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Effects of concurrent and cumulative group dynamic assessments on EFL learners' development of reading comprehension micro-skills

Mahtab Zadkhast¹, Ehsan Rezvani^{1*} and Ahmad Reza Lotfi¹

*Correspondence:
e.rezvani@khuisf.ac.ir;
ehsan.rezvani2020@yahoo.com

¹ English Department, Isfahan
(Khorasgan) Branch, Islamic Azad
University, Isfahan, Iran

Abstract

The current study set out to investigate the effects of concurrent group dynamic assessment (GDA) and cumulative GDA on Iranian EFL learners' development of reading comprehension micro-skills. To this end, a convenience sample of 60 intermediate undergraduate EFL university students that were selected based on the results of a placement test and randomly assigned to two experimental groups participated in the study. The participants met once a week for 90-min lessons in a *Reading II* class over an academic semester. Each group received a concurrent or cumulative GDA mediation on reading tasks with a focus on activities involving five fundamental reading comprehension micro-skills, namely identifying the main idea, finding inferences, finding supporting details, understanding vocabulary, and finding references. A pretest/post-test procedure was used to compare the two group's achievements. The results of *t* test analyses demonstrated that both GDA approaches were effective but the students in the concurrent GDA group significantly outperformed those in the cumulative GDA group in terms of micro-skills of identifying the main idea and finding inferences whereas no significant differences were observed for other micro-skills. It could be argued that in concurrent GDA since the secondary interactants expect to be called on at any moment, they are more alert and attentive to mediational exchanges, and this contributes to enriching the micro-skills of identifying the main idea and finding inferences. The findings suggest that concurrent and cumulative GDA approaches when applied to teaching reading comprehension should be viewed as complementary. The concurrent approach works better with activities that require higher-cognitive functions and top-down processes such as identifying main ideas or finding inferences. On the other hand, both approaches could be equally beneficial and interchangeably used in activities that involve lower-level bottom-up cognitive processes such as finding supporting details, understanding vocabulary, or finding references. The findings offer significant implications for classroom practice and subsequent research that are discussed.

Keywords: Dynamic assessment, Group dynamic assessment, Concurrent group dynamic assessment, Cumulative group dynamic assessment, Reading comprehension, Reading comprehension micro-skills

Introduction

Dynamic assessment (DA henceforth) has recently attracted extensive interest from scholars and practitioners in the field of foreign/second language education because it offers a unique framework that views teaching and assessment as integrated activities (Lantolf & Poehner, 2011; Poehner, 2005). Advocates of DA maintain that instruction and assessment must be unified into a single activity in which various forms of support are provided to reveal the scope of learners' abilities while simultaneously aiding their development (Poehner & Infante, 2017; Poehner & Lantolf, 2005; Poehner et al., 2015).

The importance of DA lies in the fact that it develops the interactive nature of learning as advanced by the mediation theory and zone of proximal development (ZPD) proposed under Vygotsky's (1978, 1989) sociocultural theory (SCT). In simple words, ZPD is the gap between what a learner can do independently of others and what s/he can perform with the assistance of others, both in assessment and classroom learning environments. Mediation is the process of assistance through which the learner grows and gains skills at her/his own pace (Poehner et al., 2019). The ZPD-sensitive mediation calls for an unconventional unique pedagogy assimilating instruction and assessment into a single and development-oriented activity which is manifested in DA (Poehner, 2007, 2008). This is precisely why DA has attracted the attention of many scholars who have proposed different approaches to co-constructing ZPDs with students in classroom settings (Al-Dawoody Abdulaal et al., 2022; Jia et al., 2022; Kao et al. 2022; Poehner & Leontjev, 2022; Poehner & Yu, 2022; Rassaei, 2023; Rezai et al., 2023).

DA highlights the role of graduated and dialogic mediation tailored to learners' current level of development which can optimally occur in ZPD, conceptualized as the space between what learners can perform independently and the level they can reach under the guidance and support of more capable others (Vygotsky, 1978). Through the ZPD space, therefore, we can account for not only the cycles and maturation processes that have already been completed but also those processes that are currently in a state of formation, that are just beginning to mature and develop (Vygotsky, 1989).

Learning and development in the SCT framework are the fruit of external mediation provided by a more capable other within the ZPD (Lantolf & Poehner, 2011). Nevertheless, the most efficacious and convenient way of implementing mediation in L2 classrooms is an unresolved issue. More specifically, the major challenge is whether it should be provided in a one-to-one or group format. SCT literature indicates a great tendency toward one-to-one mediator–learner mediation (Poehner, 2009). However, since a one-to-one teacher–learner procedure is time-consuming and demanding, it is not much practical in EFL classroom contexts where constraints such as crowded classes or time limits make the one-to-one interactions difficult if not impossible (Poehner et al., 2015). One possible solution to overcome this problem is the application of group mediation as Vygotsky himself recognized the possibility of constructing a group ZPD by negotiating mediation with more than one individual (Poehner et al., 2019).

If the group mediation is provided by the teacher, it is best conceptualized as group dynamic assessment (GDA). GDA, as first proposed by Poehner (2009), is an approach to shift the focus of teacher-led mediation from one individual learner to a group of learners. In other words, GDA applies the same principles of mediation as in individualized interactions but broadens the focus to potentially an entire class. In GDA, students

could be involved in class exchanges as primary or secondary interactants (Poehner, 2009). Primary interactants are those students who are directly addressed and mediated with the teacher in a one-on-one fashion whereas secondary interactants are other students present in class who can benefit from mediation potential in an indirect way.

Poehner (2009) distinguishes between two forms of GDA: “concurrent GDA” and “cumulative GDA” (pp. 478–480). In concurrent GDA, the teacher interacts with the whole group rather than individuals. Occasionally, the teacher provides mediation in response to an individual’s problem, but as soon as another learner struggles, questions, or raises a comment, the interaction shifts for another’s contribution. In cumulative GDA, the teacher runs a set of one-to-one interactions with the group members and the individuals engage in interactions with the teacher while taking advantage of earlier one-to-one exchanges that the class has observed.

Although the fruitfulness of both concurrent and cumulative GDA in promoting ZPD-sensitive mediation has been confirmed in the literature, scant research has compared the effects of concurrent and cumulative GDA in Iranian EFL classrooms. This paucity in the literature is the motivation behind the current study. Another issue that has not been addressed by previous studies is that although a considerable body of research has been carried out on the applicability of GDA in fostering different areas of language (e.g., grammar, vocabulary, pragmatics), very little is known about the effects of the implementation of GDA in teaching reading comprehension micro-skills.

Reading is the most fundamental skill, or “the mother of all skills” (Grabe, 1991, p. 21), for foreign/second language learners. It serves as the building block for learning the English language because most often texts in English are the primary source of input for EFL learners (Hedgcock & Ferris, 2009). Also, for those language learners who wish to gain mastery in academic contexts, reading skill is of primary importance (Grabe, 2009). It is documented that reinforced reading skills enable ESL/EFL learners to proceed and achieve remarkable development in all academic fields (Cartwright, 2023). On the other hand, the ultimate goal of reading is *comprehension* because, in the reading process, understanding the direct and explicit meaning of the words is not enough; what is of crucial importance is comprehending the implicit, implied, and intended meaning of the text. As Newton et al. (2018) characterize, reading comprehension is a combination of a cognitive and visual undertaking to extract meaning from a written piece of discourse by comprehending the written text, processing the data, and associating it with background knowledge.

Reading comprehension necessitates a high degree of linguistic and cognitive capability as well as a plethora of social and cultural factors, and motivational and affective elements (Hedgcock & Ferris, 2009). Put differently, in order to comprehend or assign meaning to a text, various linguistic, conceptual, reasoning, and meta-cognitive abilities must work efficiently and simultaneously within the reader (Cartwright, 2023). This makes reading comprehension a daunting and challenging skill to acquire for EFL learners.

Alternatively, there is ample evidence that the process of comprehension is both interactive and strategic rather than passive and non-dynamic (Cartwright, 2023), and if learners learn to read strategically and become strategic readers, they can gain mastery over reading comprehension. In general, strategies are deliberate, intentional, effortful,

and self-selected actions designed to achieve a long-term or overall aim (McNamara, 2007). In SCT terms, strategies are *skills under consideration* in much the same way that Vygotsky (1978) describes “defossilized” actions. That is why in this study, following SCT literature, strategies are referred to as *micro-skills*. Scholars have identified numerous strategies or micro-skills that readers need to employ to achieve maximum reading comprehension. The most important of those are: identifying the main idea, finding supporting details, finding inferences, understanding vocabulary, and finding references (Hessel & Schroeder, 2020).

Mastery of these micro-skills involves a multitude of cognitive processes which are generally classified into higher-level and lower-level cognitive functions. Higher-level cognitive processes refer to cognitive functions that allow readers to be flexible when they encounter unfamiliar and novel situations by modifying what they already know and have experienced before. These higher-level skills include the ability to construct a mental model of the central ideas or themes within a text, make inferences from the text, and monitor comprehension to avoid incorrect interpretations (Saidi et al., 2022; Urquhart & Weir, 2014). In contrast, lower-level comprehension skills serve as the foundational knowledge for text comprehension including the ability to recognize words as whole units, the ability to determine the meaning of a word by accessing a sight vocabulary, and the ability to recognize basic features, such as grammar, that connects a word with those around it (Ghahderijani et al., 2021; McNamara, 2007).

Higher-level and lower-level cognitive functions go hand in hand with another well-known distinction in reading comprehension research, namely top-down and bottom-up processes (Kendeou et al., 2016). Top-down processing happens when the reader activates his/her world knowledge to facilitate comprehending the text. In bottom-up reading, the text itself is the center of attention, and reading proceeds from letters to sounds, to words, and to meaning. Higher-level cognitive processes are closely associated with top-down reading as they both rely on knowledge sources in long-term memory, mental schemas, background information, and prior world knowledge (Hessel & Schroeder, 2020). Similarly, lower-level cognitive skills are aligned with bottom-up reading because of their reliance on working memory, sensory information, and here-and-now stimuli and data (Urquhart & Weir, 2014). Thus, reading comprehension micro-skills such as finding the main idea or making inferences are tied up with the higher-level cognitive functions and top-down processes that exploit background information and demand deeper analysis of the text. Contrarily, micro-skills such as finding supporting details, vocabulary, and reference are linked to the lower-level cognitive functions and bottom-up processes that do not involve attentiveness or recall of prior knowledge and proceeds from individual meanings or grammatical characteristics of the basic units of the text (McNamara, 2007; Rezai et al., 2022a, 2022b).

As mentioned before, previous research has failed to address the probable link between GDA and the development of the reading skill, let alone a detailed analysis of how different types of GDA may impact the five micro-skills involved in reading comprehension differently. Hence, this study is an attempt to address the unresolved question of how different forms of mediation, namely concurrent and cumulative GDA, may affect L2 students’ development of reading comprehension micro-skills in an EFL class. Accordingly, the following research questions and research hypotheses were formulated:

RQ1. Does concurrent GDA have significant effects on Iranian EFL learners' development of reading comprehension micro-skills, namely identifying the main idea, finding supporting details, finding inferences, understanding vocabulary, and finding references?

RQ2. Does cumulative GDA have significant effects on Iranian EFL learners' development of reading comprehension micro-skills, namely identifying the main idea, finding supporting details, finding inferences, understanding vocabulary, and finding references?

RQ3. Are there any significant differences between the effects of concurrent and cumulative GDA on Iranian EFL learners' development of reading comprehension micro-skills, namely identifying the main idea, finding supporting details, finding inferences, understanding vocabulary, and finding references?

Based on the above research questions, the following hypotheses were raised:

H01. Concurrent GDA has no significant effects on Iranian EFL learners' development of reading comprehension micro-skills, namely identifying the main idea, finding supporting details, finding inferences, understanding vocabulary, and finding references.

H02. Cumulative GDA has no significant effects on Iranian EFL learners' development of reading comprehension micro-skills, namely identifying the main idea, finding supporting details, finding inferences, understanding vocabulary, and finding references.

H03. There are no significant differences between the effects of concurrent and cumulative GDA on Iranian EFL learners' development of reading comprehension micro-skills, namely identifying the main idea, finding supporting details, finding inferences, understanding vocabulary, and finding references.

Literature review

Theoretical underpinnings of GDA

DA is a relatively new way of L2 assessment that has been acquainted with L2 research and the educational community by Lantolf and Poehner (2011) and since then it has turned into a huge pattern for specialists and scholars. It is characterized as a methodology that integrates intervention within the assessment procedure by including appropriate forms of ZPD-sensitive mediation to foster learners' L2 development (Lidz & Gindis, 2003).

The most common classification of DA is based on the provision of mediation. There are two main approaches to DA regarding their way of providing mediation, namely, interventionist and interactionist (Lantolf & Poehner, 2004, 2011). The interventionist DA delivers the mediation in the form of pre-scripted hints from implicit to explicit whereas the interactionist approach takes a more radical attitude and invests in learners' responsivity for mediation; thus, it is sensitive to each learner's ZPD (Lantolf & Poehner, 2004). By comparison, the interventionist approach is advocated by practitioners and researchers who seek standardization and quantification while the interactionist approach is favored by those who do not look at mediation as a one-size-fits-all scheme for a large number of participants (Azizi & Namaziandost, 2023; Poehner et al., 2019).

The interventionist and interactionist DA approaches in their early formats were solely confined to one-to-one teacher-learner procedures (e.g., Ableeva, 2010; Anton, 2009). Obviously, that form of administration could be quite time-consuming and unpractical for a classroom teacher whose responsibility is to manage a group of learners and not just an individual. In this regard, the notion of group dynamic assessment (GDA) was introduced by Poehner (2009) to address the issue of mediating a group of learners' performances and co-constructing ZPDs with several students in an L2 classroom context. Poehner (2009) further extended this notion into two approaches to GDA: *concurrent* and *cumulative*.

In concurrent GDA, the teacher interacts with the whole class and the extended one-to-one interaction is absent so that it may seem similar to entire class instruction. The teacher addresses particular individuals and offers comments in response to their contributions. The interaction shifts rapidly between primary (teacher and a learner) and secondary (other learners) interactants as one learner's question or comment sets the stage for another's contribution. In cumulative GDA, interactions unfold between the teacher and each learner one at a time as the group works toward mastery of a problem. In other words, the teacher runs a set of one-to-one interactions, and the individuals, as primary interactants, engage in interactions with the teacher while taking advantage of earlier one-to-one exchanges that they had observed. Both concurrent and cumulative GDA follows the same principle of offering learners mediation to help them co-construct a ZPD, but they differ in that "the concurrent GDA is to promote each individual by working within the group's ZPD but cumulative GDA promotes the group through co-constructing individuals' ZPDs" (Poehner, 2009, p. 476).

Research on GDA

The efficiency of concurrent and cumulative GDA in EFL classrooms has been explored by various studies establishing evidence in favor of GDA over non-GDA approaches. For example, Mirzaei et al. (2017) investigated the effect of cumulative GDA on the depth of vocabulary knowledge in an EFL context. The results showed that, regarding the depth of vocabulary knowledge, the students who received interactionist cumulative GDA outperformed the non-DA group on both immediate and delayed post-tests. Likewise, Farahani and Moghadam (2020) studied the impact of cumulative GDA on the learning of congruent and non-congruent collocations among Iranian intermediate EFL learners. The results revealed that while cumulative GDA was effective in the learning of both congruent and non-congruent collocations, the scores obtained from congruent collocations were higher than those from non-congruent collocations. Another study conducted by the same researchers (Moghadam & Farahani, 2020) showed that concurrent GDA was significantly effective in the achievement of phrasal verbs at a productive level. Examining the role of concurrent GDA in enhancing listening comprehension and metacognitive awareness of listening strategies was the focus of Moradian and Kogani Baharvand's (2015) research. Their analysis demonstrated that concurrent GDA could contribute to improving both listening comprehension and metacognitive awareness of listening strategies.

A number of studies have made an effort to compare the effects of concurrent and cumulative GDA. For instance, with a focus on teaching English articles, Miri et al.

(2017) showed that both types of GDA increased Iranian high school students' gains in learning articles. However, it came to light that the concurrent group performed better than the cumulative one. In another research concerning L2 reading, Fani and Rashtchi (2015) found that mediation in both concurrent and cumulative GDA promoted the Iranian EFL learners' reading ability. However, no significant differences were found between the effects of these two types of GDA.

Sanaeifar and Divcolaii (2019) investigated the effect of implementing cumulative and concurrent GDA on students' self-management of learning tasks among Iranian intermediate EFL learners. They found that both types of GDA had statistically significant effects on promoting students' self-management on learning tasks but cumulative GDA was revealed to be more effective than concurrent GDA. In a similar vein, Safaei Asl et al. (2021) explored the effect of concurrent and cumulative GDA on homogeneous and heterogeneous EFL learners' auditory memory in listening tasks. Their results indicated that GDA approaches on the one hand and homogeneity and heterogeneity of EFL learners on the other hand both have significant main and interaction effects on EFL learners' auditory memory. Moreover, cumulative GDA appeared to have more effects than concurrent one on heterogeneous EFL learners' auditory memory. But the two GDA approaches did not differ in their effect on homogenous learners. In another study, Ghenaat et al. (2022) compared the effects of GDA, computerized DA, and interactionist DA on Iranian EFL learners' listening comprehension. The results demonstrated that, first of all, the three models of assessment affected the participants' listening comprehension; and secondly, GDA had a more positive impact in comparison with the other two models.

More recently, Rezai et al. (2023) compared the effectiveness of GDA and process-based instruction (PBI) on EFL learners' metacognitive awareness and listening comprehension. Three homogenous groups of participants (GDA, PBI, and control) took part in a pretest/intervention/posttest procedure. Findings evidenced that although both the GDA and PBI groups outperformed the control group, the GDA was more effective than PBI to foster EFL learners' metacognitive awareness and listening comprehension.

DA-based research on reading comprehension

One of the pioneering studies tailoring DA to reading comprehension was the work of Ableeva (2008) who used DA with university students learning French. She found that the differences in learners' difficulties on an assessment revealed their unique ZPDs, which were not revealed in the non-dynamic pre-test. Her results showed that employing DA in receptive comprehension classrooms makes it possible for both learners and their teachers to identify the probable sources of problems that might hinder text comprehension. Following the same line of research, Al-Dawoody Abdulaal et al. (2022) addressed the impact of DA vs non-DA approaches on the development of EFL learners' receptive skills. Their findings indicated that DA had significant effects on both receptive skills of reading and listening.

In the Iranian EFL context, a few studies have addressed the applicability of sociocultural notions of mediation and scaffolding to the reading comprehension ability of EFL learners. For example, Attarzadeh (2011) addressed the effect of scaffolding on reading comprehension of various text modes on Iranian EFL learners at different proficiency

levels. The results turned out to be in favor of scaffolded narrative text types for mid-level learners. Also, Birjandi and Daftarifard (2011) investigated the possible impact of ZPD on EFL learners' performance on two types of reading comprehension tests (i.e., the main idea and the Wh-question type). The researchers used a software program to analyze the data and estimate the learners' Rasch measure in pre, post, and mediation tests. The findings indicated that the ZPD was the main reason for the observed difference between the learners' performance on the pretest (actual level of development) and posttest (future level of development). The study also revealed that the learners with lower Rasch measures showed more sensitivity to mediation.

Ajideh and Nourdad (2012) investigated the existence of any difference between a dynamic and non-dynamic assessment of EFL learners' reading comprehension ability. They reported that DA had a positive immediate and delayed impact on the reading comprehension of the EFL learners at all proficiency levels. Their results also revealed a significant difference between the dynamic and non-dynamic assessment of reading ability with the DA outscoring. In another study, Naeni and Duvall (2012) used a mixed method to study the improvements in reading comprehension performance of university students by applying the mediation of the DA approach to instruction and assessment. Their findings revealed significant improvement in the reading comprehension performance of the participants after the mediation. Likewise, Birjandi et al. (2013) aimed at exploring the feasibility of the implementation of a DA procedure in the area of EFL reading comprehension and metacognitive awareness of reading comprehension. A statistically significant effect was found for the performance of the participants in the experimental group who received the DA mediation.

Another study was performed by Estaji and Khosravi (2015) who investigated the impact of collaborative and static assessment on Iranian EFL students' reading comprehension, critical thinking, and metacognitive strategies of reading. Their results showed that the students in the experimental group showed statistically significant gains in reading comprehension and metacognitive strategy as compared with the participants in the control group but did not show any significant difference in their critical thinking. Similarly, the analysis of the interviews and classroom observations provided important themes which confirmed that the students found collaborative assessment a very fruitful and practical way of promoting their reading skills and strategies. Likewise, Fani and Rashtchi (2015) compared the impact of individualized and GDA on the reading comprehension ability of Iranian EFL learners. The results showed that mediation in concurrent and cumulative GDA, as well as individualized DA equally improved participants' reading comprehension ability.

Nikmard and Tavassoli (2019) examined the effect of using DA on EFL learners' performance on selective and productive reading comprehension tasks. The primary finding was that DA improved EFL learners' performance on both types of tasks significantly. In another study, Kazemi et al. (2020) investigated whether the implementation of an interventionist model of DA, using a repetitive process of pretest-teach-retest, could contribute to improving reading comprehension, and have a positive impact on learners' reading motivation in the EFL context of Iran. Descriptive and inferential analyses revealed that the experimental DA group significantly outperformed the control non-DA group on the scales of reading comprehension skill confirming that the use of DA

appears to provide scaffolding support for the students to understand the reading texts. A change was also observed in the reading motivation level of the experimental group.

Taking a different research stance, Zare et al. (2021) explored the possible effect of critical thinking-oriented DA on Iranian EFL learners' reading comprehension performances. While learners in the first experimental group received mediation loaded with critical thinking, learners in the second experimental group received DA mediation, and learners in the control group did not receive any mediation. The results revealed that critical thinking-oriented DA and DA groups outperformed the control group however no statistical differences between the two DA groups were observed indicating that both types of SCT mediations had a similar impact on the learners' reading achievement.

The literature gap and rationale of the study

Overall, the studies comparing concurrent and cumulative GDA yielded controversial and inconsistent findings and the question about the more effective mediational strategy for the management of GDA in EFL classes still remains unresolved. Furthermore, although the majority of studies addressing this issue have attempted to investigate the effects of GDA on L2 development in one way or another, there has been little discussion about the impact of concurrent or cumulative GDA on the development of the micro-skills of reading comprehension.

This gap in the literature needs to be addressed because reading comprehension is not only the cornerstone of the reading skill, but it also is among the notoriously challenging parts of the English language (Kendeou et al., 2016). Many EFL students have difficulties understanding the information presented in the written form of English texts, and sometimes it may be very time-consuming for them to read a text in English and understand it (McNamara, 2007). More importantly, what makes reading comprehension a daunting and challenging skill to acquire for EFL learners is a number of micro-skills that they need to employ to achieve maximum reading comprehension, namely identifying the main idea, finding supporting details, finding inferences, understanding vocabulary, and finding references. Thus, exploring the impact of concurrent or cumulative GDA on the development of those micro-skills seems a worthwhile research endeavor.

Method

Participants

The participants consisted of 60 undergraduate EFL university students majoring in Translation Studies and Teaching English as a Foreign Language at Islamic Azad University, Kermanshah branch, Iran. They were both males ($N=14$) and females ($N=46$) and their ages ranged from 20 to 26 years old. All of them were Persian native speakers. Due to practicality issues, a convenience sampling technique was utilized. The participants were selected from an original pool of 95 students who were assigned to two *Reading II* classes by the university registration office. In order to control for language proficiency, Oxford Placement Test was administered and the obtained scores were used to discriminate intermediate-level students from the rest of the participants. In each class, from among those students who scored within the range of one standard deviation above and below the mean, 30 students were randomly selected. Thus, two sets each comprising 30 students shaped the two concurrent and cumulative groups participating in the study.

Instruments

Oxford Placement Test (OPT)

OPT as a valid and reliable test and a highly effective instrument in grouping participants was used to select the participants within the same level of English language proficiency. The OPT used in this study was Allan's (2018) version. The OPT was conducted on a population of 95 students but based on the results of the test only 60 students whose scores fell within the range of intermediate language proficiency (120–149 out of 200) were selected as the participants in the study.

Pretest/posttest

To assess the participants' reading comprehension ability before and after the experiment, one of the researchers (who was the instructor of the two classes as well) devised a pre-/posttest. The pretest consisted of 3 passages and 30 multiple-choice items, and the posttest was a parallel form of the pretest consisting of the same number of passages and multiple-choice questions. The pretest/posttest assessed reading ability in terms of five micro-skills, namely identifying the main idea, finding supporting details, finding inference, understanding vocabulary, and finding references. The chief reason for making such a decision was to keep the process of assessment aligned with the instruction of the treatment given to the groups; an alignment which was highly recommended by scholars in the field of L2 assessment and testing (e.g., Norris, 2016).

Both the pretest and posttest consisted of 3 reading comprehension passages each followed by 10 multiple-choice items. The passages were 600 to 700 words long, adopted from the reading comprehension section of TOEFL iBT (ETS, 2020). From among a bulk of reference materials, prep books, online resources, and official guides to TOEFL iBT, the "Official TOEFL iBT Tests (Vol. 1 and 2)" was chosen as the source of reading comprehension passages. Each volume of this book contains five authentic and actual retired TOEFL iBT tests administered and published by Educational Testing Service (ETS), a private non-profit organization, which designs, administers, and officially issues the scoring reports of the TOEFL test across the world. It was reasoned that this book, published by the official makers of the test, would provide an authentic and reliable source of reading materials for the study.

The rationale behind choosing TOEFL iBT materials was that they complied with the purpose of the study in that each TOEFL iBT reading comprehension text is followed by multiple-choice questions that examine the same micro-skills that were the foci of the present study. Furthermore, TOEFL iBT reading comprehension materials have been proven to be appropriate and suitable for Iranian undergraduate university students majoring in English in terms of readability level, vocabulary size, topic and content familiarity, and relevance (e.g., Poorstoti & Asl, 2015). To ensure validity, both tests were reviewed by expert judges. In addition, KR21 was run to calculate the reliability of the pretest and posttest ($r=0.79$).

Treatment materials

For reasons discussed in the previous section, the selected reading comprehension passages used as classroom materials were adopted from the reading comprehension

section of the TOEFL iBT (ETS, 2020). A major characteristic of the task collection was the difficulty level of the tasks. Since the study centered on the notion of ZPD-sensitive mediation, the tasks in this collection had to be slightly more difficult than what students could manage independently. This is based on the SCT assumption that students' cognitive development would accelerate if they received tasks that were slightly beyond their present cognitive level because in accomplishing such tasks, they would seek assistance and scaffolding from their instructor (Sato & Ballinger, 2016).

Another point of consideration in composing the treatment tasks was preparing appropriate question items for each passage. Almost all the available and common reading comprehension materials were followed by multiple-choice items; however, that could not be exactly copied here since the typical multiple-choice format was not compatible with socioculturally-based mediation in which students would intentionally be given hints to find the answer. If a multiple-choice format was used, as soon as a student was given a hint, s/he might realize that the answer was wrong and in fact, s/he was left with three alternatives, and in the case of receiving the second hint s/he had just two alternatives, and so forth. In other words, the provision of each hint would mean the deletion of one alternative. To avoid this, open-ended questions were designed so that giving hints to students would not make them guess the right answer.

Based on these considerations, five TOEFL iBT reading comprehension tasks were selected as the treatment materials of the study. Each task was followed by five open-ended questions each focusing on one reading comprehension micro-skill; that is, identifying the main idea, finding supporting details, finding inference, understanding vocabulary, and finding references. The passages were 600–700 words long. The readability coefficient of the tasks was controlled based on Crossley et al.'s (2011) readability test ($r=0.79$).

Data collection procedure

Based on the results of the OPT, which was administered at the outset of the procedure, 60 intermediate university students were selected and divided into two equal groups of 30. One group received concurrent GDA and another group was offered cumulative GDA. In the concurrent GDA group, the teacher distributed the reading comprehension tasks to the class and asked them to read the passage and then the teacher ran a whole-class discussion following the guidelines of Lantolf and Poehner's (2011) prompting approach. To do so, the teacher called a student to answer the first question while ensuring that the other learners were actively engaged. If the learner was unable to give the correct answer, the teacher offered the first mediation (the most implicit one) intended to help the learner. If the student still experienced difficulty, the teacher shifted the interaction to another learner providing the second prompt. The interaction continued with different learners until the correct answer was found.

In the cumulative GDA group, the teacher called a student to answer the first question while ensuring that the other learners were actively listening. If the learner's answer was correct, the teacher asked her to discuss the answer to find out why it was correct. If the answer was incorrect, the teacher provided her with an appropriate form of mediation according to the prompting model proposed by Lantolf and Poehner (2011). The mediation was negotiated between the teacher and the learner in a flexible and cooperative

manner. The amount and type of mediation offered by the teacher were fine-tuned to the individual's needs and the developmental level of the student (Poehner, 2018; Poehner et al., 2015). The interaction between the teacher and the learner continued until the learner reached the correct answer. The median went on through a sequence of turn-taking procedures in which, as Poehner (2009) illustrates, “students will take turns engaging directly as primary interactants with the teacher, with the understanding that each subsequent one-on-one exchange will have the advantage of building on earlier interactions that the group members witnessed” (p. 478).

The mediational procedure was integrated into a *Reading II* course. The participants met once a week for 90-min lessons over a 16-week semester aligned with an ongoing university program. The pretest was administered to both groups in the first week of the semester and the mediation procedure (using the treatment materials; that is, five reading comprehension tasks) followed over the subsequent weeks. In the last week, the posttest was administered to both groups. The posttest was a counterbalanced version of the pretest and all the conditions of the test administration were the same for the pretest and posttest.

Data analysis procedure

The pretest/posttest procedure for the two experimental groups provided two sets of quantitative data which were separately scored and analyzed. Since the pretest/posttest included three reading comprehensions each following 10 questions, each test contained a total of 30 questions in the multiple-choice format. To score the test, each correct item received one point. The obtained score showed the overall reading comprehension ability of each individual. On the other hand, every two items on the pretest/posttest examined a different micro-skill of reading comprehension namely, identifying the main idea (MI), finding supporting details (SD), finding inference (I), understanding vocabulary (V), and finding references (R). Table 1 displays the distribution of items and the assessed micro-skills.

To answer the RQs, the data were fed into the SPSS software (version 28.0) and independent samples *t* tests were run.

Results

The first research question examined whether concurrent GDA had any significant effects on Iranian EFL learners' development of reading comprehension micro-skills. To this end, the concurrent GDA group's scores on the pretest and posttest were compared. Table 2 demonstrates the results of this analysis.

Table 1 Distribution of items and the assessed micro-skills on the pretest/posttest

Data set	Item number	Reading comprehension micro-skill
MI	1 and 2	Identifying the main idea
SD	3 and 4	Finding supporting details
I	5 and 6	Finding inference
V	7 and 8	Understanding vocabulary
R	9 and 10	Finding references

Table 2 Independent samples *t* test on concurrent GDA group pretest/posttest scores

Micro-skill	Pretest		Posttest		t test		
	M	SD	M	SD	t	df	p
MI	0.33	0.48	5.77	0.43	46.23	58	0.00
SD	1.00	0.83	5.00	0.83	18.66	58	0.00
I	0.28	0.44	4.98	0.45	40.90	58	0.00
V	1.10	0.67	5.20	0.63	24.41	58	0.00
R	0.98	0.72	5.40	0.52	27.26	58	0.00

Table 3 Independent samples *t* test on cumulative GDA group pretest/posttest scores

Micro-skill	Pretest		Posttest		t test		
	M	SD	M	SD	t	df	p
MI	0.33	0.48	5.67	0.48	18.88	58	0.00
SD	0.87	0.82	4.93	0.83	19.06	58	0.00
I	0.29	0.43	2.82	0.47	21.75	58	0.00
V	1.21	0.66	5.18	0.77	21.44	58	0.00
R	1.00	0.81	5.44	0.61	23.98	58	0.00

According to the results of the *t* tests shown in Table 2, a statistically significant difference was observed among the pretest and posttest scores of all the reading micro-skills ($p < 0.005$). Considering that the *p* value is less than the significance level, the null hypothesis H01 is rejected and the alternative hypothesis is accepted confirming that at the end of the mediational procedure, the participants in the concurrent GDA group showed a learning gain in reading sub-skills. It could be concluded that the concurrent GDA had a significant impact on the development of reading micro-skills for this group.

The second research question addressed the effects of cumulative GDA on Iranian EFL students' reading comprehension micro-skills. To do so, the cumulative GDA group's scores on the pretest/posttest were compared through multiple independent samples *t* tests the results of which are presented in Table 3.

As Table 3 portrays, a statistically significant difference could be seen among the pretest and posttest scores of all the reading sub-skills ($p < 0.005$). Since the *p*-value is less than the significance level, the null hypothesis H02 is rejected in favor of the alternative hypothesis that the cumulative GDA had a significant effect on this group's development of reading comprehension micro-skills.

The third and last research question focused on the comparison of the effects of concurrent and cumulative GDA mediation on the participants' reading comprehension micro-skills. In order to compare the two groups' performances statistically, multiple independent samples *t* tests were run. The results of this analysis are illustrated in Table 4.

As is evident from Table 4, the two groups' scores on the pretest were not significantly different ($p > 0.005$). Simply put, the groups' performances were relatively close on the pretest and the participants were approximately at the same level of competency on different micro-skills of reading comprehension when they started the procedure. In order

Table 4 Independent samples *t* test on concurrent and cumulative GDA groups' pretest scores

Micro-skill	Concurrent		Cumulative		<i>t</i> test		
	M	SD	M	SD	<i>t</i>	df	<i>p</i>
MI	0.33	0.48	0.33	0.48	0.00	58	1.00
SD	1.00	0.83	0.87	0.82	0.61	58	0.54
<i>I</i>	0.28	0.44	0.29	0.43	0.09	58	0.93
<i>V</i>	1.10	0.67	1.21	0.66	0.64	58	0.52
<i>R</i>	0.98	0.72	1.00	0.81	0.10	58	0.91

Table 5 Independent samples *t* test on concurrent and cumulative GDA groups' posttest scores

Micro-skill	Concurrent		Cumulative		<i>t</i> test		
	M	SD	M	SD	<i>t</i>	df	<i>p</i>
MI	5.77	0.43	2.67	0.48	26.35	58	0.00
SD	5.00	0.83	4.93	0.83	0.33	58	0.45
<i>I</i>	4.98	0.45	2.82	0.47	18.12	58	0.00
<i>V</i>	5.20	0.63	5.18	0.71	0.11	58	0.92
<i>R</i>	5.40	0.52	5.44	0.61	0.28	58	0.79

to compare the scores of the two groups on the posttest, another series of independent samples *t* tests were run. The results of these analyses are illustrated in Table 5.

As Table 5 indicates, the results of *t*-tests for two of the micro-skills of reading comprehension, namely MI and *I* were significant whereas the results for other micro-skills turned out to be insignificant. The participants who were mediated through concurrent GDA ($M=5.77$, $SD=0.43$) compared to the participants who received cumulative GDA ($M=2.67$, $SD=0.48$) demonstrated significantly better reading comprehension scores in terms of the micro-skill of MI ($t(58)=26.35$, $p<0.005$, $\eta^2=0.6$). Likewise, compared to the participants in the cumulative GDA group ($M=2.82$, $SD=0.47$), the participants in the concurrent GDA group ($M=4.98$, $SD=0.45$) obtained significantly higher reading comprehension scores regarding the micro-skill of *I* ($t(58)=18.12$, $p<0.005$, $\eta^2=0.6$). As for other micro-skills of reading comprehension, no statistically meaningful differences were observed between the concurrent and cumulative GDA groups. Considering the observation that the *p* value was less than the significance level for just two micro-skills, the null hypothesis H03 is partially rejected in favor of the alternative hypothesis that there were significant differences between the effects of concurrent and cumulative GDA on Iranian EFL learners' development of two reading comprehension micro-skills, namely identifying the main idea, finding supporting details and finding inferences.

Discussion

Regarding the first and second research questions that aimed to investigate whether concurrent GDA and cumulative GDA had any significant effects on Iranian EFL learners' development of reading comprehension micro-skills, the results revealed that both groups were effective in this regard as the participants in both groups showed significant gains at the posttest in terms of reading comprehension micro-skills. As for the third research question that focused on the comparison between the two groups, the results

demonstrated that concurrent GDA was significantly more effective than cumulative GDA in developing the micro-skills of identifying the main idea (MI) and finding inference (I). However, no statistically meaningful differences were found between the effects of concurrent and cumulative GDA in developing other micro-skills, namely finding supporting details (SD), understanding vocabulary (V), and finding references (R).

The interesting difference between concurrent and cumulative GDA effects might find an explanation in the cognitive nature of the micro-skills and the fact that the two GDA approaches, with their different treatment of primary and secondary interactants, may provoke different cognitive functions. In concurrent GDA where the mediation is suddenly directed to a random secondary interactant as soon as the previous primary interactant is unresponsive, the unpredictable shift and the expectation of being the next primary interactant compel the students to be aware of and attentive to the classroom exchanges. Therefore, students in a concurrent GDA class need to draw on higher-level cognitive functions so that they can be more engaged with learning and gain a better and deeper understanding of reading tasks. Higher-level cognitive functions rely not only on long-term memory and the background knowledge of the reader but also on the top-down cognitive processes necessary to capitalize on this existing knowledge (Hessel & Schroeder, 2020). This combination leads to the successful accomplishment of micro-skills tasks such as identifying the main idea and finding inferences that require access to prior knowledge from long-term memory, integration of prior knowledge with new information in a text, making inferences based on information in the text, and the ability to recall new information from memory. In contrast, in the cumulative GDA class, a few students find the chance to be primary interactants and the students are often secondary participants or bystanders observing others. This might lead to distraction and inattentiveness during the long dyadic exchanges between the teacher and a primary interactant. This, in turn, may interfere with or impede higher-level cognitive functions; and accordingly, the students may not become much competent in top-down micro-skills tasks such as MI and I.

The findings of the study support this postulation as the participants in the concurrent GDA class outperformed the participants in the cumulative GDA group regarding the micro-skills that involve higher-level cognitive processes; that is, MI and I. In the concurrent GDA class, when doing the reading activities, the teacher provided group mediation by calling on a student (i.e., primary interactant) and eliciting a correct response from her/him by providing feedback but if that student struggled or failed to respond the teacher rapidly shifted to another student (i.e., secondary interactant). However, in the cumulative GDA, during the reading tasks, the teacher conducted one-on-one interactions with individuals working with one student at a time toward mastery of a problem without shifting between other classmates. Consequently, in the concurrent GDA class, all the students could have expected to be primary interactants because as soon as the previous interlocutor failed to respond correctly the teacher might turn to them and call on them to participate in the task. On the other hand, in the cumulative GDA class, a few students found the chance to be primary interactants and most of the students were secondary participants most of the time. It could be inferred that the expectation of being the next primary interactant in the concurrent GDA class compelled them to be attentive and aware

of the classroom exchanges; therefore, they became more engaged with learning and developed a better and deeper understanding of reading comprehension strategies and skills. That is why they could do better on the MI and I micro-skills that demand higher-level cognitive functions and top-down processes. In contrast, in the cumulative GDA class, the long wait before the next student became a primary interactant and the extended time of remaining a secondary interactant may have led to inattentiveness, distraction, and failure to engage in higher-level cognitive skills.

Aside from the two abovementioned micro-skills, the results confirmed that concurrent and cumulative GDA were equally successful in promoting other micro-skills. This finding provides solid evidence of the applicability of GDA as an approach to enhancing the whole group's ZPD development as concurrent GDA supports the development of each individual by working within the group's ZPD while cumulative GDA attempts to move the group forward through co-constructing ZPDs with individuals (Poehner, 2009). In light of SCT insights, it could be argued that the social space of the GDA classrooms created an atmosphere of intersubjectivity (Shabani, 2018) and collective scaffolding (Donato, 1994) that helped move the primary and secondary interactants forward in their ZPD regarding the micro-skills associated with lower-level cognitive functioning, namely SD, V, and R. The findings also reflect Poehner's (2009) suggestion that interactions in a class can be beneficial for both students who directly receive dialogic feedback and those who are exposed to the interactions but not directly addressed. This is congruent with one of the most fundamental tenets of Vygotskian SCT that knowledge is initially co-constructed on a social level where learners have the opportunity to interact with more capable others (Lantolf & Poehner, 2011).

The present results support evidence from other studies (e.g., Al-Dawoody Abdulaal, 2022; Fani & Rashtchi, 2015; Kazemi et al., 2020; Nikmard & Tavassoli, 2019; Zare et al., 2021) that reported on the effectiveness of applying various forms of DA in general and GDA in particular in the development and improvement of EFL learners' L2 reading ability. The findings are also in accordance with previous findings offering evidence in support of the efficiency of concurrent or cumulative GDA in developing various aspects of language education (e.g., Ghenaat, 2022; Rezai et al., 2023; Safaei Asl et al., 2021; Sanaeifar & Divcolaii, 2019). Also, the findings corroborate previous findings that reported the superiority of the concurrent GDA over the cumulative type (e.g., Miri et al., 2017). Moreover, the results contradict the claims that GDA cannot be largely implemented in EFL classes because ELT teachers have assumed that it is not practical and the teacher cannot construct different ZPDs, especially in university classrooms where different students have distinct ZPDs (Anton, 2009). Finally, the findings suggest that GDA could be regarded as a promising solution to the inefficiency of dyad-based DA that might not fulfill the needs of all the students in a class due to constraints of time (Davin, 2013). Applying GDA, thus, would diminish Iranian ELT teachers' concern that using DA in Iranian educational settings is not feasible because it is time and energy-consuming (Saniei, 2012). In sum, the findings cast doubt on the long-held belief that dynamic assessment works best for individual tutoring rather than for EFL university classes and confirms that providing mediation to the whole class through concurrent or cumulative GDA is feasible and fruitful.

Conclusion

This study set out to address and compare the effects of two approaches to the provision of mediation in EFL classrooms; that is, concurrent and cumulative GDA. Results showed that both approaches to GDA were effective in fostering EFL learners' development of reading comprehension micro-skills. However, the concurrent approach was more efficient in developing the micro-skills of identifying the main idea (MI) and finding inferences (I). No significant differences were observed between the two GDA approaches in enhancing the development of other micro-skills, namely finding supporting details (SD), understanding vocabulary (V), and finding references (R). These findings may be explained by the fact that in concurrent GDA since the secondary interactants expect to be called on at any moment, they are more alert and attentive to mediational exchanges, and this contributes to enriching the micro-skills of MI and I that involve higher-level cognitive functions and top-down processes. Furthermore, in light of SCT insights, the fruitfulness of both approaches could be attributed to the common core of DA and GDA and the SCT underlying principle that through group-mediated dialogues and ZPD-sensitive mediation, both GDA groups could acquire knowledge at a deeper level, to ultimately grow beyond their potential level of competency (Poehner & Lantolf, 2005; Vygotsky, 1989).

The findings of this study hold apparent implications for teaching English in general and reading in particular. Overall, the findings may raise university-level language teachers' awareness of various kinds of reading comprehension micro-skills and the way they pose challenges for learners. In light of these findings, L2 teachers can also gain familiarity with the principles of GDA and its two modes (i.e., concurrent and cumulative) as well as the steps required to implement these techniques. Currently, English teachers in Iran follow an almost traditional approach to teaching L2 reading, mostly emphasizing Persian translation of English texts and vocabulary memorization. Thus, it is high time stakeholders included innovative approaches to reading instruction in the English language curriculum that are supported by empirical studies in the Iranian EFL context. Both concurrent and cumulative GDA could be potential candidates considering that they evidently fostered Iranian EFL learners' development of reading comprehension micro-skills in this study.

Another important implication of the study is that it showed the implementation of *interaction* (in the form of interactional mediation) in teaching L2 reading could be an appropriate response to the problems of the current English reading classes in Iran. Furthermore, the findings provided more insights into the cognitive processes which are associated with the development of L2 reading ability within the whole class ZPD. The ELT teachers can draw upon the findings to get engaged in exchanging ZPD-sensitive feedback and co-building new knowledge and awareness. However, it should be noted that concurrent and cumulative GDA approaches when applied to teaching reading comprehension should be viewed as complementary. The concurrent approach works better with activities that require higher-cognitive functions such as identifying main ideas or finding inferences in a passage. On the other hand, both approaches could be equally beneficial in activities that involve lower-level bottom-up cognitive processes such as finding supporting details, understanding vocabulary, or finding references.

Despite its novel contributions, there are some limitations to the present study that should be acknowledged. Due to the small sample size of the classes, no claims about the generalizability of the results could be made. In addition, the study did not take into account a number of moderating variables such as participants' age, gender, and language proficiency level that might have interfered with the outcomes of the experiment. This study also lacked a non-DA or static group. The sole focus on reading comprehension micro-skills from among all the areas of L2 might be another constraint. The study merely addressed some of the reading comprehension micro-skills whereas other aspects of the reading skill such as phonics, phonological awareness, word recognition, fluency, understanding sentence structure, and understanding text structure (coherence and cohesion) would have been equally worthy of further investigation. Taken together, future studies may shed more light on these findings by including a control group, choosing larger sample sizes with diverse characteristics, targeting other areas and skills of L2, and working in contexts other than Iranian universities.

Abbreviations

GDA	Group dynamic assessment
EFL	English as a foreign language
DA	Dynamic assessment
ZPD	Zone of proximal development
SCT	Sociocultural theory
OPT	Oxford Placement Test
TOEFL	Test of English as a Foreign Language
iBT	Internet-based test
ETS	Educational Testing Service
MI	Main idea
SD	Supporting details
I	Inference
V	Vocabulary
RQs	Research questions

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Authors' contributions

All authors have made substantial contributions to conception and design, acquisition of data, analysis and interpretation of data, and writing the manuscript. All authors read and approved the final manuscript.

Authors' information

Mahtab Zadkhast is currently a Ph.D. candidate of TEFL in the English Department, Isfahan (Khorasgan) Branch, Islamic Azad University, Iran. She is doing her Ph.D. dissertation on cumulative group dynamic assessment. Her research areas of interest are issues in second language acquisition (SLA) and dynamic assessment.

Ehsan Rezvani is an assistant professor of TEFL in the English Department, Isfahan (Khorasgan) Branch, Islamic Azad University, Iran. His main research areas of interest are issues in second language acquisition (SLA) and computer-assisted language learning (CALL). Ehsan Rezvani has published several articles on language teaching and he has presented papers in international conferences. He can be contacted at e.rezvani@khuisf.ac.ir.

Ahmad Reza Lotfi is an assistant professor of Linguistics in the English Department, Isfahan (Khorasgan) Branch, Islamic Azad University, Iran. His main research areas of interest are general and applied linguistics as well SLA. Ahmad Reza Lotfi has published a number of articles on linguistics and language teaching. He can be contacted at lotfi.ahmadreza@gmail.com.

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