from teachers are not readily available in online education settings. Therefore, the development of independent learning skills becomes extremely important [3]. Consequently, self-regulatory abilities become highly important in online courses. Additionally, student engagement plays a pivotal role in maintaining their involvement in the process of learning and promoting effective learning [4,5].

Numerous theories exist to explicate the concept of self-regulation in learning in online instruction. Among them, the social cognitive theory put forward by Schunk and Usher in 2012 [6] and Usher and Schunk in 2017 [7] and the theory of information processing by Winne [8] are frequently employed. The information processing theory outlines four stages that govern the regulation of learning: comprehending the task, establishing goals and devising plans to accomplish them,

employing strategies, and engaging in metacognitive adjustments.

The social cognitive theory views the self-regulation of learning as an interactive process between individuals and their surroundings. It involves analyzing the learning task and setting learning goals in the initial phase called the forethought. This theoretical framework highlights the significance of motivation in pursuing educational objectives, as it impacts cognitive and metacognitive functions [7].

According to Azevedo, Johnson, Chauncey, and Burkett [9], advancements in technology have led to the development of means that empower learners to adjust and manage their own learning process. Azevedo and Aleven [10], Hadwin, Järvelä, and Miller [11], Winne [8], and Riemann and Bennert [12] argue for the regulation of learning, recognized as a fundamental principle in educational research.

While there are cultural variations in the finer aspects of self-regulated learning, the fundamental components remain consistent across cultures. In essence, self-regulation of learning holds universal importance for school engagement and academic achievement [13]. According to Zhu, Valcke and Schellens [14], there is a direct connection between specific self-regulation tactics and the enhancement of deep learning. The utilization of strategies of learning self-regulation is also linked to psychological factors such as academic self-concept and self-efficacy [15]). Huang and Prochner [16] suggest that among Asians, family dynamics, teaching styles (comparative, authoritarian, and Western), and closeness between family members play central roles in the adoption of self-regulated learning. Furthermore, in certain cultures, family influence is related to "trustworthiness," or " failure anxiety " serving as a positive factor for engagement in the process of learning [17].

The impact of self-regulation in learning on educational success has been substantiated by Cengiz-Istanbullu and Sakiz [18] as well as Davis and Hadwin [19]. Boekaerts, Pintrich and Zeidner [20] argue that self-regulation in learning can be assessed through multiple factors, such as goal setting, goal control, and outcome evaluation. These factors significantly influence students' capacity to effectively manage their learning processes and achieve favorable academic results. By establishing explicit goals, students can establish a sense of purpose and direction, enabling them to proceed with their learning more effectively.

Wandler and Imbriale [21] observed a strong correlation between self-regulation and academic achievement in online learning environments. Therefore, it seems crucial for educators to equip students with the essential resources to develop self-regulated learning strategies. These authors argue that incorporating diverse strategies within online classes can improve students' adoption of strategies of learning self-regulation. Ensuring that online learning environments are structured to endorse self-regulated learning is also a significant consideration in fostering motivation and success among students.

Numerous studies have been carried out to investigate the concept of self-regulated learning in online instruction. Examples include research by Chiu, Liang, and Tsai [22], Chen and Huang [23], and Dunn, Rakes, and Rakes [24]. These studies have demonstrated that self-regulated learning holds significance not only in traditional face-to-face education but also in the context of online classes. The number of scientific investigations concerning self-regulated learning in online settings has increased [25-27]. Zhang et al. [28] developed a scale consisting of six factors to assess the process of learning English in an online setting. These factors include goal establishment, time

management, structuring the learning environment, seeking assistance, employing task strategies, and self-assessment.

Research indicates that learners exhibit positive attitudes towards online learning [27], particularly in the domain of English language acquisition [28]. Students who possess strong self-regulation abilities demonstrate competence in effectively controlling their focus, memory utilization, and impulse restraint [29]. The effectiveness of online language learning for language learners greatly depends on self-regulated learning, as highlighted by Cho and Shen [30] and Li et al. [31]. Giving priority to self-regulated learning is beneficial for it allows learners to enthusiastically engage in the learning process and cultivate favorable habits for acquiring language skills.

Contrasted with traditional classroom learning, online learning requires students to possess a higher degree of self-reliance. However, the online platforms have the advantage of tracking learners' progress (e.g., content learning and duration of online presence) and providing precise feedback to facilitate self-regulated learning. Consequently, understanding learners' self-regulation in online second language learning holds significance.

According to Viberg et al. [32], self-regulated learning is central for determining both the outcomes of learning and academic satisfaction, while also providing learners with the ability to shape their future educational and professional trajectories. Crucially, it is worth noting that self-regulated learning has the potential to be instructed and managed by learners themselves [33,34]. Consequently, it becomes vital for educators to provide assistance and guidance in promoting their students' self-regulated learning.

Thomas and Rose [35] demonstrated that employing language learning strategies significantly influences an individual's ability to proficiently self-regulate themselves and successfully acquire a second language. Dörnyei [36] holds that there is ongoing debate regarding the definition of language learning strategies and points out the lack of precision in measurement methods. In his model, he categorizes self-regulated learning abilities into five specific types: commitment control, metacognitive control, satiety control, emotion control, and environmental control. Expanding on this framework, Tseng, Dörnyei and Schmitt [37] created a survey known as the "Self-Regulatory Ability of Vocabulary Learning" to overcome the constraints of conventional language learning strategies. The aim was to evaluate students' comprehensive aptitude for self-regulated learning instead of solely concentrating on specific strategies.

There seems to be a positive correlation between academic success and self-regulated learning, particularly in relation to metacognitive regulatory actions such as monitoring and planning. Having a strong ability to engage in self-regulated learning is advantageous for L2 learners in online learning settings [38].

The ability of second language learners to control their learning in online environments is impacted by external elements, including guidance and intervention. It is essential to support students in cultivating this ability because those who can effectively self-regulate their learning tend to attain greater academic achievements. Research has shown that providing learners with guidance on learning strategies can improve both their self-regulation skills and academic performance [39].

According to Cleary et al. [40] and Cleary and Zimmerman [41], there are conceptual

similarities between models of student engagement and self-regulated learning. In terms of engagement, cognitive involvement encompasses motivational and regulatory procedures such as establishing goals, monitoring progress, and evaluating performance. According to Pohl [42], the concept of cognitive engagement denotes the level of commitment students demonstrate towards their learning, recognizing its importance, exerting effort to learn, and employing effective strategies to understand content, complete assigned tasks, acquire skills, and achieve their objectives (p. 254).

Lewis et al. [43] believe that engagement encompasses the level of cognitive processes, emotions, and activities involved in the process of learning (p. 251). In their study, Connell et al. [44] classified student engagement into three distinct dimensions: behavioral engagement, which relates to perseverance, effort, and focused attention during learning; emotional engagement, which pertains to curiosity and enthusiasm for learning; and psychological engagement, which involves embracing challenges, independent thinking, and active participation in educational initiatives. Meanwhile, Reschly et al. [45] claimed that academic participation entails factors such as grades achieved and the time dedicated to academic tasks such as attending lectures, completing tasks, and participating in group activities.

According to Khan, Egbue, Palkie and Madden [46], instructors encounter numerous obstacles when attempting to enhance student engagement in online instruction. The primary challenge lies in their inclination to employ traditional teaching methods within the online class setting, without adapting or modifying their approaches. In online instruction, instructors are required to assume a broader role beyond lesson design. They must effectively communicate their instruction methods and educational expectations to students, provide feedback, and rectify errors [47].

According to Umbach and Wawrzynski's study [48], it was found that students who faced academic challenges posed by their professors demonstrated higher levels of engagement in the learning process. Furthermore, Fisher [49] suggests that students' prior experience in online classes contributes to their engagement in such courses. This implies that students who lack previous exposure to online classes may struggle to actively participate in the class. Fisher also notes that the majority of students prefer traditional in-person teaching because it is the sole instructional approach they have been exposed to during their high school or early college experiences.

In their studies, Taplin [50] and Hoffman and Ritchie [51] have reached the conclusion that certain students struggle to transition from passive, teacher-dependent learning habits. These students often experience anxiety when confronted with changes in teaching methods, placing blame on their instructors. Additionally, Layne et al. [52] claimed that the individual characteristics of students play a crucial role in their ability to sustain their studies. Factors such as self-efficacy and resilience can significantly impact their capacity to persevere and excel in their academic pursuits.

The success of online education depends on various educational factors and the adaptability of instructors to modify teaching practices, manage time effectively, and so on. Students expect that instructors will establish a sense of community in online learning similar to traditional classrooms, thus enhancing their learning experience.

According to the findings of Allen and Zhang [53], students in online education need to cultivate certain skills and traits such as a strong desire for learning, building a solid knowledge foundation and self-perception, mental readiness for learning, problem-solving abilities, and self-regulation. Among adult learners, effective management of learning and active involvement play a prominent role, ultimately boosting their motivation. However, Phillips [54] offers a contrasting perspective by suggesting that external mechanisms for learning management should be established to facilitate student engagement.

The Motivated Learning Strategies Questionnaire, designed by Pintrich, et.al [55], is the most commonly utilized research tool for investigating self-regulated learning. Several research studies, including Hodges and Kim [56], Klingsieck et. al, [57], and Cho and Shen [30] have utilized the aforementioned questionnaire in their investigations. However, Cho, and Cho, [1] argued that questionnaires made for traditional classroom settings may not be suitable for online courses since they might not sufficiently evaluate the distinctive characteristics of online learning. Furthermore, such questionnaires may lack validity for online students. To address these concerns, Cho, and Cho, [1] conducted a thorough review of the literature and developed a new standardized tool known as the online self-regulation questionnaire. This questionnaire has been utilized in the current research; further details can be found in the research instrument section.

As stated by Dixon [58], engagement encompasses various aspects such as perception, cognition, behavior, and communication with others. It involves investing time, energy, and effort in the learning process, along with the student's subjective experience of it. To gauge these dimensions, the "scale of engagement in online education" aims to assess students' activities, their perception of learning, and their interactions with course content, instructors, and peers in terms of skills, class involvement, performance, and emotional responses. This questionnaire has been utilized in the current study; its details can be found in the instruments section.

With the rise of online education, it is crucial for educational institutions to modify their methods and strategies to better cater to students' needs. According to Yuan and Kim [59], educators should aim for collective education in the online environment to foster stronger relationships between professors and students. This approach enhances student performance and academic satisfaction.

This study explores the concept of self-regulation and engagement in learning and their significance in online English classes. The article provides an assessment of students' level of engagement and self-regulation in learning and academic progress to provide more information about the participants of this study. More specifically, the main objective of this study is to investigate the function of learning self-regulation and engagement in the reading comprehension abilities of Iranian students in online classes. To achieve these objectives, the following questions are addressed.

Is the students’ level of engagement satisfactory?

Is the students’ level of self-regulated learning satisfactory?

Is the students' academic progress, as reflected in reading comprehension skills, satisfactory?

To what extent can self-regulated learning and engagement serve as predictors of learning outcomes?

In what follows, the method of the study including participants, instruments, and the procedure is detailed.

Method

Participants

The study involved an available sample of 345 students, ranging in age from 19 to 23, who were registered at a university in Tehran for a general language course. Among the enrolled participants, 287 students completed the questionnaires in their entirety. However, during the initial data screening process, it was observed that 21 of the questionnaires were either incomplete or contained inaccurate responses. These inadequately filled questionnaires were deemed unsuitable for analysis due to the potential biases they could introduce. A total of 266 complete and accurate responses were available for detailed analysis.

Instruments

The researcher aimed to collect data to investigate the significance of self-regulation and engagement in the learning process. To achieve this objective, two meticulously designed questionnaires were utilized: the 'Online Self-regulation Questionnaire' containing 30 items, and the 'Online Student Engagement Scale' consisting of 19 items. Additionally, the researchers incorporated the reading section of the widely acknowledged TOEFL test, which encompassed a total of 40 items. The selection of these instruments was based on their proven dependability and accuracy in measuring self-regulation, engagement, and reading skills in the online learning setting.

The online self-regulation questionnaire (OSQ)

Cho and Cho [1] developed this questionnaire in 2017. It consisted of 30 items divided into three constructs. The first construct (items 1 to 11) focused on how students dealt with the course materials. The second construct (items 12 to 20) examined students' responsibility for interactions, collaboration, and communication with their instructors. The third construct (items 21 to 30) explored students' positive involvement in peer interactions, group discussions, and collective learning. To evaluate the participants' responses, this questionnaire utilized a Likert scale consisting of seven points. The scale ranged from 1, representing "not at all true of me," to 7, representing "very true of me."

To provide validity evidence, the original authors conducted a study employing a sample size of 799 students from two Midwestern universities. These students were enrolled in online courses across various disciplines, including mathematics, politics, economics, history, psychology, and physics. The questionnaire was shown to be reliable by the authors using Cronbach's alpha coefficient, which had a value greater than 0.9, indicating a strong level of internal consistency.

Online Student Engagement Scale (OSE)

The study employed the Online Student Engagement Scale, which was created by Dixon in 2015 [58]. The measure consisted of 19 statements that encompassed different engagement-related behaviors. Participants were asked to use a 7-point Likert scale to indicate the degree to which each statement reflected their personal experiences. The scale ranged from 1, indicating "not at all characteristic of me," to 7, representing "very characteristic of me."

The questionnaire designer assessed engagement by dividing it into four dimensions. The first dimension, Skills, looked at behaviors such as note-taking. Items 1, 3, 4, 5, 6, and 7 focused on participants' active involvement in acquiring and organizing information. The

second dimension, Emotional Engagement, explored participants' intrinsic motivation and desire to learn. Items 2, 8, 9, 10, 11, and 19 measured emotional investment, curiosity, and enthusiasm. Participation formed the third dimension, emphasizing involvement in discussions and forums. Items 12, 13, 14, 17, and 18 evaluated collaborative learning, idea sharing, and peer interaction. The fourth dimension, Performance, focused on achieving high grades. Items 15 and 16 assessed academic accomplishment and motivation to excel.

The reliability of the assessment tool was evaluated by the questionnaire designer using a group of 34 students (11 males and 23 females) from various advanced communication courses. The students voluntarily completed the OSE survey and allowed their instructor to share information about their online activities.

Once students finished the survey and the semester concluded, instructors exchanged tracking data for analysis. The data encompassed an elaborate log of students' learning engagements throughout the semester, including the quantity of emails, discussions, and assignments they accessed, as well as the number of files, content pages, and web pages they viewed. Additionally, it documented their interaction with the material by means of metrics such as the number of discussions initiated, emails sent, assessments finished, and assignments turned in.

The Cronbach's alpha for this study was .86, suggesting strong internal consistency of the instrument. The observed behaviors exhibited a noteworthy correlation with the OSE scale, offering robust evidence for the scale's validity as an indicator of student engagement.

Reading Comprehension Test

The TOEFL's reading section served as a tool for evaluating students' reading comprehension abilities. It encompasses an array of micro-skills such as recalling the meanings of words to ensure a firm grasp of vocabulary, comprehending words in the context of the given text, and understanding the interplay between textual and external sources. Furthermore, the TOEFL reading section focuses on higher-level skills, such as making inferences based on the text, identifying synonyms, and efficiently searching for specific information. It also tests the students' ability to comprehend references and grasp grammatical relationships within the text. In addition, the test assesses the ability to utilize skimming and scanning techniques effectively to navigate through the text and locate relevant information. Lastly, the section delves into the students' ability to recognize the author's style and tone, thereby enabling a deeper understanding of the text's intended message.

Procedure

To assess the learning outcome of students in the general English course, the TOEFL reading section was administered to the students. This test was conducted through the virtual education system of the university, which is a convenient and accessible platform for students to participate. The students were given forty minutes to do the test. To gather data for research objectives, the questionnaires were adapted using Google Forms and sent to the students in autumn 2022. The questionnaires comprised a series of statements, allowing students to express their agreement or disagreement on a scale of 1 to 7.

To confirm the respondents' comprehension of the questionnaire items, the researcher utilized Persian versions of the questionnaires. These questionnaires had not been previously published or accessible in Iranian research journals, necessitating the researcher to independently translate them. To guarantee

precision, two professors proficient in both languages conducted back-translations of the questionnaires.

Out of the 345 students who received the questionnaires, 287 students completed and submitted them. However, upon closer examination, it was discovered that 21 responses exhibited patterns that rendered them unreliable for analysis. These patterns included consistently selecting the neutral option or choosing the same response for every question. Consequently, these 21 responses were excluded from the subsequent analysis, leaving a total of 266 valid responses.

The remaining 266 responses of the students, along with their reading comprehension scores were included in the data analysis. By combining the questionnaire responses and the actual performance in the TOEFL reading section, researchers aimed to gain insights into the association between students' self-reported perceptions and their reading comprehension abilities. This approach allowed for a more robust and nuanced understanding of the students' language ability levels within the context of the general English course.

Design

The study's design is descriptive correlational, to investigate the connections between regulatory engagement and learning outcomes. This approach enables the researcher to consider the associations between these variables and obtain a better understanding of their nature and strength.

Results and Findings

As stated earlier, the study aimed to investigate the relationship between self-regulation of learning and engagement with reading comprehension among Iranian students in online classes. Data was collected through questionnaires assessing self-regulation of learning and engagement, as well as the TOEFL reading section. Statistical analysis using SPSS and Amos included reliability, factor analysis, one-sample t-test, correlation, and regression analyses. Here are the results.

Before addressing the research questions, it is essential to provide an evaluation of the psychometric features of the measures used in the study. The psychometric properties, specifically reliability and construct validity, play a significant role in establishing the credibility and accuracy of the measurements employed. In this regard, the reliability and construct validity of the instruments utilized in the study are reported.

Cronbach's Alpha coefficient was calculated for each measure to evaluate the reliability of the instruments. As depicted in Table 1, the obtained Cronbach's Alpha coefficients for Engagement, Self-regulation, and Reading test were found to be .89, .94, and .86, respectively. These coefficients suggest that the instruments exhibit satisfactory levels of reliability. This suggests that the items within each measure exhibit a high degree of correlation, which signifies robust internal consistency and reliability of the instruments.

The assessment also included an evaluation of construct validity, which examines how accurately the instruments measure the intended constructs. Construct validity provides evidence that the instruments are indeed measuring the theoretical concepts they are designed to capture. It is important to note that construct validity was evaluated through confirmatory factor analysis.

Table 2 presents the findings regarding construct validity. The RMSEA values for

Engagement, Self-regulation, and Reading are reported as .08, .07, and .01 respectively, indicating satisfactory results. According to Browne and Cudeck [60], models with RMSEA below .08 and PCLOSE of .5 or higher are considered adequate.

Now that the questionnaires and the reading test have been thoroughly assessed for their reliability and validity, we can confidently proceed with addressing the research questions central to our study.

One-sample t-test technique was employed to address the first three research questions that are restated below for clarity. By employing this method, researchers were able to determine whether there were notable distinctions between the mean value of the observed sample and a presumed population mean.

Is the students' level of engagement satisfactory?

Is the students' level of self-regulated learning satisfactory?

Is the students' academic progress, as reflected in reading comprehension skills, satisfactory?

To address the aforementioned research questions, a benchmark of achieving at least 70% of the total scores was set. The statistical significance of the variables in the study was determined by calculating the t values, which are presented in Table 3. The results revealed that all of the variables, namely Engagement, Self-regulation, and Reading, had statistically significant t values (Engagement: t (265) = 4.45, P = .00; Self-regulation: t (265) = 6.56, P = .00; Reading: t (265) = 2.96, P = .02). This outcome holds significant implications as it provides strong evidence that students' engagement, self-regulation, and reading ability were deemed satisfactory based on the data collected and analyzed in the research. In other words, the results suggest that students displayed encouraging levels of involvement, effective self-regulation, and proficient reading skills, which attest to their overall academic performance and competence in these domains.

Table 1: Reliability of the Instruments

Instrument	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Engagement	.89	.89	19
Self-regulation	.94	.94	30
Reading	.86	.87	40

Table 2: Model Fit Statistics for Engagement, Self-regulation and Reading Comprehension

Instrument	RMSEA	LO 90	HI 90	PCLOSE
Engagement	.08	.07	.09	.5
Self-regulation	.07	.06	.09	.5
Reading	.01	.01	.02	1.00

Table 3: One-sample t-test for Engagement Self-regulation and Reading Comprehension

Instrument	Test Value	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Engagement	%70	4.45	265	.00	4.00	2.23	5.78
Self-regulation	%70	6.56	265	.00	9.66	6.76	12.55
Reading	%70	2.96	265	.02	.44	.06	.81

The major research question of the current study was:

To what extent can self-regulated learning and engagement serve as predictors of learning outcomes?

The researcher employed standard linear regression to assess the predicting power of self-regulated learning and engagement in reading comprehension of the learners. To assess the multicollinearity among the independent variables, their correlation was examined to find a coefficient of 0.82 (Table 4). According to Pallant's [61] guideline, a bivariate correlation of .7 or higher between independent variables can create challenges when testing and interpreting regression coefficients. She suggests creating a 'composite' variable from the scores of the two strongly correlated variables.

Table 4: Correlations between the variables

	Reading	engagement	Self-regulation
Reading	1	.42	.46
engagement	.42	1	.82
Self-regulation	.46	.82	1
Sig. (2-tailed)	.00	.00	
N	266	267	266

It is worth mentioning that recent studies by Cleary et al. [40] and Pohl [32] have shed light on the interconnectedness between student engagement and self-regulated learning. These two constructs share common elements that contribute to academic success and effective learning outcomes. The shared elements encompass various aspects such as goal setting, progress monitoring, performance assessment, investing effort in learning, employing effective strategies, completing assigned tasks, acquiring skills, and achieving objectives.

Given the significant overlap between these constructs, it becomes theoretically feasible to develop a composite variable that combines the dimensions of self-regulation and engagement. This composite variable, often referred to as 'regulatory engagement,' as termed by Cleary and Lui [62], integrates the essential components of both constructs into a single measure. By merging these variables, researchers and educators can gain a more comprehensive understanding of students' learning experiences and their level of involvement in the learning process.

The concept of regulatory engagement holds great potential for educational research and practice. It offers a holistic perspective on the dynamic interplay between students' self-regulated learning strategies and their active engagement in educational activities. Moreover, this composite variable provides a valuable framework for designing interventions and instructional approaches aimed at promoting effective learning environments and enhancing students' motivation, metacognition, and overall academic achievement.

To generate a composite variable, the scores of the two variables were first converted into Z scores, which standardized

the data and allowed for meaningful comparisons. This transformation ensured that both variables were on the same scale, eliminating any potential bias caused by differences in their original measurement units. Once the Z scores were obtained, they were merged using a specific statistical procedure outlined in Tabachnick and Fidell's [63] work. This merging process involved combining the Z scores from each variable to create a single composite score that captured the underlying relationship between the two variables. By integrating the information from both variables into a composite measure, the researcher aimed to get a more complete understanding of the phenomenon under investigation. Hence, a new research question was formulated as below.

Does regulatory engagement have a significant correlation with reading comprehension?

To respond to this question, a bivariate correlation analysis was conducted. The objective of the study was to ascertain the level of connection between these variables and provide insights into their interrelationships. The findings from this analysis are outlined in Table 5.

The findings from the analysis reveal a noteworthy positive association between the variables (r=0.46, n=266, p=0.00). This correlation coefficient indicates a moderate level of association, as outlined by Cohen [64, pp. 79–81]. Furthermore, the value of R^2, which measures the percentage of variance explained by the composite variable, is 0.21. This indicates that the amalgamation of the variables accounts for approximately 21 percent of the variation observed in reading comprehension. While there may be other factors influencing reading comprehension beyond those considered in this study, the composite variable constructed from the examined variables holds substantial explanatory power in understanding the variance in reading comprehension outcomes.

Table 5: Correlation between reading and Regulatory Engagement

	Reading	Regulatory Engagement
Reading	1	.46
Sig. (2-tailed)	.00	.00
N	266	266

Since regulatory engagement encompasses multiple dimensions, it can be beneficial to break it down into its constituent components to get a deeper appreciation of the research findings. This approach allows for a more subtle interpretation of the data. The newly proposed variable comprises various elements, including 'skills,' which refers to the mastery and application of knowledge; 'emotional engagement,' which pertains to the emotional connection students have with the subject matter; 'participation,' which involves active involvement and contribution in learning activities; 'performance,' which gauges the level of achievement or success in academic tasks; 'student-Content interaction,' which examines how students interact with the course material; 'student-teacher interaction,' which explores the quality and extent of student-teacher relationships; and 'student-student interaction,' which assesses the collaborative interactions among students. For additional details on these components, please refer to the 'instruments' section of the study, where comprehensive information is provided. Here, the reader can find a thorough description of the outcomes derived from the regression analysis.

The results presented in Table 6 provide compelling evidence of the statistical significance of the overall regression analysis. The coefficient of determination (R^2) value of

0.26 indicates that the regulatory engagement components included in the model explain approximately 26 percent of the variability observed in reading comprehension. This finding is highly encouraging and suggests that these components play a substantial role in influencing individuals' ability to comprehend written material.

Furthermore, the model was deemed statistically significant based on the F-statistic (F = (7,258) 13.2, p = 0.00). This indicates that the relationship between the regulatory engagement components and reading comprehension is not merely due to chance. Instead, it signifies a meaningful and reliable association between these variables.

To gauge the multicollinearity among the major variables, a thorough examination of their correlation was conducted. The analysis revealed that the correlation coefficients fell within the range of .3 to .69, indicating no significant evidence of multicollinearity. Furthermore, the Variance Inflation Factor (VIF) values were found to be less than 3, which further supports the conclusion that multicollinearity is not a concern here.

To guarantee the precision of the regression model, various additional diagnostic tests were conducted. Outliers were identified and assessed to determine their impact on the results, and it was determined that they did not exert undue influence on the findings. The assumption of normality was examined, and the data exhibited a satisfactory distribution, indicating that the residuals followed a normal pattern.

Additionally, the assumption of linearity was examined, and it was determined that there exists a satisfactory linear relationship between the regulatory engagement and reading skills. Homoscedasticity, which refers to the equal variance of the residuals across all levels of the predictors, was also evaluated and found to be satisfactory.

Finally, the independence of residuals was assessed, and no significant autocorrelation or patterns were detected, suggesting that the residuals were independent of each other.

A summary of these diagnostic tests and their results can be found in Table 7, which provides a complete overview of the assessment of multicollinearity and the various assumptions underlying the regression model.

Table 6: Model Summary for Components of Regulatory Engagement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.51	.264	.24	4.81	.264	13.20	7	258	.000

Table 7: Regression Coefficients of Components of Regulatory Engagement and Reading Comprehension

	Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity
Model	B	Std. Error	Beta	t	Sig.	Zero-order	Part	Tolerance	VIF
(Constant)	11.48	2.18		5.26	.00				
skills	.10	.08	.10	1.26	.20	.36	.06	.45	2.21
emotion	.02	.07	.02	.25	.80	.30	.01	.47	2.11
participation	-.05	.07	-.05	-.66	.50	.33	-.03	.48	2.07
performance	.71	.19	.25	3.68	.00	.42	.19	.61	1.62
Student-Content	-.00	.05	-.01	-.16	.86	.35	-.00	.34	2.87
Student-Teacher	.07	.04	.11	1.52	.12	.40	.08	.48	2.04
Student-Student	.12	.04	.21	2.92	.00	.40	.15	.51	1.94

The findings presented in Table 7 provide evidence that both 'performance' and 'student-student interactions' significantly contribute to predicting reading comprehension. The findings of the regression analysis demonstrated that 'performance' had a beta coefficient of 0.25 (p=0.00), indicating a robust and positive association with reading comprehension. Similarly, 'student-student interactions' exhibited a beta coefficient of 0.21 (p=0.00), suggesting a noteworthy and positive connection to reading comprehension.

Examining the part correlations, it was observed that 'performance' had a correlation of 0.19 with reading comprehension, while 'student-student interactions' had a correlation of 0.15 with reading comprehension. These values designate the strength of the relationships between these variables and reading comprehension.

To further understand the impact of these predictors on reading comprehension, the squared values were calculated. The squared value of 'performance' was found to be 0.036, meaning that performance explains 3.6% of the variance in reading comprehension scores. Similarly, the squared value of 'student-student interactions' was 0.022, indicating that student-student interactions explain 2.2% of the variance in reading comprehension scores.

Discussion

The current study's discoveries greatly enhance our understanding of the subject matter by revealing the complex connection between regulatory engagement and reading comprehension abilities. By examining these variables in detail, this research underscores their importance in shaping individuals' ability to comprehend written texts effectively. These results not only reinforce the conclusions drawn by previous studies such as Cengiz-Istanbullu and Sakiz [18], Chen and Huang [23], Chiu, Liang, and Tsai [22], Davis and Hadwin [19] and Dunn, et.al [24] but also provide additional evidence supporting the claim that self-regulation plays a pivotal role in achieving educational success.

Furthermore, the outcomes of the current study align with the perspectives put forth by Dent and Koenka [41], King [2], and King and Ganotis [17], emphasizing the crucial role of engagement in the learning process, particularly in the context of online education. These researchers argue that active involvement and participation in the learning experience are essential elements for effective online education. The findings of this study lend further support for this conviction,

highlighting the significance of student engagement as a key factor in promoting successful outcomes in online educational settings. Overall, this research enhances existing literature and emphasizes the importance of regulatory engagement for improving reading comprehension and online learning.

The significant correlation between the different aspects of regulatory engagement and reading comprehension underscores the paramount importance of fostering effective regulatory techniques in learners. This connection emphasizes that the skills to regulate one's cognitive processes, such as attention, self-monitoring, and goal setting, play a pivotal role in enhancing reading comprehension abilities. By recognizing this relationship, educators and policymakers can harness these findings to design targeted interventions and innovative teaching methods aimed at promoting and enhancing students' regulatory engagement skills.

By incorporating strategies that explicitly teach students how to regulate their cognitive processes during reading tasks, educators can empower learners to play active roles in their learning. These interventions may include teaching metacognitive strategies, such as self-questioning, summarizing, and monitoring comprehension, which have been shown to improve reading comprehension outcomes. Additionally, educators can integrate explicit instruction on self-regulation techniques, such as setting goals, managing time effectively, and utilizing effective study strategies, to equip students with the necessary tools to navigate complex texts and extract meaning from them.

Furthermore, policymakers can use these research findings to inform educational policies and initiatives that prioritize the development of regulatory engagement skills. By integrating these principles into curriculum frameworks, policymakers can ensure that schools provide chances for students to practice and refine their regulatory techniques across various subjects and grade levels. This holistic approach to education recognizes that regulatory engagement is not limited to reading comprehension alone but extends to other academic domains and real-life contexts.

Ultimately, by adopting an approach that prioritizes the cultivation of effective regulatory techniques, learners can develop stronger reading skills, succeed academically, and thrive in various areas of their lives. The capability to regulate one's cognitive processes not only enhances reading comprehension but also equips individuals with valuable skills for lifelong learning and success. By inspiring students to play an active role in controlling their learning experiences, educators and policymakers can foster a generation of independent, critical thinkers who are well-equipped to navigate the complexities of the modern world.

Overall, the conclusions of this study underscore the significance of two key factors, namely 'performance' and 'student-student interactions,' in determining reading comprehension. In addition to the present study, Kreijns et al. [65] also recognized the value of interaction among students in online learning environments. They argued that the effectiveness of online learning is enhanced when student groups cultivate an environment characterized by mutual trust, as this fosters a favorable atmosphere for learning.

While both performance and student-student interactions contribute significantly to reading comprehension, it is worth noting that 'performance' appears to exert a slightly stronger influence. This factor encompasses aspects such as getting good marks and good performance on tests and quizzes. It explains a larger percentage of the variance in reading

comprehension compared to student-student interactions. These results suggest that while collaborative interactions among students are valuable, individual academic achievement plays a more prominent role in predicting reading comprehension outcomes.

It seems that performance, characterized by improved academic achievement and cognitive abilities, has positively influenced self-regulation or motivation, leading to a subsequent enhancement in reading comprehension skills. In essence, self-regulation and/or motivation may serve as mediating factors in this relationship, acting as catalysts for the observed improvements. However, due to the complexity of these interactions and the variability across individuals, further comprehensive research is required to delve into the intricacies of this mediation effect. By conducting additional studies, we can gain a deeper understanding of how self-regulation and motivation contribute to enhanced reading comprehension and unveil potential strategies to optimize educational outcomes.

Conclusions

The significant correlation between the different aspects of regulatory engagement and reading comprehension highlights the crucial role of cultivating effective regulatory techniques in learners. These findings can be utilized by educators to create interventions and instructional approaches that encourage and improve students' regulatory engagement abilities. This, in turn, will enable learners to become more skilled readers and provide them with the essential resources for academic success and beyond.

Prioritizing self-regulated learning is advantageous for the learners as it empowers them to enthusiastically participate in the learning process and develop positive habits for acquiring language skills. In comparison to traditional classroom learning, online learning necessitates a greater level of self-dependence from students. Nevertheless, the online platform offers the benefit of monitoring learners' progress (such as content comprehension and time spent online) and offering specific feedback to enhance self-regulated learning.

However, due to the study's limited scope, it was unable to examine other factors that may impact reading comprehension skills. Consequently, it may be necessary to conduct more studies to investigate other variables that might impact reading comprehension and build upon the existing discoveries. For example, examining the effects of cultural background, teaching techniques, and individual variations in cognitive abilities such as working memory capacity and attentional control on reading comprehension could offer a more thorough comprehension of the topic. Additionally, delving into the influence of technological advancements such as digital reading platforms or multimedia integration could reveal fresh perspectives on how technology impacts the process of reading comprehension.

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Conflict of Interest

The author has no personal or financial interests that could potentially influence this work.

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