Journal of Language Horizons

Scientific Quarterly Journal of Language Horizons, *Alzahra University*
Volume 8, Issue 1, Spring 2024
Research Article
pp. 33-61

Differential Impact of Synchronous and Asynchronous Computer-Assisted Dynamic Assessment on Higher-Order and Lower-Order Writing Skills

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Received: 26/07/2022 Accepted: 11/03/2023

Abstract

This study endeavored to scrutinize the differential impacts of asynchronous and synchronous computer-assisted dynamic assessment (CADA) on English-as-a-foreign-language (EFL) learners' higher-order and lower-order writing skills. In a quasi-experimental pretest-posttest research design, 60 Iranian EFL university students of both genders were selected through convenience sampling and were randomly assigned to two experimental groups. They experienced dynamic assessment (DA) procedures and received mediation on their writing either asynchronously or synchronously for 12 weeks where the higher-order and lower-order writing skills were rated by the researchers based on the West Virginia Department of Education (WVDE) (2011) writing rubric. The results of MANOVA revealed that both groups performed significantly better on the writing posttest in all the higher-order and lower-order writing skills. Nevertheless, no significant inter-group differences were found in the practiced writing skills on the posttest results. Further, 10 participants were randomly selected from each experimental group to explore their perceptions of and attitudes toward the CADA procedures. Analyzing their responses, it was observed that members of the asynchronous CADA group had more positive perceptions of writing, less level of stress, and more sense of rapport with the instructor. The findings highlight the potential of CADA to enhance EFL learners' higher-order and lower-order writing skills both in synchronous and asynchronous contexts.

Keywords: asynchronous, computer-assisted dynamic assessment (CADA), higher-order writing skills, lower-order writing skills, synchronous

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DOI: 10.22051/lghor.2023.41130.1720

Introduction

In the ever-changing world we are living in, technology is an instrument empowering human beings all around the globe to have a better life. According to Chih-Ming and Ying-You (2020), the expeditious development of information and communication technologies (ICT) has given rise to the emergence of computer-mediated communication (CMC). CMC deals with "synchronous or asynchronous electronic mail and computer conferencing by which senders encode text messages that are relayed from senders' computers to receivers" (Walther, 1992, p. 52).

Similarly, the developments observed in technological devices have influenced the second/foreign language (L2) experiences (Chakowa, 2018) and enhanced the quality of teaching, learning, and assessment (Mukminin & Habibi, 2020; Prasojo et al., 2019). Since instruction and assessment go hand in hand, any variation in one would inevitably result in a change and variation in the other. Accordingly, computer-assisted dynamic assessment (CADA) has emerged as the integration of teaching and assessment into one single activity (Ebadi & Bashiri, 2021; Poehner, 2008; Shrestha, 2020).

Dynamic assessment (DA), principally inspired by Vygotsky's sociocultural theory (SCT), is a comprehensive assessment procedure that endeavors not only to determine the learners' actual cognitive ability but also to enable them to improve their maturing ability (Shrestha, 2020). In the DA context, learners constantly receive mediating feedback through the deployment of effective interventions and social interactions, usually provided by the teacher and more capable peers, respectively (Andujar, 2020; Zandi et al., 2020).

DA has been the focus of L2 scholars' attention in the Iranian EFL context too, and several studies have scrutinized the potential of both in-class or technology-assisted versions of DA on L2 learning. In the classroom setting, Tavassoli and Nikmard (2019) identified the effectiveness of DA on L2 learners' performance on reading comprehension tasks. Also, Daneshvar et al. (2021) found the outweigh of DA over conventional static assessment in improving the learners' performance on IELTS writing task 2. Further, the technology-assisted DA has also been studied by investigating the students' writing skills through mobile-based DA (Ebadi & Bashiri, 2021; Torabi & Safdari, 2020), developing EFL learners' descriptive writing through mobile-mediated hybrid DA (Shafaiee Rad, 2021), and exploring

the developmental errors in academic writing through computer-mediated and face-to-face DA (Vakili & Ebadi, 2019).

Deploying DA approach not only necessitates an alternative to the conventional teaching and assessing procedures but also requires an integration of new technologies in teaching writing (Vakili & Ebadi, 2019). In other words, it seems beneficial to focus on computer-mediated communication in writing classes. CMC can be categorized into asynchronous and synchronous modes. The former entails some time restraints on communication while the latter requires individuals to get involved in simultaneous interactions (Kazemi et al., 2022).

Exploring how DA works as an asynchronous online medium (e.g., emails) or a synchronous online communication tool might introduce promising results in teaching L2 writing. DA can help the assessment of both macro-level or higher-order writing skills (e.g., organizational) and micro-level or lower-order writing skills (e.g., structural) (Cumming, 2001). To the best of the researchers' knowledge, in the EFL context of Iran, no study has been conducted on EFL learners' higher-order and lower-order writing skills while they are engaged in asynchronous CADA (hereafter, ACADA) or synchronous CADA (hereafter, SCADA). Moreover, no information is available about Iranian EFL learners' perceptions of and attitudes toward online DA procedures. Taking into consideration the studies mentioned above reveals that they are mostly confined to traditional classroom boundaries. However, as Shrestha (2020) asserted, "more DA studies need to be conducted in academic writing and distance education" (p. 241). Besides, in cases technology is integrated to manage mediation, no study inclined its focus on whether ACADA and/or SCADA can be effective for improving EFL learners' higher-order and lower-order writing skills, and whether such procedures are favorable and encouraging for EFL learners. Taking the paucity of research in this regard on the one hand, and the necessity of shedding light on EFL learners' inclination toward integrating DA and technology in the class, on the other hand, the researchers were inspired to conduct this study. To address this lacuna in the literature, the current study investigated the following research questions:

1. Does ACADA significantly affect EFL learners' higher-order (i.e., organization and content development) and lower-order writing skills (i.e., sentence structure, mechanics, and word choice/grammar usage)?

2. Does SCADA significantly affect EFL learners' higher-order (i.e., organization and content development) and lower-order writing skills (i.e., sentence structure, mechanics, and word choice/grammar usage)?
3. Is there any significant differential impact on EFL learners' higher-order (i.e., organization and content development) and lower-order writing skills (i.e., sentence structure, mechanics, and word choice/grammar usage) using ACADA and SCADA?
4. What are EFL learners' perceptions of and attitudes toward ACADA and SCADA of writing?

Review of the Related Literature

Dynamic Assessment (DA)

DA is deeply rooted in Vygotsky's sociocultural theory of learning (SCT) (Lantolf et al., 2018). Originated in the 1920s by Vygotsky in Russia, SCT concentrates on the human mind, its higher mental functions, and the role social contexts play in shaping individuals' thinking (Lantolf & Thorne, 2006). Mediation and zone of proximal development (ZPD) are the main components of SCT and DA (Lantolf et al., 2015). Mediation refers to the process that individuals use to control and adjust the material world and their mental and social activities by making use of cultural artifacts (Lantolf & Thorne, 2006). On the other hand, ZPD refers to the current distance between an individual's independent problem-solving and his/her potential problem-solving under the guidance of an expert or a more capable person (Vygotsky, 1978). Learners can reach their ZPD as a consequence of the received mediation (Poehner, 2008).

DA "is a development-oriented process in which learners' learning difficulties are first diagnosed based on which mediations are provided to help the learners overcome the learning issues and reach their potential capabilities" (Ebadi & Rahimi, 2019, p. 2). The type and the amount of performance that learners require to successfully perform the task in DA reveals their learning potential. In DA, the instruction is not interrupted, but rather instruction and assessment are brought together to foster the learners' development (Kazemi & Tavassoli, 2020).

Computer-Assisted Dynamic Assessment (CADA)

In 1995, the publication of the first issue of the Journal of Computer-Mediated Communication gave rise to the scholars' interest in the concept of computer-mediated communication (CMC) and the significant role computers could play in communication. CMC may involve different types of message exchange such as many-to-many, one-to-many, and one-to-one with asynchronous or synchronous modalities (Carr, 2020; Lee, 2020). In this respect, Shrestha (2020) mentioned that in a computer-mediated context, technological tools can be employed to perform DA and do research on it. Plunging into the world of technology and computers, L2 scholars have recently endeavored to indicate the effect of CADA on learning target language components. Yang and Qian (2019) illustrated that with the help of CADA, learners could perform significantly more efficiently on reading. Estaji and Saeedian (2020) also concentrated on CADA by scrutinizing the influence of three different types of mediation provision, including mediation provided by a computer, an individual, and a combination of both. Their findings revealed that the first two types of mediation had the same amount of influence on the learners' reading comprehension, while the third type was influential as well.

Employing an interventionist DA, Davoudi and Ataie-Tabar (2015) explored the influence of a computerized dynamic test of writing (CDTW) on the learners' writing performance and reported that the participants' writing performance was enhanced in four major writing sub-skills. The attitude of the participants also confirmed the effectiveness of CDTW. In addition, in a recent qualitative study, Vakili and Ebadi (2019) scrutinized the effect of DA on EFL learners' writing and compared its differential effect in face-to-face and computer-mediated contexts by analyzing four learners' writing corpora. The findings of the study indicated that mediation in the face-to-face context encouraged the learners to participate in collaborative writing whereas in the computer-mediated context, learners were more concerned with their own written text and difficult items.

EFL Learners' Perceptions of Online Classes

Individuals' perceptions and attitudes are among the influential factors affecting their beliefs, interpretations of events, and the way they make decisions

throughout their lives. Richards and Schmidt (2002) defined perception as "the recognition and understanding of events, objects, and stimuli through the use of senses" (p. 391). Many of the studies conducted on students' perceptions have revealed that their perception is a star player in any process of language learning (Nazara, 2011). Rukmi et al. (2021) also asserted that students' perception is a puissant factor influencing the effectiveness of an activity and students with more positive perceptions accomplish classroom activities more effectively and achieve better results (Manalu, 2019).

Students' perception of distant education has been the locus of many studies within the outbreak of the Covid-19 pandemic as many educational systems had to use different online learning platforms and shift toward online teaching and learning to survive. In this regard, different researchers reported various results, including both positive and negative students' perceptions. Some scholars (e.g., Atmojo & Nugroho, 2020; Melani & Kuswardani, 2022) observed that teachers and students perceived online EFL learning insufficient, less motivating, and hard to understand. However, others (e.g., Rojabi, 2020) claimed the opposite to be true. Similarly, Deiniatur (2021) identified that students had positive perceptions of the use of Google classroom as employing such classes and giving feedback on students' writing prepared them for autonomous learning. Rosalinda et al. (2022) also revealed that students showed positive responses and a strong interest in using WhatsApp for learning writing during the Covid-19 pandemic. Using Zoom, Mu'awanah et al. (2021), however, found that students with suitable online learning facilities had positive perceptions while those with poor online learning facilities had negative perceptions of the application used.

EFL Learners' Attitudes toward Online Classes

Attitude refers to "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1993, p. 1). It influences every decision people make and every action they take (Tran et al., 2019). Students' attitudes mold how they think, feel, behave, and understand the world around them (Tran, 2020).

The rapid development of technology has affected studies done on attitude and language. Tusino et al. (2021), for instance, observed that learners showed

positive attitudes toward online task-based language teaching as it enabled them to write drafts and revisions in a better way. Azizah and Nugraha (2021) also indicated that, in their qualitative study which was conducted during the Covid-19 pandemic, EFL students revealed positive attitudes toward learning writing online. Furthermore, using Facebook as a tool to provide feedback, Phuong and Nguyen (2019) mentioned that students showed positive attitudes toward the app and their writing performance significantly improved.

Method

This study adopted a quasi-experimental pretest-posttest design to investigate the differential impact of A/SCADA on higher-order and lower-order writing skills. Furthermore, the participants' perceptions of and attitudes toward the DA procedures was checked through an open-ended questionnaire.

Participants

All the participants were undergraduate university students majoring in English translation studies. Out of the initial pool of 77 students in two intact groups who were opted at the inception of the study based on convenience sampling, 60 individuals that were at the intermediate level based on their performance on an Oxford Placement Test (OPT, 2001) were selected. There were 30 students in each group. Of these, 15 participants were male (25%) and 45 were female (75%), and their ages ranged from 19 to 30.

Moreover, 10 participants from each group provided explanatory and rich data regarding their perceptions of and attitudes toward the DA procedures deployed in the two groups. However, the researchers acknowledge that information from just 10 participants from each group might not lead to generalizable results.

Instruments and Materials

The participants performed on OPT (2001) as the placement test to ensure their homogeneity and those at the intermediate level on OPT were selected.

They were also asked to write two 150-word paragraphs as the pretest and the posttest so that their writing proficiency could be evaluated. Selected from the course-book *Longman Academic Writing Series 3: Paragraphs to Essays* (2014), the

topic for the pretest was “Write a 150-word paragraph about your plans. You may write about your plans for the near future or the distant future”, and the topic for the posttest was “Write a 150-word paragraph about how you want to get the job of your dreams”.

In evaluating the writings in pretest and posttest, the West Virginia Department of Education (WVDE) (2011) writing rubric was used, which was adopted from Pourdana and Tavassoli (2022). The rubric concentrates on “organization” and “content development” as higher-level skills of writing, and “sentence structure,” “mechanics,” and “word choice/grammar usage” as lower-level skills of writing. Each component has 6 band scores and to determine the learners’ overall writing skills, it is necessary to add up all the scores obtained for each component.

The course-book which was used in both groups was *Longman Academic Writing Series 3: Paragraphs to Essays* (2014), which concentrates on writing as a process, contains a precisely structured approach to writing, and is suitable for students studying at university. This course-book provides students with realistic writing models, clear explanations, and systematic practice that enable them to have a step-by-step writing development through the acquisition of new vocabulary, grammar, sentence structure, and mechanics (Oshima & Hogue, 2014).

In the ACADA group, email was used to carry out the interaction between the teacher and the students while in the SCADA group, the Adobe Connect platform was deployed to enable the simultaneous evaluation of the students’ writing.

Further, to build up a comprehensive picture of the students’ perceptions of and attitudes toward ACADA and SCADA of writing skills, the researchers adopted a perceptions questionnaire from Darhower (2014) and asked 10 participants from each experimental group to complete it. The questionnaire consisted of 13 questions to unmask the students’ perceptions of and attitudes regarding the merits and demerits of DA procedures. The students were required to indicate, based on the experience they had in the class, whether each question was true for them or not. They were also required to provide detailed explanations about their answers so that the researchers could obtain a better understanding of their perceptions and attitudes.

Procedure

The study was done in Iran in late 2020 and early 2021 during the Covid-19 pandemic. After signing the consent form, 77 EFL learners in two intact groups participated in an electronic version of OPT (2001). Of these, 60 learners, 30 in each group, whose scores were at the intermediate level (30-37) on OPT were selected. The two groups were randomly assigned into two experimental groups. All the 60 participants were informed about the classroom procedures and were told that during the semester, they would learn how to organize and develop paragraphs by reviewing different models, studying various explanations with examples, and having extensive practice on writing. They were also informed that they were required to write paragraphs individually and constantly receive feedback from their teacher. Then, the participants were asked to write a 150-word paragraph electronically for the pretest to evaluate their higher-order and lower-order writing skills. Employing the WVDE writing rubric (2011), adopted from Pourdana and Tavassoli (2022), the researchers rated the pretest of both groups.

Next, the treatment sessions started following the DA approach which lasted for 12 sessions. The instructor of the two groups was one of the researchers who was quite familiar with applying the DA procedures. The ACADA group received instruction once a week on the Adobe Connect platform. However, most of the communication between the instructor and the students was done through emails. In DA sessions, the students were required to send their writings to their instructor through emails. Their writings were assessed several times, and every time they received relevant guidance step-wise by moving from implicit to explicit corrective feedback through emails. The erroneous parts were initially highlighted to draw the students' attention to the problematic structural, lexical, or discursive constituents in their writing. In case they could not resolve their errors, they were provided with a hint or clue to locate their errors. Finally, if they were still unable to use the accurate language form, they were given several choices to select the most suitable one. In parallel, the students' writings in the SCADA group were checked in the Adobe Connect platform and they were simultaneously coached to correct their errors through orally leveled guidance inside the classroom. The corrective feedback similarly ranged from implicit to explicit in a step-wise manner. The main difference between SCADA and ACADA groups was that in the former, the feedback occurred

synchronously in the context of the classroom and in front of all the other students.

Near the end of the treatment, 10 randomly selected participants from each experimental group were asked to electronically answer a perceptions questionnaire adapted from Darhower (2014) regarding their perceptions of CADA procedures with explanatory responses. They were required to decide if each question was true for them or not. More importantly, they were asked to provide explanatory answers to the questions to identify their perceptions better. They were also provided with three open-ended questions to share their attitudes regarding the advantages and disadvantages of the CADA procedures used in their class. Even though the researchers were aware that information from only 10 participants from each group might not be enough, since the obtained data were explanatory and rich in nature, they considered this number acceptable. Later, the researchers analyzed the content of the students' responses to the questionnaire items collaboratively to extract the main themes.

Finally, in the last session, all of the students had to write a 150-word paragraph electronically for their posttest. The posttest of both groups was also rated by the researchers using the WVDE writing rubric (2011).

Results

The collected data were analyzed by the researchers to answer the research questions of the study.

Preliminary Investigations

The quantitative data from the pretest and posttest of the two groups were fed into the Statistical Package for Social Sciences (SPSS) for further analysis. First, to check whether to use parametric formulae in analyzing the data, the normality of the scores on the writing pretest and posttest were scrutinized through the one-sample Kolmogorov-Smirnov test (KS-test) (Pallant, 2011). The results showed that the two sets of scores were normally distributed because their levels of significance were larger than the critical level ($p_{pretest}$=.37; $p_{posttest}$=.53; α=.05; $p>\alpha$). Hence, these data sets were normally distributed and parametric formulae could be used to analyze them.

Next, to ensure the consistency of the pretest and posttest scores, the inter-

rater reliability was measured between the two raters' ratings of individual components of the WVDE writing rubric (2011) and the total writing scores using a series of Pearson correlations. The Pearson correlation values for the pretest scores (on individual components of writing and the total) ranged from .83 to .92 and for the posttest scores ranged from .89 to .97, all representing high values since they were all higher than .7 (Pallant, 2011).

In the next step, the homogeneity of the participants' writing was checked at the outset of the study through an independent-samples t-test on their pretest scores. The related descriptive statistics and the independent-samples t-test are reported in Tables 1 and 2.

Table 1

Descriptive Statistics of the Writing Pretest of the ACADA and SCADA Groups

	N	Mean	SD
ACADA	30	23.60	2.06
SCADA	30	23.09	2.26

Table 2

Independent-Samples T-Test on the Writing Pretest of the ACADA and SCADA Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Writing Pretest	Equal variances assumed	.00	.99	.82	58	.41

As Table 1 indicates, the pretest mean scores were 23.60 and 23.09 for ACADA and SCADA groups, respectively, which appeared to be close to each other. The difference between the two groups was checked statistically (Table 2). The significant value for the t-test was .41 and higher than the critical level (t=.82; p=.41; α=.05; $p>\alpha$), representing insignificant inter-group differences.

Investigation of Research Questions 1-3

To investigate research questions 1-3, a multivariate analysis of variance

(MANOVA) was carried out to investigate the two groups' performance on higher-order and lower-order writing skills (based on WVDE writing rubric, 2011) in the pretest and posttest. First, the descriptive statistics of the pretest and posttest scores are reported in Table 3.

Table 3

Descriptive Statistics of Higher-Order and Lower-Order Writing Skills of the ACADA and SCADA Groups

				Pretest	Posttest
Higher-Order Skills	Organization	ACADA	Mean	4.08	5.35
			SD	.90	.91
		SCADA	Mean	3.84	5.40
			SD	.96	.86
	Content Development	ACADA	Mean	5.26	5.67
			SD	.44	.45
		SCADA	Mean	5.28	5.46
			SD	.45	.70
Lower-Order Skills	Sentence Structure	ACADA	Mean	4.54	4.92
			SD	.39	.72
		SCADA	Mean	4.50	5.02
			SD	.65	.63
	Mechanics	ACADA	Mean	4.80	5.15
			SD	.50	.71
		SCADA	Mean	4.70	5.16
			SD	.55	.50
	Word Choice/ Grammar Usage	ACADA	Mean	4.85	5.31
			SD	.54	.56
		SCADA	Mean	4.80	5.33
			SD	.63	.27
	Total	ACADA	Mean	23.60	26.42
			SD	2.06	2.06
		SCADA	Mean	23.09	26.39
			SD	2.26	1.96

Taking a look at Table 3, it can be seen that both the ACADA and SCADA

groups had noticeable improvement from their pretest to posttest as far as the five higher- and lower-order writing skills and the total writing scores were concerned. To statistically check the significance of the observed differences, a MANOVA was run and the result is reported in Table 4.

Table 4

MANOVA on Higher-Order and Lower-Order Writing Skills of the ACADA and SCADA Groups

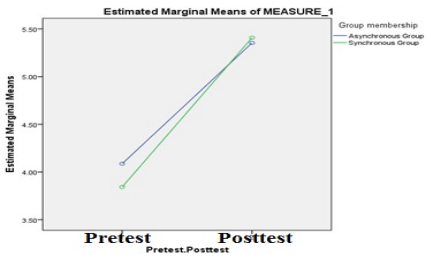
Source		Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Higher-order skills	Organization	49.14	1	49.14	58.82	.00*	.38
		Content Development	2.08	1	2.08	7.49	.00*	.07
	Lower-order skills	Sentence Structure	5.66	1	5.66	14.95	.00*	.13
		Mechanics	3.50	1	3.50	10.53	.00*	.10
		Word Choice/ Grammar Usage	6.04	1	6.04	22.07	.00*	.19
Group	Higher-order skills	Organization	.22	1	.22	.26	.60	.00
		Content Development	.21	1	.21	.78	.37	.00
	Lower-order skills	Sentence Structure	.00	1	.00	.00	.97	.00
		Mechanics	.12	1	.12	.37	.54	.00
		Word Choice/ Grammar Usage	.00	1	.00	.01	.90	.00
Time * Group	Higher-order skills	Organization	.54	1	.54	.65	.42	.00
		Content Development	.33	1	.33	1.19	.27	.01
	Lower-order skills	Sentence Structure	.21	1	.21	.57	.45	.00
		Mechanics	.15	1	.15	.46	.49	.00
		Word Choice/ Grammar Usage	.03	1	.03	.11	.73	.00

Table 4 shows that the significance value for "time" in the case of all the higher-order and lower-order writing skills was .00 and smaller than the critical level (p_{time}=.00; α=.05; $p<\alpha$). In other words, there was a significant difference between the performance of the two groups in all the higher-order and lower-order writing skills from pretest to posttest and the effect sizes in all cases were either moderate or large. It should be noted that the partial eta squared is small if it is .01 or 1%, moderate if it is .06 or 6%, and large if it is .138 or 13.8% (Pallant, 2011). However, there was not a significant difference between the performance of the two groups on any of the higher-order or lower-order writing skills since the significance values for "group" were all higher than the critical value (α=.05; $p>\alpha$), where all the effect sizes were zero. Therefore, they indicated similar improvements in both groups who received DA no matter synchronously or asynchronously. Finally, the results of the interaction of "time*group" revealed that neither of the two groups had a more significant progress from pretest to posttest on any of the higher-order and lower-order writing skills since all the p-values were above .05 (α=.05; $p>\alpha$), with effect sizes of zero or close to zero.

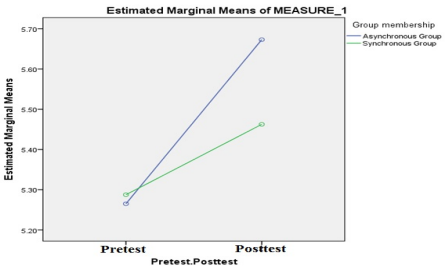
Figure 1 shows the performance of the two groups on the higher-order and lower-order writing skills and their total writing scores from pretest to posttest. The figure shows that in all cases, both groups had similar pretest scores, improved significantly from pretest to posttest, and had a similar performance on the posttest.

Figure 1

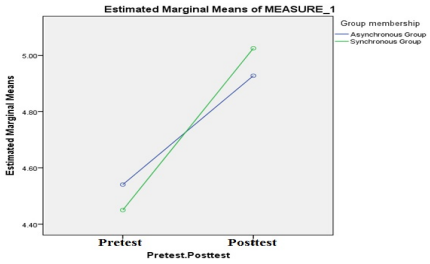
Comparison of the ACADA and SCADA Groups



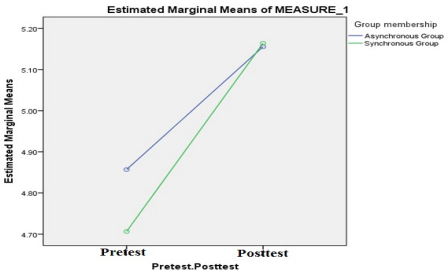
Organization



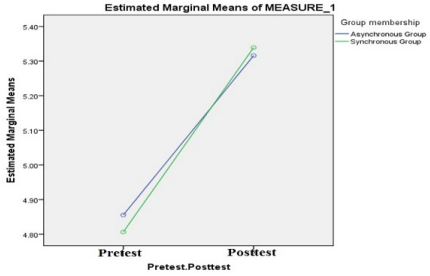
Content Development



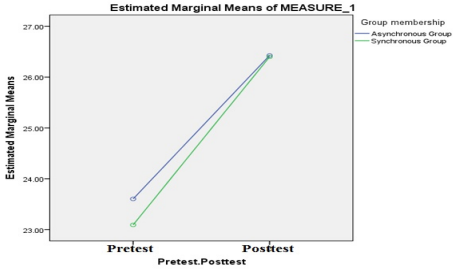
Sentence Structure



Mechanics



Word Choice/Grammar Usage



Total

To sum up, based on the results presented in Tables 3 and 4 as well as Figure 1, both the ACADA and SCADA significantly affected the Iranian EFL learners' higher-order and lower-order writing skills. Furthermore, it was found that no significant differences were observed between the effects of the ACADA and SCADA on Iranian EFL learners' higher-order and lower-order writing skills.

Investigation of Research Question 4

To explore the participants' perceptions of and attitudes toward ACADA and SCADA, 10 participants were randomly selected from each 30-member experimental group to answer a perceptions questionnaire which was adopted from Darhower (2014) and was modified based on the objectives of the current study.

To understand the learners' perceptions of CADA on their writing improvement, the participants answered the items with true/false which best suited their experience with DA procedures and wrote down a brief explanation about each item. Table 5 summarizes the frequency of the responses in each group followed by the chi-square test to examine the potential differences between the groups. The chi-square tests showed insignificant measures for all the items (α=.05; $p>\alpha$) which

were interpreted as the participants' positive perceptions of DA.

Table 5

Frequency of Responses to the Items in the Perception Questionnaire

		ACADA F	SCADA F	Chi-square	Sig.
1.	I can write better than I could before the class.	10	9	.05	.81
2.	The instructor's assistance helped me learn to write better.	10	10	.00	1
3.	I am more aware of the problems I have in my writing as a result of the instructor's explanations on my writing.	10	9	.05	.81
4.	The instructor's explanation sometimes confused me rather than helping me.	0	1	---	---
5.	The instructor's explanation on my writings was an effective way to practice writing.	10	10	.00	1
6.	I prefer to have a face-to-face conversation with the instructor.	9	9	.00	1
7.	Over time, the amount of help that I need in my writing becomes less and less.	10	6	1	.31
8.	Discussing my writing problems in English was more helpful than discussing them in Persian.	10	3	3.6	.06
9.	I think online classes are not effective at all.	9	3	3	.08
10.	I would have preferred that my errors were checked alone rather than talking about them with the instructor and other students in the class.	3	5	.5	.48

--- There were not enough valid cases for processing.

To delve into the participants' perceptions about CADA procedures more, example explanations about each item follow. Considering item 1, almost all

participants in both groups found CADA effective in improving their writing ability, which was in line with the results of the quantitative data analysis of the study.

> *I thought writing was one of the hardest skills, but learning the rules of writing and, of course, practicing and repeating can help improve your writing skills.* (Student J in ACADA group)

For item 2, all the participants claimed that the instructor's assistance was influential. This highlights the role of the teachers' mediation in supporting the students to put more effort into practice the next time they want to write.

> *It's crystal clear that the instructor's assistance helped me write better. Rules make everything better.* (Student F in SCADA group)

Regarding item 3, almost all participants agreed that the explanations they received enabled them to be aware of their writing problems more and this could be attributed to the positive effect of the feedback they received in the writing process.

> *The fact that you read all my writings many times and say my mistakes was really useful for me and I'm grateful.* (Student H in ACADA group)

Considering item 4, almost all participants rejected that the instructor's explanations confused them.

> *In most cases, the instructor gave us some general feedback and fortunately I could get her mind map.* (Student D in SCADA group)

Regarding item 5, all the participants in both groups agreed with the effectiveness of the instructor's explanations on their writings. In other words, they all considered DA as a beneficial way to practice writing.

> *My teacher's explanations are so sufficient and good that once she says it, I fully understand it and understand what she wants from me.* (Student G in ACADA group)

For item 6, almost all the participants, except one in each group, preferred to have a face-to-face conversation with the instructor.

> *100%, face-to-face classes are more effective.* (Student C in SCADA group)

With respect to item 7, although all the members of the ACADA group agreed that the amount of assistance they needed in their writing became less over time, in the SCADA group, 4 individuals disagreed and stated that they still wanted their teachers or peers to read their writing and make a comment on it.

> *Over the term, my mistakes became less and I learned how not to repeat past mistakes which I had in my writing. In other words, I became my own instructor.* (Student E in ACADA group)

For item 8, in contrast to the members of the ACADA group who unanimously preferred their writing problems to be discussed in English, most members of the SCADA group preferred their writing problems to be discussed in Persian (their mother tongue). This can be explained in terms of the academic environment they experienced. The participants of the SCADA group stated that as their errors were checked in the class, they suffered from too much anxiety and were under a lot of stress. Using a foreign/second language doubled their stress level.

> *In some cases, we can't understand the explanation of our mistakes in a paragraph. Telling it in Persian is better and it reduces our stress*. (Student I in SCADA group)

Regarding item 9, almost all of the participants in the ACADA group agreed that online classes are not effective. Some of them stated that online classes

were their second choice and they mentioned some problems such as lack of concentration and not being energetic in online classes. However, the majority of the students in the SCADA group rejected this idea.

> *It's not fair to say on-line classes are not effective. It's better to say face-to-face classes are more effective.* (Student B in SCADA group)

The last item was about the students' preference for their errors to be checked alone rather than being talked about with the instructor and other students. Three students in the ACADA group and five students in the SCADA group responded positively to this item while most claimed the reverse or that there was no difference for them.

> *I prefer the teacher to correct my mistakes, and if he tells me in front of the other students, it's better because I think it has a greater impact on me because when problems are raised in front of someone else, my motivation to do it right increases.* (Student A in ACADA group)

Overall, it was concluded that the participants in both groups had positive perceptions of DA procedures. Next, to explore the participants' attitudes toward CADA, three-open ended questions were added to the end of the questionnaire. The first two questions directly asked the students to mention the advantages and disadvantages of the A/SCADA procedures used in their classes.

Regarding the advantages, both groups mentioned that the CADA procedures enabled them to notice their mistakes and avoid repeating them. The ACADA group stated that they had more time to think, less stress, and a good rapport with the instructor. In addition, they stated that the classroom procedures gave them enough time to correct their errors on their own and helped them remember their mistakes, try to minimize them, and avoid their recurrence. On the other hand, the SCADA group believed that the main advantage of having synchronous DA was the instructor's immediate error feedback and elaboration on

students' errors. An example follows:

> *When I write a paragraph, and send it to my instructor, I need her to give feedback to my writing. As a result, I understand my errors, and learn the correct forms. When she just highlights my errors, and let me correct them, I try more, and also learn more.* (Student B in ACADA group)

Regarding the disadvantages, four members in the ACADA group did not mention any disadvantages, but the others stated that the procedures were lengthy and difficult especially for the older participants to cope with. On the other hand, most of the participants in the SCADA group objected to the shortage of class time as a result of which they could not submit high-quality works. Moreover, they maintained that they were stressed and could not make a good rapport with the instructor. Some of the participants in the SCADA group found the DA procedures useless and the cause of students' embarrassment, stress, and low concentration. Some students mentioned the poor internet connection as one of the major disadvantages.

> *When I have to write my assignments in a limited time, I get lots of stress, and I can't write as good as I can, so my work has many mistakes. When I make mistakes, I will lose marks. I can't focus on my topic easily in a short time and can't write about it.* (Student G in SCADA group)

Regarding the advantages and disadvantages of CADA procures, an interesting pattern was observed between the two groups as if the two groups' responses were the two extreme ends of a continuum. In contrast to the ACADA group who mentioned more advantages, the SCADA group mentioned more disadvantages. The themes extracted from the participants' responses in each group regarding the advantages and disadvantages of CADA are presented in Table 6.

Table 6

Extracted Themes from the Participants' Responses

	ACADA Group	SCADA Group
Advantages of CADA Procedures	• Becoming aware of errors and minimizing them • Being encouraged to write more • Having less stress • Having more time to think • Having the chance to correct mistakes and get better scores • Improving accuracy, structures, and punctuations • Having more self-confidence • Correcting the errors with the instructor's assistance • Making a good rapport with the instructor • No stressful atmosphere • Not being afraid of making mistakes because mistakes would lead to students' progress • Remembering mistakes and avoiding their repetition	• Checking a student's error helps others obtain information about their possible problems • Increased speed of typing • Increased speed of writing • Not being mocked by others • Remembering mistakes and avoiding their repetition • Checking students' errors instantly
Disadvantages of CADA Procedures	• Being hard for students who do not know how to work with computers • Needing more time to do the tasks • Being stressed • Time consuming	• Shortage of class time • Lowering self-confidence • Decrease of students' writing quality due to time limitation • Lack of concentration • Being stressed • Feeling embarrassed • No good rapport with the instructor • Poor internet connection and computer problems

The last open-ended question asked the participants of the ACADA group to state if they could write better in class and receive constructive feedback in class. Only two of the participants were positive and mentioned that as class writing would simulate the exam atmosphere, it could help reduce their stress level. The other eight participants preferred to write at home where they could have plenty of time to reflect on what to write and how to express their ideas. On the other hand, in the SCADA group, the students were asked if they preferred to write after class time and receive feedback in private. They unanimously stated that writing at home would give them more time to focus on their writing and therefore would be able to perform much better.

Discussion

The researchers in the current study aimed to delineate the differential impact of ACADA and SCADA on Iranian EFL learners' higher-order and lower-order writing skills. The results of the present study showed that both ACADA and SCADA positively influenced Iranian EFL learners' higher-order (including organization and content development) and lower-order writing skills (including sentence structure, mechanics, and word choice/grammar usage). However, there was no significant difference between ACADA and SCADA in improving either the higher-order or lower-order writing skills, and both were useful mediation tools for improving EFL learners' writing ability. Furthermore, the results of the study indicated that the learners had a more positive inclination toward ACADA than SCADA. Overall, it seems that for elementary and intermediate level L2 learners who are not much proficient, writing requires much time to form structures and to choose appropriate vocabulary. Accordingly, using SCADA may put a lot of pressure on such learners and make them much stressed. In contrast, ACADA seems to be a more appropriate tool for EFL students at lower levels as it might create a more supportive environment where students constantly receive scaffolding from their teacher who is a more competent and knowledgeable person.

The findings of this study are in line with Helm (2015) who found similar results by stating that asynchronous communication settings might enable students to make use of more quality time to consult various resources and browse the websites for relevant posts to provide suitable replies. In another study, Zafarani and

Maftoon (2016) found that the procedures of DA used by Web 2.0 tools were effective for enhancing the learners' syntactic complexity, vocabulary, and quantity of the information they present. Moreover, employing google docs to observe the effect of synchronous DA procedures on academic writing, Ebadi and Rahimi (2019) indicated that DA positively influenced the coherence, cohesion, lexicon, structure, and accuracy of the participants' academic wiring. Finally, Ebadi and Bashiri (2021) using collaborations between the students and the teacher with text-based and voice-based mediation found that mobile-assisted DA enhanced the EFL learners' writing proficiency.

Conclusion

Technology integration has influenced every aspect of individuals' lives and enabled them to have broader thinking, deeper learning, and wider knowledge. Showing the effectiveness of both ACADA and SCADA, the current study intended to lead EFL teachers to use different CADA procedures in their classes to improve students' target language knowledge, especially their higher-order and lower-order writing skills. Such procedures may especially benefit L2 students who are not much proficient to improve different aspects of their writing. Both ACADA and SCADA enable teachers to have a more precise understanding of the students' performance. Thus, teachers may use CADA procedures as an opportunity to reflect in-, on-, and for-action to make better decisions regarding their students' needs and expectations and modify their teaching procedures accordingly. Teachers can also consider CADA as the foundation for action research in their classes to resolve potential teaching and learning problems.

Similar to other studies, this study has faced some limitations that might have influenced the results in one way or another. The 30 participants in each experimental group with various age ranges and different genders made a small research sample which could have affected the generalizability of the findings. Also, only 10 participants from each group provided data regarding their perceptions of and attitudes toward CADA procedures. Accordingly, future research can be done with a larger number of participants to collect both quantitative and qualitative data. Moreover, the researchers used the Adobe Connect platform and email as tools for communicating with students for sending writings and receiving feedback.

Interested researchers may look for other applications and find their potential effects on different language components following CADA procedures. They may also employ other effective procedures such as blended learning, computer-mediated collaborative writing, or blogging to observe their possible effect on higher-order and lower-order writing skills. Researchers may conduct other similar studies using CADA procedures and examining their impact on writing complexity, accuracy, and fluency. Finally, more qualitative studies can be done through interviews and observations to explore the teachers' and students' attitudes toward CADA procedures.

References

Andujar, A. (2020). Mobile-Mediated dynamic assessment: A new perspective for second language development. *ReCALL*, *32*(2), 178-194. http://dx.doi.org/10.1017/S0958344019000247.

Atmojo, A. E. P. & Nugroho, A. (2020). EFL classes must go online! Teaching activities and challenges during Covid-19 pandemic in Indonesia. *Register Journal, 13*(1), 49-76. http://dx.doi.org/10.18326/rgt.v13i1.49-76.

Azizah, A., & Nugraha, S. I. (2021). A qualitative study: Exploring EFL students' attitude toward learning writing during online learning Covid-19 in Karawang senior high school. *Edukatif: Jurnal Ilmu Pendidikan, 3*(4), 2265-2270. http://dx.doi.org/10.31004/ edukatif.v3i4.1188.

Carr, C. T. (2020). CMC is dead, long live CMC! Situating computer-mediated communication scholarship beyond the digital age. *Journal of Computer-Mediated Communication, 25*(1), 9-22. http://dx.doi.org/10.1093/jcmc/zmz018.

Chakowa, J. (2018). Enhancing beginners' second language learning through an informal online environment. *Journal of Educators Online, 15*(1), 1-14. http://dx.doi.org/10.9743/JEO2018.15.1.7.

Chih-Ming, C., & Ying-You, L. (2020). Developing a computer-mediated communication competence forecasting model based on learning behavior features. *Computers and Education: Artificial Intelligence*, *1*, 10-31. http://dx.doi.org/10.1016/j.caeai.2020.100004.

Cumming, A. (2001). Learning to write in a second language: Two decades of research. *International Journal of English Studies, 1*(2), 1-23. https://doi.org/10.6018/ijes.1.2.48331.

Daneshvar, A., Bagheri, M. S., Sadighi, F., Yarmohammadi, L., & Yamini, M. (2021). A probe into Iranian learners' performance on IELTS academic writing task 2: Operationalizing two models of dynamic assessment versus static assessment. *Journal of Modern Research in English Language Studies*, *8*(2), 25-58. http://dx.doi.org/10.30479/jmrels.2020.13075.1617.

Darhower, M. A. (2014). Synchronous computer-mediated dynamic assessment: A case study of L2 Spanish past narration. *Calico Journal, 31*(2), 221-243. http://dx.doi.org/10.11139/cj.31.2.221-243.

Davoudi, M., & Ataie-Tabar, M. (2015). The effect of computerized dynamic assessment of L2 writing on Iranian EFL learners' writing development. *International Journal of Linguistics and Communication*, *3*(2), 176-186.

http://dx.doi.org/10.15640/ijlc.v3n2a16.

Deiniatur, M. (2021). Students' perception on the use of google classroom in essay writing class. *INCARE, International Journal of Educational Resources, 1*(6), 496-507. http://ejournal.ijshs.org/index.php/incare/article/view/101.

Eagly, A.E., & Chaiken, S. (1993). *The psychology of attitudes*. Harcourt, Brace, & Janovich.

Ebadi, S., & Bashir, S. (2021). An exploration into EFL learners' writing skills via mobile-based dynamic assessment. *Education and Information Technologies*, *26* (1), 1-22. http://dx.doi.org/10.1007/s10639-020-10348-4.

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

Estaji, M., & Saeedian, A. (2020). Developing EFL learners' reading comprehension through computerized dynamic assessment. *Reading Psychology*, *41*(4), 1-22. http://dx.doi.org/10.1080/02702711.2020.1768981.

Helm, F. (2015). The practices and challenges of tele-collaboration in higher education in Europe. *Language Learning & Technology, 19*(2), 197-217. http://llt.msu.edu/issues/june2015/helm.pdf.

Kazemi, N., & Tavassoli, K. (2020). The comparative effect of dynamic vs. diagnostic assessment on EFL learner's speaking ability. *Research in English Language Pedagogy, 8*(2), 223-241. https://doi.org/10.30486/RELP.2019.1878561.1155.

Kazemi, P., Pourdana, N., Khalili, G. F., & Nour, P. (2022). Microgenetic analysis of written languaging attributes on form-focused and content-focused e-collaborative writing tasks in google docs. *Education and Information Technologies, 27*(3). https://doi.org/10.1007/s10639-022-11039-y.

Lantolf, J. P., Poehner, M. E., & Swain, M. (Eds.). (2018). *The Routledge handbook of sociocultural theory and second language development.* Routledge. http://dx.doi.org/10.4324/9781315624747.

Lantolf, J. P., & Thorne, S. L. (2006). *Sociocultural theory and the genesis of second language development*. Oxford University Press.

Lantolf, J. P., Thorne, S. L., & Poehner, M. E. (2015). Sociocultural theory and second language development. In B. van Patten & J. Williams (Eds.), *Theories in second language acquisition* (pp. 207-226). Routledge.

Lee, E. J. (2020). Authenticity model of (mass-oriented) computer-mediated communication: Conceptual explorations and testable propositions. *Journal of Computer-Mediated Communication, 25*(1), 60-73. http://dx.doi.org/10.1093/jcmc/zmz025.

Manalu, B. H. (2019). Students' perception of digital texts reading: A case research at the

English education department of Universitas Kristen Indonesia. *Journal of English Teaching, 5*(3), 191-203. http://dx.doi.org/10.33541/jet.v5i3.1312.

Melani, E., & Kuswardani, R. (2022). Students' perception and challenges on online learning during pandemic: EFL senior high school speaking learning context. *Retain, 10*(2), 1-8. https://ejournal.unesa.ac.id/index.php/retain/article/view/47954.

Mu'awanah, N., Sumardi, & Suparno, (2021). Exploring EFL students' perception of using zoom during learning from home period. *PROCEEDING AISELT (Annual International Seminar on English Language Teaching), 6*(1), 191-204. https://jurnal.untirta.ac.id/index.php/aiselt/article/view/12509/7719.

Mukminin, A., & Habibi, A. (2020). Technology in the classroom: EFL teachers' technological pedagogical and content knowledge. *Informatologia*, *53*(1-2), 24-36. http://dx.doi.org/10.32914/i.53.1-2.3.

Nazara, S. (2011). Students' perception on EFL speaking skill development. *Journal of English Teaching, 1*(1), 28-43. http://dx.doi.org/10.33541/jet.v1i1.50.

Oshima, A., & Hogue, A. (2014). *Longman academic writing series: Paragraphs to essays.* Pearson.

Pallant, J. (2011). *A step-by-step guide to data analysis using the SPSS program: Survival manual* (4th ed.). McGraw-Hill, Berkire.

Phuong, Y. H., & Nguyen, P. T. Y. (2019). Impact of online peer feedback on students' writing performance and attitude. In H. Y. Phuong & T. V. Nguyen (Eds.), *Using alternative assessment to improve EFL learners' learning achievement from theory to practice* (pp. 81-98). Nova Science Publishers.

Poehner, M. E. (2008). *Dynamic assessment: A Vygotskian approach to understanding and promoting L2 development.* Springer.

Pourdana, N., & Tavassoli, K. (2022). Differential impacts of e-portfolio assessment on language learners' engagement modes and genre-based writing improvement. *Language Testing in Asia*, *12*(7), 1-19. https://doi.org/10.1186/s40468-022-00156-7.

Prasojo, L. D., Mukminin, A., Habibi, A., Hendra, R., & Iqroni, D. (2019). Building quality education through integrating ICT in schools: Teachers' attitudes, perception, and barriers. *Quality - Access to Success, 20*(172), 45-50.

Richards, J. C., & Schmidt, R. (2002). *Longman dictionary of teaching and applied linguistics.* Pearson Education.

Rojabi, A. R. (2020). Exploring EFL students' perception of online learning via Microsoft teams: university level in Indonesia. *English Language Teaching Educational Journal, 3*(2), 163-173. http://dx.doi.org/10.12928/eltej.v3i2.2349.

Rosalinda, E., Hamamah, H., & Degeng, P. D. D. (2022). Students' perception on the use of WhatsApp for learning writing during Covid-19 pandemic: A case study. *Jurnal Pendidikan: Riset dan Konseptual, 6*(3), 500-509. http://dx.doi.org/10.28926/ riset_konseptual.v6i3.557.

Rukmi, N. S., Novianti, H., & Rukminingsih (2021). Students' perceptions toward distance education with online collaborative platforms in EFL critical reading course. *New Language Dimensions, 2*(1), 102-115. https://journal.unesa.ac.id/index.php/nld/index.

Shafaiee Rad, H. (2021). Exploring use of mobile-mediated hybrid dynamic assessment in improving EFL learners' descriptive writing skills. *Computer-Assisted Language Learning, 22*(1), 111-127.

Shrestha, P. N. (2020). *Dynamic assessment of students' academic writing: Vygotskian and systemic functional linguistic perspectives.* Springer Nature. http://dx.doi.org/10.1007/978-3-030-55845-1.

Tavassoli, K., & Nikmard, F. (2019). The effect of dynamic assessment on EFL learners' performance on selective and productive reading comprehension tasks. *Foreign Language Research Journal, 9*(2), 445-478. https://doi.org/10.22059/JFLR.2019.257289.505.

Torabi, S., & Safdari, M. (2020). The effects of electronic portfolio assessment and dynamic assessment on writing performance. *Computer-Assisted Language Learning Electronic Journal, 21*(2), 51-69.

Tran, T. Q. (2020). EFL students' attitudes toward learner autonomy in English vocabulary learning. *English Language Teaching Educational Journal, 3*(2), 86-94. http://dx.doi.org/10.12928/eltej.v3i2.2361.

Tran T. Q., Duong, T. M., & Huynh, N. T. T. (2019). Attitudes toward the use of TELL tools in English language learning among Vietnamese tertiary English majors. *VNU Journal of Social Sciences and Humanities, 5*(5), 581-594. http://dx.doi.org/10.1172/ vjossh.v5i5.498.

Tusino, Faridi, A., Saleh, M., & Fitriati, S. W. (2021). Online task-based language teaching using google classroom in writing class: How does it affect EFL learners' writing performance and attitude? *Journal of Asia TEFL, 18*(1), 262-270.

Vakili, S., & Ebadi, S. (2019). Exploring EFL learners' developmental errors in academic writing through face-to-face and computer-mediated dynamic assessment. *Computer Assisted Language Learning,35* (4), 1-36. http://dx.doi.org/10.1080/09588221.2019.1698616.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.*

Harvard University Press.

Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction: A relational perspective. *Communication Research, 19*, 52-90. http://dx.doi.org/10.1177/009365092019001003.

Yang, Y., & Qian, D. D. (2019). Promoting L2 English learners' reading proficiency through computerized dynamic assessment. *Computer Assisted Language Learning, 33*(5-6), 628-652. http://dx.doi.org/10.1080/09588221.2019.1585882.

Zafarani, Z., & Maftoon, P. (2016). Investigating dynamic writing assessment in a Web 2.0 asynchronous collaborative computer-mediated context. *Iranian Journal of Applied Linguistics, 19*(2), 195-240. http://dx.doi.org/10.29252/ijal.19.2.195.

Zandi, G., Tavassoli, K., & Nikmard, F. (2020). Improving EFL learners' performance on receptive-response and productive-response listening comprehension items through diagnostic vs. dynamic assessment. *Journal of Teaching Language Skills, 39*(3.1), 217-252. https://doi.org/10.22099/jtls.2020.38116.2865.