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Computer-Based Dynamic Assessment of EFL Learners' Writing Performance: Evidence from Both Cognitive and Emotive Domains

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ABSTRACT

This present study was carried out to investigate the effect of computer-based dynamic assessment (CBDA) on Iranian EFL learners' performance in writing and their attitude towards CBDA. To do so, 60 intermediate EFL learners were chosen out of 120 EFL learners based on their performance on the Nelson Language Proficiency Test. Next, they were randomly divided into two equal groups; CBDA as the experimental group and a control group. Based on a pretest and posttest design, group-specific writing instruction followed by an attitude questionnaire was conducted. The experimental group underwent CBDA while the control group was exposed to conventional writing skill instruction. The pertinent parametric and nonparametric statistical analyses indicated both significant differences between the CBDA and control groups on developing writing performance, on the one hand, and positive attitude towards CBDA, on the other. The study's findings suggest that teaching and assessing writing skills through a computer can improve students' performance in writing. Alongside its theoretical contributions to the field, it may assure the practitioners of the cognitive and emotive applicability and efficacy of CBDA in EFL settings in general and in teaching writing skills in particular.

Keywords: Attitude; Computer-Based Dynamic Assessment; EFL Learner; Writing Ability

INTRODUCTION

In recent years, technology has moved a long way toward establishing a ubiquitous trend in enhancing learning quality on the one hand and getting integrated into the second language (L2) teaching/learning process on the other. This newly-established trend has made both educational institutions and learners attach ever-stronger importance to developing learning skills, particularly when acquiring and developing second language (L2) skills. To this end, several studies (e.g., Hirvela & Qian, 2013; Li, Link & Hegelheimer, 2015) have been conducted to demonstrate the impact of Computer-Assisted Instruction (CAI) on enhancing mainly reading, listening and speaking abilities. However, the role of writing, despite its importance in academic contexts, seems to be the least-investigated one. Besides, an acceptable level of writing expected in all academic fields and workplaces makes it a critical skill to be learned in light of the demands of the 21st century (Rao, 2019). Pertinent studies on writing report that learners are required to be proficient in essay writing to

make progress on the academic path (Hirvela & Qian, 2013), though it represents a significant challenge for foreign language (FL) learners as they may find it difficult to generate data relevant to the essay topics in non-native languages (Hirvela & Qian, 2013).

Parallel to teaching second language skills, many scholars have turned their attentions towards the importance of a sound and practical assessment approach because scholars like Chapelle and Brindley (2002) considered language assessment as "the act of collecting information and making judgments on a language learner's understanding of a language and his ability to use it" (p. 267). But, language assessment, by itself, has experienced various alternatives and models like democratic assessment, peer-and self-assessment, collaborative assessment, and the model called dynamic assessment (DA). The last one is commonly identified by two basic approaches, including interventionist and interactionist models.

DA models have had their advocates and opponents. The first group maintain that dynamic assessment is prognostic rather than diagnostic (Poehner, 2008), while some others (Poehner, 2007, 2008; Vygotsky, 1978) consider it an approach that emphasizes an individual performance process enabling the instructor about how an error can be treated. Similarly, Sternberg and Grigorenko (2002) stated that DA could pave the way for the learners to develop their skills more than non-dynamic assessments could do. The critics, by contrast, criticized DA for its validity, practicality, and low reliability.

Computers have specifically revolutionized language education regarding technology integration (Lee et al., 2009). More specifically, when writing skill is concerned, it is argued that writing instruction in a computer context is more favorable to pupils than writing in a traditional context because of its adaptability to cognitive needs (Pennington, 2003).

Adaption of computer technology in education is not confined to just the cognitive side of the academic achievements as there are also manifestations that "the use of computers can improve L2 learners' [emotive side of the coin including] motivation, attitudes, and confidence about writing" (Hyland, 2003a, p. 172). To add more, integrity in Gardner's (1985, 2001) idea is a latent construct made up of attitudes toward the uses of language in all situations, incorporated bearing and appealing to other languages. Attitudinal, goal-directed, and motivational variables are included in the integrative motive. Gardner (1985, 2001) continued that motivated learning behaviour is believed to be made of 1) attitudes toward learning the L2, 2) passionate vehemence, and 3) the interest in acquiring the L2. Pertinent studies about motivation and perceptions have proved them influential in L2 learning (Gardner, 1985). Notwithstanding, as Skehan (1989) argued, it is not clear whether learners are highly motivated since they are prosperous or flourishing since they are highly motivated.

The extent to which computers can play a role in writing continues to be a subject of interest to researchers. Besides, growing empirical evidence indicates that DA can successfully boost productive skills (Birjandi & Ebadi, 2010, 2012; Chodorow & Burnstein, 2004; Montero-Fleta & Pérez-Sabater, 2010; Wichadee, 2011; Yeh, 2014; Yim & Warschauer, 2017; Zafarani & Maftoon, 2016). However, it is unclear whether the integration of computer and DA can be as effective as assumed in teaching writing skills in particular. Laying on this rationale and as an innovative step, this study attempted to extend previous research on the role of Computer-based Dynamic Assessment (CBDA) in writing development. Alongside the cognitive side directly related to skill gaining, incorporation of the emotive side; the learners' attitude towards such adaption or integration of CBDA in writing instruction and development was another side of the coin addressed in this single study. This double-purpose is realized in the form of two specific research questions:

RQ1: *Does Computer-based Dynamic Assessment (CBDA) more significantly contribute to developing writing skills than the non-CBDA counterpart?*

RQ2. *How do the learners perceive CBDA in developing writing skills?*

REVIEW OF LITERATURE

Dynamic Assessment and CALL: *Focus on Learners' Cognition in Language Skill Development*

Writing is undoubtedly an essential skill for language learners to be successful, particularly in academic studies. However, pedagogically, it has been approached both as a product and a process. As a process, the emphasis is on grammatical accuracy like organization, improvement, and expression in the light of the teacher's comment on many drafts. In line with this process-oriented approach, Flower and Hays (1980) defined writing skill as a complex, goal-directed, and dynamic problem-solving process characterized by four phases: planning, interpreting, reviewing, and monitoring. Therefore, such a dynamic trait should be approached through a dynamic-pedagogical treatment called Dynamic Assessment (DA) after that instruction and assessment are bifurcated.

Theoretically, DA has rooted in Vygotsky's (1986) sociocultural theory (SCT) of child progress, based on which the duty of those who are significant is considered as key to the constitution and development of a child's mental abilities in the path of the Zone of Proximal Development (ZPD). Moreover, it is held that learning is a matter of dynamically constructing ZPDs and activating it through scaffolding and interactive mediation or assisted performance.

Relying on bifurcation philosophy, DA aims for optimization by discernment of the mutual effect of the link between the learner and the educational plan (Sternberg & Grigorenko, 2002). Dynamic assessment-based researches with more than fifty years of experience in pedagogical settings as well as its recent usage in language education (Ableeva, 2008; Anton, 2009; Lantolf & Poehner, 2004; Poehner, 2008; Poehner & Lantolf, 2005) give real insights to considering mental promotion and cognitive modifiability in the assessment required for effective learning (Ableeva, 2010).

Parallel educational developments to DA realized in various forms, including computer adaptation in teaching or assessment, have opened promising horizons. Computer-adapted testing or assessment in various scenarios (i.e., self, peer, NDA or DA) go back to recent years. For example, Crook (1991) tried to investigate the mediating function of computer-mediated devices to facilitate the social process required for development. Nowadays, computer-mediated instruments are considered essential phenomena, "*a medium for learning and not a method for L2 instruction*" (Adair-Hauck, Willingham-McLain, Youngs, 2000, p. 272). Moreover, Jacobs (1998, 2001) suggested KIDTALK (Kidtalk Interactive Dynamic Test of Aptitude for Language Knowledge) program that recommended learners with examples from a created language according to the Swahili setting. In the same vein, Tzuriel and Shamir (2002) made an automated DA procedure that assisted children in their serial thinking. Another multilingual practical program is *The Evaluation and Prediction Assessment* (EPA), developed by Desoete, Roeyers, Buysee, and De Clercq (2002), which focuses on the metacognitive functions of prediction and evaluation. Though it was mainly designed for mathematics disabilities, it can be applied in language assessments, too.

Through Web 2.0, a web-based inquiry in the Synchronous Computer-Mediated Communication (SCMC) was generated by Birjandi and Ebadi (2010, 2012), who detected the micro-genetic improvement of EFL learners' spoken language skills through the internet. The research discriminated between the learners' skills regarding their reaction to the mediator's online intervention, such as a computer. The results showed that the learners' responsiveness is considerably connected to their ZPD levels regarding their time on individual items. In another similar attempt, Pishghadam and Barabadi (2012) utilized the Computerized Dynamic Reading Test to improve learners' reading development. They treated and then scored each learner both non-dynamically and dynamically, but the latter approach resulted in higher reading comprehension skills. The main limitation with

these studies is that they are dominantly either test-retest oriented or purely software governed and therefore they are less assessment-based sort of investigations. On the contrary and as an innovative movement, Poehner and Lantolf (2013) applied DA maxims through an online format for learners' listening and reading comprehension through mediated and non-mediated test performance. The research confirmed the importance of C-DA managed through the internet in learners' improvement.

Teo (2012) developed a C-DA program to master the limited amount of time the majority of instructors encounter with their learners in an ESP class. He applied the View-let Quiz 3 program to incorporate computers with language evaluation. Thereby the learners could cooperate with and react to the preprogrammed computerized mediation. After a student completed reading a passage, s/he was exposed to an inferential multiple-choice item. If a student answered a question erroneously, s/he was given the computerized mediation to boost explicitness. The findings showed that the learners' self-reflection in their working portfolio produced valuable data demonstrating their meta-cognition in their reading processes. Furthermore, the quantitative data indicated an essential dissimilarity between the pretest and posttest results. Luckily, the majority of these studies, including the Teo's in one way or another, can be approached as relevant interventions and achievements to the cognitive sides of both C-DA.

The development of web-based courses like Essay Critiquing System (ECS) by Lee et al. (2009) and a web-based error rectification system by Yeh (2014), which was linked to an online annotation mechanism for writing skill treatment, paved the way for learners so that they can develop their writing skill. The former researchers attempted to discover how the system may assist the learners in the experimental group to revise their papers in terms of both content and grandiloquent aspects such as organization of ideas and discourse characteristics such as cohesion and coherence. The findings of their study demonstrated that the application of the ECS appears to be more helpful in paving the way for learners to improve the quality of their essays. Through Yeh's (2014) intervention or suggested model, learners composed novel writing pieces with the error rectification system, and the instructor illustrated learners' errors with the Annotation Editor. Learners could peruse the rectified written production and the outcomes of error correction using the Viewer. The error analysis process suggested essay writing to the learner to practice error rectification and employ peer feedback. Through a feedback process, the learner could juxtapose his/her rectifications with the instructor's rectifications on the corresponding essay. The system permitted the learners to submit and take feedback. Besides, it presented an appropriate connection with learners to employ error rectification activity on written productions with identical error delivery. This mechanism presented a context for instructors to practice technique teaching for error rectification activity and peer feedback practices.

As an instructional, mediational, and feedback-exchange platform, computers can help learners exchange ideas with each other and with their instructor and receive feedback without face-to-face communication (Hyland & Hyland, 2006). A particular benefit of computer-mediated communication (CMC) is for less able learners (Belcher, 1990; Hartman et al., 1991) and second language learners (Warschauer, 2002; Greenfield, 2003). Lately, software programs have been generated to give feedback in different fields, such as grammar. For instance, the Criterion Online Writing Service automatically assesses essay responses (Burstein, Chodorow & Leacock, 2004), and an e-rater produces a holistic score for an essay with actual feedback about grammar, usage, and style (Burstein, 2003). Electronic corpora can also comment on writing via computer by presenting more chances for learning. Concordancers, for example, provide learners with many examples of specific characteristics in large groups of scripts so that they can emphasize typical outlines in writing and make use of feedback. In this regard, Milton (1999) stated that whenever learners transfer their writing electronically, educators can hyperlink mistakes to an according file, and pupils can

scrutinize the settings and appropriate use the vocabularies they have misapplied. This reflective feedback could be constructive for increasing pupils' recognition of genre-specific codes, improving autonomous education abilities, and boosting writing abilities (Hyland, 2003b; Milton, 2004, as mentioned in Hyland & Hyland, 2006).

Furthermore, Ware and Warschuaer (2006) proposed *electronic feedback* that adverts to automated feedback through technology in general and computer in particular. They defined three research domains on electronic feedback for L2 writing skills. The first domain adverts to feedback generated by a specific software that substitutes or improves individual feedback. The following domain adverts to the influence of technology-assisted individual feedback on writing production. The third research domain is framed by a sociocultural outlook, scrutinizing the difference between electronic approaches and the feedback presented in linguistic and cultural exchanges via online cooperation.

As an example of research, the criterion e-rater proposed by Educational Testing Services (ETS) is the most acknowledged automated evaluation system (Burstein, Chodorow & Leacock, 2004) by which the e-rater is set to search for lexical difficulty, syntactic variety, topical content, and grammatical mistakes in a bid to give feedback in the domains of components such a style, organization, grammar, and usage. Applying this automated evaluation system, Chodorow and Burnstein (2004) conducted data comprised of 10,000 pieces of writings from learners' answers to seven test prompts on the TOEFL. They found that e-raters vary little from individuals in attaining concordance on the total mark.

Contrary to the applications reported so far, mainly on the other three skills, the current studies do not much benefit from the power of this active procedural approach to increase the productive skills (e.g., writing) in an in-depth assessment. Comparatively, then too few scholars, excluding those by Alavi and Taghizadeh (2014), Shrestha and Coffin (2012), and Xiaoxiao and Yan (2010), have focused on DA-oriented writing performance development.

Besides the cognitive side of C-DA realized in skill acquisition as a cognitive and mental by-product and process, C-DA or any other innovative intervention mechanism or platform seems to trigger learners' emotive sides like perceptions, attitudes, motivation, etc. Learning and development as multidimensional phenomena are subject to multiple factors synergized mainly into main cognitive and emotive aspects; the former is more mental, while the latter discussed as follows are more emotional, each of which affects learning and development specifically. However, attitude change or motivation enhancement in the light of a particular type of intervention seems to be an end on the one hand and a means on the other it causes further changes in the process of skill acquisition.

Dynamic Assessment and CALL: *Focus on Learners' Emotion in Language Skill Development: the case of Attitude*

Attitude is usually associated with motivation to the extent that Gardner and Lambert (1972) look at them as a single construct. Goktepe (2014) investigated 90 Turkish freshmen learners to investigate their attitude and motivation in L2 learning. They held that highly motivated and positively oriented learners are more successful than those who lack motivation. The findings yielded support for the effectiveness of integrative motivation in the process of L2 acquisition.

Either separately or integratively, the role of emotional factors in language learning has received prime importance in academic research (e.g., Mohd Sallehhuddin, 1994; Mahreez, 1994; Yang, 2012; Chalak & Kassaian, 2010; Galloway, 2011; Latifah et al. 2011; Al Mamun, Rahman, Rahman, & Hossain, 2012; Bobkina & Fernandez, 2012; & Tahaineh & Daana, 2013). In the same line, attitude studies towards technology involvement in language education (i.e., teaching and assessment) are crucial in the literature. For example, Wang, Shang, and Briody (2013), in an attempt to combine the technology into the composting process,

developed "Correct English" to pave the way for foreign writers to promote their main piece of writing and correction abilities. The findings illustrated that learners' autonomous attitude is increased when there is no limitation of the amount of time and repetition of usage, and hence learners could finish their task assignment and receive instant feedback whenever and wherever possible. Upon the analysis of the elicited data, it became apparent that the majority of the learners indicated positive attitudes towards the use of AWE for its potential to promote their writing accuracy. Briody's study reveals a lot about the cyclical interrelations and mutual contributions among the treatment type, skill development, and attitude change but this study endorses a lack of C-DA interwoven type of attitude change.

Additionally, Zoghi and Malmeer (2013) investigated the impact of DA on Iranian EFL learners' intrinsic motivation as an emotive side of skill development. They applied an interactionist DA approach in reading comprehension for an experimental group and a Non-dynamic model for a control group. The participants replied to an intrinsic motivation questionnaire so that they could explore the learners' intrinsic motivation. The results indicated a considerable difference between the pupils' intrinsic motivation in the experimental and control groups. It became apparent that there is a remarkable variation in learners' intrinsic motivation when a DA procedure is used. It positively impacts the learners' intrinsic motivation as the learners in the experimental group were more encouraged and had less anxiety within the assessment. In the same vein, Ebadi and Yari (2015) examined the learners' attitudes toward DA procedure to improve word knowledge. Their study exhibited that pupils had a positive attitude about DA and regarded it as an influential factor in training English, which means that emotional changes in attitude enhancement are subject to instruction and assessment integration. But this study first and foremost focuses purely on the attitude issue disregard for cognitive development realized in the form of a particular skill, and second, it is just DA related and devoid of C-DA.

Taheri and Dastjerdi (2016) attempted to explore the impact of DA on Iranian intermediate EFL learners' writing ability and their attitudes toward DA and giving feedback within the writing process. The outcomes demonstrated that DA greatly impacted learners' writing skills and caused positive attitudes towards the DA-based intervention. Similarly, Babamoradi, Nasiri, and Mohammadi (2018), scrutinized the attitudes of Iranian English learners toward instructing and assessing writing via Computerized Dynamic Assessment (C-DA). They established a program that had 11 types of multiple-choice questions. Via each series of tests, learners were given feedback according to their requirements and within their ZPD. Then, learners were asked to express their perceptions about the usefulness of C-DA in training and assessing writing skills. The results indicated that all of the pupils had positive perceptions about the application of C-DA in instructing writing. Their investigation enjoys some type of proximity to the rationale behind this very study and is highly illuminating to our endeavor; this is single and among rare studies that justify replication.

Khdabakhsh, Abbasian, and Rashtchi (2018) investigated the effects of implementing the two different models of DA (i.e., interventionist & interactionist) on developing EFL learners' level of language awareness (LA) and metacognitive strategy use (MSU) in the process of writing instruction. The experimental group gained higher levels of LA than their control group counterparts, but both interventionist and interactionist models of DA resulted in relatively similar effects. As to the MSU, the results showed no significant results in the light of neither the interventionist nor the interactionist models as to MSU levels. In the same line, they (2020) synthesized the development of the speaking skill, LA, MSU in the light of DA models. While showing significant gains in speaking scores due to DA-based interventions, the respective data indicated insignificant effects on LA and MSU of neither model.

Luckily the studies like this one improve over what was done contrary to the studies done

by Taheri and Dastjerdi (2016) and Babamoradi, Nasiri, and Mohammadi (2018). However, the findings are still lagging behind in suggesting a sound theory for integrating a computer into the assessment of EFL learners' writing performance on one hand and attitude enhancement on the other.

METHOD

Participants

The present research was carried out with the help of 60 Iranian EFL intermediate learners (30 male and 30 female) within an age range of 17-22, drawn from 120 learners from a private language school. To assure their homogeneity in terms of language proficiency, they completed a version of the Nelson Proficiency test based on that those standing between + &- 1SD (NO=60) were recruited in the form of two randomly divided groups into one experimental one control group. In a more detailed state, the majority of the EFL learners (56.7 %) were male, and 43.3 % were female. In terms of age range, they ranged from a low of 13 to 38 years old. Additionally, they form four majors distributed as Translation Studies 3.3%, Teaching English as a Foreign Language 1.7%, English Literature, and others 80.0% but 8.3% missing. In terms of educational degrees, they ranged from diplomas to even Ph.D. holders.

Instrumentation

Language Proficiency Test: besides the Nelson Language Proficiency Test (NELSON) employed for selecting the sample, the *Writing sub-test of the* Preliminary English Test (PET) was utilized for diagnostic and achievement purposes. Additionally, the already validated, Likert scale Attitude *Questionnaire* adopted from Shams Hosseini and Modarresi (2015) was used for investigating the participants' attitudes towards computer-based dynamic assessment. To elicit the participants' attitudes, they replied to an open-ended 8-item questionnaire. Their responses were sorted into a tabular format since open-ended questions may diverge from the interview guide.

In a bid to ensure the reliability and validity indices of the instruments, detailed steps were taken. All instruments employed in this study; i.e. NELSON language proficiency test and pretest and post-test of writing were piloted on a group of 20 students to check the reliability of the NELSON test and inter-rater reliability for the pretest and post-test of writing. As a result, the NELSON test enjoyed KR-21 reliability of .84. But, inter-rater correlation analysis on the pretest and posttest of writing indicated significant agreements between the two raters on pretest (r (18) = .628 representing a large effect size, p = .003) and posttest (r (18) = .637 representing a large effect size, p = .003) of writing.

The construct validity of these tests was investigated using exploratory factor analysis (EFA). An exploratory factor analysis (EFA), using principal axis factoring and varimax rotation method, was run to investigate the underlying constructs of the NELSON test and pretest and posttest of writing. The KMO index of .494 was lower than the minimum acceptable value of .60 (Field 2018). Thus, it can be concluded that the present sample size of 60 was not adequate for running EFA.

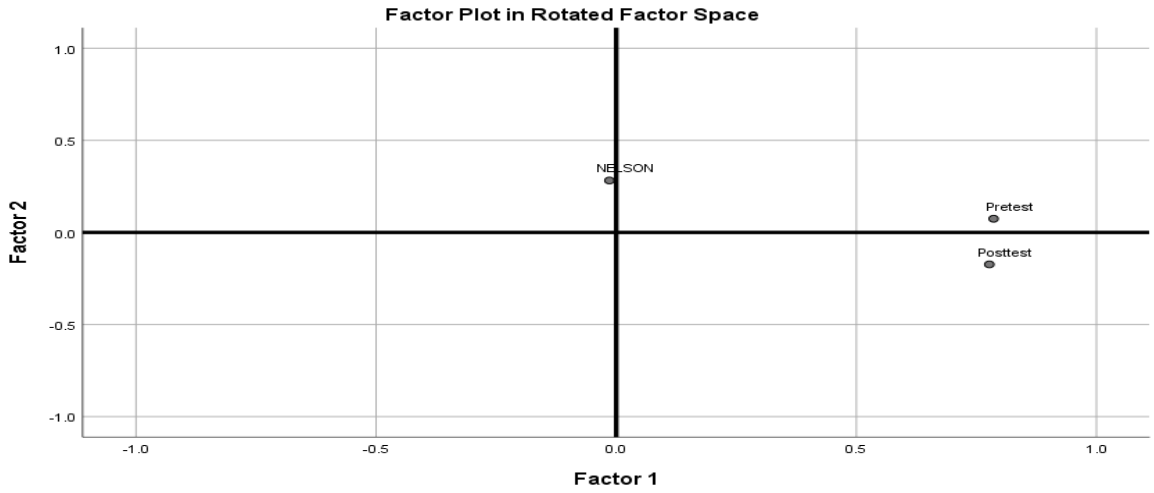
Table A
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.494
Bartlett's Test of Sphericity	Approx. Chi-Square	25.736
	Df	3
	Sig.	.000
Determinant		.638

The analysis extracted two factors that accounted for 44.45 percent of the variance. In other words, the NELSON test and pretest and posttest of writing measured two underlying constructs with an accuracy of 44.45 percent. The two tests had large (>= .50) contributions to the first factor. The NELSON test, although showing a weak contribution (< .30), loaded

under the second factor, which can be named the "general language proficiency" factor. Moreover, finally, the pretest and posttest of writing loaded under the first factor, which can be labeled as the "writing ability" factor.

Factor Plot 1 displays the factor loadings in rotated space. The pretest and posttest of writing fell on the x-axis. The NELSON test had its loading on the y-axis. All tests had their loadings on the positive sides of the coordinate, i.e. they had positive correlations with each other.



Factor Plot 1
Factor loadings in rotated space

Procedure

This quasi-experimental research in design was conducted in the light of two different routes given the data types. Having administered the Nelson Test, whereby the sample was identified and divided into two groups, the researchers measured the writing ability of the participants through the PET writing subtest before the treatment. The primary treatment based on *College writing from paragraph to Essay* by Zemach and Rumisek (2003) was started for both groups.

The experimental group received an interventionist computer-based dynamic assessment of writing followed by prompts and hints in writing instruction and doing the respective tasks. They received personal profile-based feedback on writing performance following each writing task, and the teacher used the profile to trace the development of the learners. After each session, the experimental group received writing instruction through the weblog and reviewed the notes taught in the class to provide sample paragraphs in the weblog. Then, they wrote paragraphs about the topics suggested by the teacher and sent them electronically to her. After that, the teacher assessed the learners' writings and identified the necessary parts to be checked and rectified. This process was repeated and kept on till the last session. The rationale behind implementing the interventionist approach in this study was the compatibility of this approach to first teaching writing and, more specifically, to web-based mechanism compared to the interactionist approach to DA, which is more amenable to field and classroom dominated type of instructional setting embracing more interactions (Poehner 2008, & Hyland, 2003a).

However, the control group took was involved in the conventional instruction and assessment process through which the participants were briefed on the requirements of writing a paragraph. In the following sessions, writing topics followed by the respective instructions were given. During the instruction, the paragraphs composed by the learners were assessed by the teacher each session, the learners' errors were specified, and the required comments were given. The writing posttest was run with both groups in the final session, but the Attitude Questionnaire was administered to just the experimental group.

The collected data were analyzed through Statistical Package for Social Sciences (SPSS), version 22. In order to answer the first research question, an independent t-test was used for investigating the significant difference between computer-based DA and conventional procedure of treatment on writing. Furthermore, to investigate the second research question, frequencies and percentages of the responses of EFL learners' attitudes towards CBDA were presented.

RESULTS

Comparing Groups on Pretest of Writing

Since the assumption of normality of the writing pretest scores (Table 1) was not met, a Mann-Whitney test was run to compare the experimental and control groups' median marks to ensure the groups' homogeneity regarding their writing skill before the instructions. The results indicated that the experimental (Median = 3.25) and control (Median = 3) (Table 1) had almost equal medians on the pretest of writing.

The results of the Mann-Whitney tests (Z = -.03, p = .976, r = .0047 indicating a low effect size) (Table 2 and Figure 1) represented that there was not any significant variation between the two groups' median scores on the writing pretest; giving yield to the homogenous nature of both groups in terms of their writing production before the treatments.

Table 1

Mean Ranks; Pretest of Writing by Groups

	Group	N	Mean Rank	Sum of Ranks	Median
Pretest of Writing	Experimental	30	30.57	917.00	3.25
	Control	30	30.43	913.00	3.00
	Total	60			

Table 2

Mann-Whitney Test; Pretest of Writing by Groups

	Score
Mann-Whitney U	448.000
Wilcoxon W	913.000
Z	-.030
Sig. (2-tailed)	.976

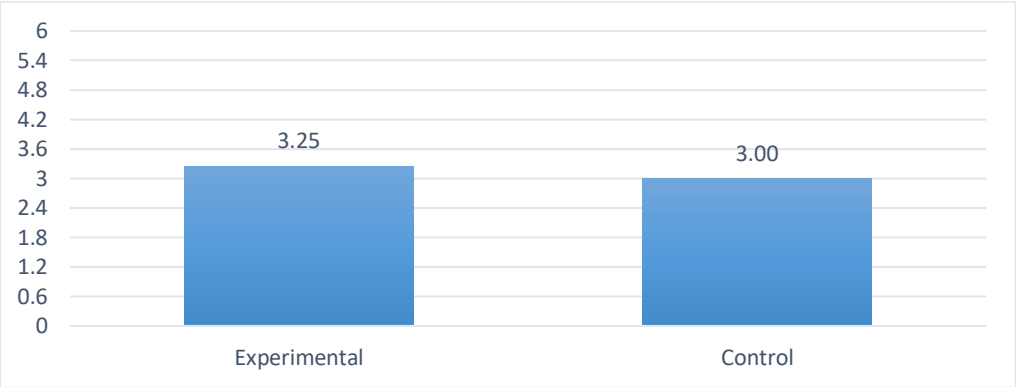


Figure 1

Median Scores on Pretest of Writing by Groups

Investigating Research Question 1

The first research question addressing likely statistically significant differences between the impacts of computer-based DA and conventional treatment procedures on EFL learners' writing ability was investigated through an independent t-test. As Table 3 shows, the experimental group (M = 4.83, SD = .136) outperformed the control group (M = 3.03, SD = 1.24) on the writing posttest.

Table 3
Descriptive Statistics; Posttest of Writing by Groups

	Group	N	Mean	Std. Deviation	Std. Error Mean
Posttest	Experimental	30	4.833	.1366	.024
	Control	30	3.033	1.245	.227

The outcomes of the independent t-test (t (29) = 7.87, p = .000, r = .825 showing a large effect size) (Table 4 and Figure 2) verify the descriptive statistics; indicating that the experimental group, after receiving the computer-based dynamic assessment, significantly outperformed the control group on the writing posttest. Therefore, the first null hypothesis was rejected. Nevertheless, since the assumption of homogeneity of variances was not met (Levene's F = 74.96, p = .000), the second row of Table 4.4, i.e. "Equal variances not assumed", is reported.

Table 4
Independent Samples t-test; Posttest of Writing by Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	74.962	.000	7.87	58	.000	1.800	.228	1.342	2.257
Equal variances not assumed			7.87	29.69	.000	1.800	.228	1.332	2.267

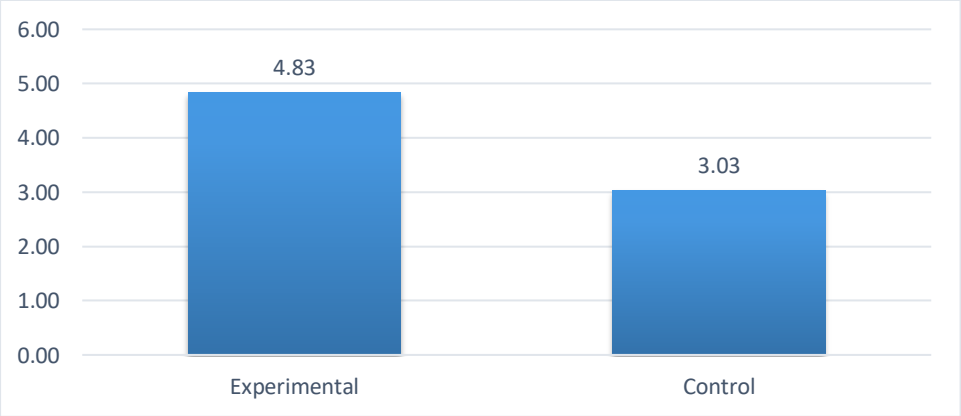


Figure 2
Means of Posttest of Writing by Groups

Investigating Research Question 2

Similarly, the second research question was posed to explore learners' attitudes toward computer-based dynamic writing skill assessment. To this end, the data collected through the attitude questionnaire from the experimental group (Table 5) was subject to frequencies analysis and estimation of percentages. The results indicated that more than 81 percent of the learners; i.e. 50.3 % agree + 31.3 % strongly agree, had positive perceptions of CBDA, while 16.8 percent of respondents were undecided and only .7 percent

disagreed with CBDA. Additionally, Figure 3 illustrates the state of the Liker scale options. As it shows, the majority of the respondents evaluated CBDA positively.

Table 5

Frequencies and Percentages of Learners' Attitude towards Computer-Based Dynamic Assessment

		Frequency	Percent
	Strongly Disagree	1	.1
	Disagree	8	.6
	Undecided	222	16.8
	Agree	664	50.3
	Strongly Agree	413	31.3
	Total	1308	99.1
Missing	System	12	.9
Total		1320	100.0

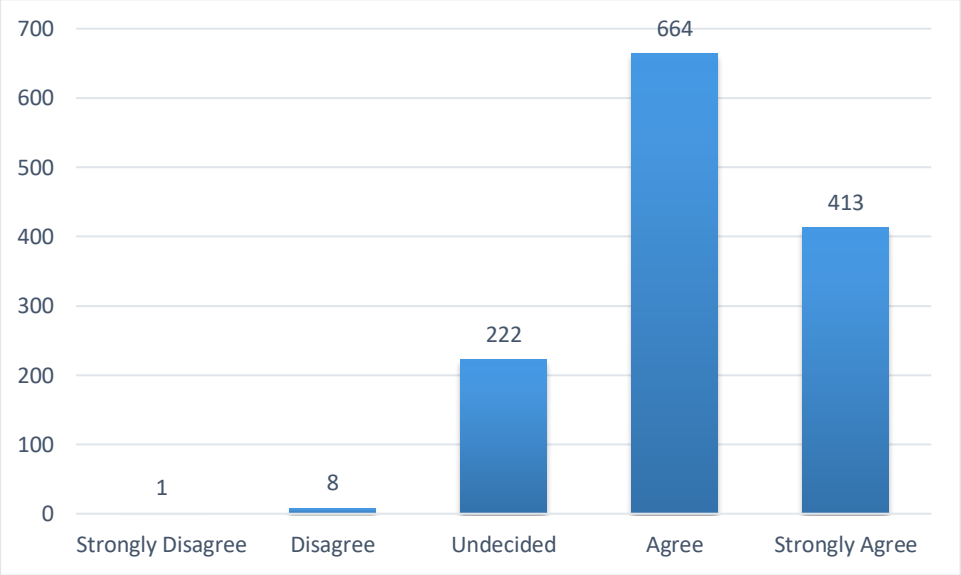


Figure 3

Frequencies of Learners' Attitude towards Computer-based Dynamic Assessment

Besides the given quantitative representations, Table 6 displays the EFL learners' replies to individual items of an open-ended 8-item questionnaire (Appendix) as follows:

- Most respondents agreed that CALL is becoming an integral part of daily life nowadays; 30 % agree + 68.3 % strongly agree.
- Most of the respondents agreed that Computer-aided materials help learners participate actively in the classroom activities; 57.6 % agree + 39 % strongly agree.
- Almost all respondents believed that the application of technological tools increases learners' motivation to learn English; 69 % agree + 24.1 % strongly agree.
- Most respondents believed that CALL programs might create an environment for active learning in which learners can become the constructors of their knowledge through written forms; 62.1 % agree + 31 % strongly agree.
- Most respondents claimed that CALL tools could create a new environment for L2 learning and developing writing

skills; 51.7 % agree + 38.3 % strongly agree.

- The majority of the respondents believed that the availability of computers and the internet can facilitate the development of a second language; 61.7 % agree + 26.7 % strongly agree.

Table 6

Frequencies and Percentages of Learners' Attitude towards Computer-Based Dynamic Assessment (Individual Items of Questionnaire)

		Choices					
		Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	Total
I think that CALL is becoming an integral part of daily life nowadays	Count	0	0	1	18	41	60
	%	0.0%	0.0%	1.7%	30.0%	68.3%	100.0%
Computer-aided materials help learners to participate actively in the classroom activities	Count	0	1	1	34	23	59
	%	0.0%	1.7%	1.7%	57.6%	39.0%	100.0%
Using computer-assisted learning may give the learners the freedom to express themselves and express their own voices	Count	0	0	8	31	20	59
	%	0.0%	0.0%	13.6%	52.5%	33.9%	100.0%
The application of technological tools increases learners' motivation to learn English	Count	0	0	4	40	14	58
	%	0.0%	0.0%	6.9%	69.0%	24.1%	100.0%
I assume that CALL tools can create a new environment for L2 learning and developing writing skills	Count	0	0	6	31	23	60
	%	0.0%	0.0%	10.0%	51.7%	38.3%	100.0%
A combination of teachers' support and automatic feedback from the computer is more effective for the learners in developing writing	Count	0	0	15	29	16	60
	%	0.0%	0.0%	25.0%	48.3%	26.7%	100.0%
Availability of computer and internet can facilitate the process of developing a second language	Count	0	0	7	37	16	60
	%	0.0%	0.0%	11.7%	61.7%	26.7%	100.0%
Those learners who have CALL literary can work independent of time and space	Count	0	1	15	25	18	59
	%	0.0%	1.7%	25.4%	42.4%	30.5%	100.0%
CALL programs encourage learners to learn collaboratively in developing writing ability through working together	Count	0	0	8	32	19	59
	%	0.0%	0.0%	13.6%	54.2%	32.2%	100.0%
The application of CALL offers learners opportunities to use the L2 written language in meaningful situations	Count	0	0	12	29	18	59
	%	0.0%	0.0%	20.3%	49.2%	30.5%	100.0%
Offering hints and prompts by means of computerized version of dynamic assessment could promote success for all	Count	0	2	12	30	16	60
	%	0.0%	3.3%	20.0%	50.0%	26.7%	100.0%
In my opinion, CALL provides an enjoyable and exciting L2 learning mode for writing skills development	Count	0	0	14	25	21	60
	%	0.0%	0.0%	23.3%	41.7%	35.0%	100.0%
	Count	0	1	11	30	17	59

Newer mobile software tools such as Telegram and IMO provide access to social communities interacting in English language	%	0.0%	1.7%	18.6%	50.8%	28.8%	100.0%
Computer-based resources could provide an educational environment for self-directed learning of writing skills	Count	0	1	11	28	19	59
	%	0.0%	1.7%	18.6%	47.5%	32.2%	100.0%
The challenging nature of CALL programs could offer problem-solving activities as far as writing ability is concerned	Count	0	1	10	35	14	60
	%	0.0%	1.7%	16.7%	58.3%	23.3%	100.0%
Computer-based materials could expose L2 learners to increase written language input and output	Count	0	0	12	32	16	60
	%	0.0%	0.0%	20.0%	53.3%	26.7%	100.0%
CALL programs may create an environment for active learning in which learners can become the constructors of their own knowledge through written forms	Count	0	0	4	36	18	58
	%	0.0%	0.0%	6.9%	62.1%	31.0%	100.0%
Developing written mode of English by means of computer-aided materials would be more interesting	Count	0	0	15	31	14	60
	%	0.0%	0.0%	25.0%	51.7%	23.3%	100.0%
The cognitive perspective in CALL helps learners to monitor their own learning in the process of developing writing ability	Count	0	0	16	24	20	60
	%	0.0%	0.0%	26.7%	40.0%	33.3%	100.0%
The learner-centered mode of CALL empowers learners to get involved in learning processes	Count	0	0	15	27	18	60
	%	0.0%	0.0%	25.0%	45.0%	30.0%	100.0%
CALL activities can offer materials and tasks helping L2 learners to improve their learning culture	Count	1	1	9	26	22	59
	%	1.7%	1.7%	15.3%	44.1%	37.3%	100.0%
CALL provides an environment through which learners, who have low self-efficacy, find opportunities to express themselves	Count	0	0	16	34	10	60
	%	0.0%	0.0%	26.7%	56.7%	16.7%	100.0%
Total	Count	1	8	222	664	413	1308
	%	0.1%	0.6%	17.0%	50.8%	31.6%	100.0%

DISCUSSION

Concerning the first research question, the results indicated that the experimental group experienced higher performance than the control group on the post-test; showing a remarkable diversity between the CBDA and traditional procedure of treatment on writing. Consequently, the first null hypothesis was rejected, and the outcomes support the superiority of computerized-dynamic assessment over the conventional treatment procedure. This finding corroborates Taheri and Dastjerdi's (2016) findings, who investigated the impact of DA on the development of EFL learners' writing, showed that the experimental group outperformed the other group and had positive attitudes toward DA. Additionally, this result is in line with the results reported by Hassaskhah and Javan Haghparast (2012), who exhibited the impact of DA models, including interventionist DA and interactionist, on enhancing the writing skill

and perceptions of EFL students and have demonstrated the benefits of two models of DA. Moreover, the findings of the current research study support Yeh's (2014) findings which supported the effectiveness of computer assessment in improving learners writing ability.

The current research study discerned that weblog as a Web 2.0 tool is instrumental in writing. In this study, utilizing a weblog provided the EFL learners with a situation to cooperate, make knowledge, contribute their opinions, feel independent, and contribute their compositions, therefore improving their writing skills. The feeling of autonomy may assist participants in making their own decisions in writing concerned with their perspectives and making their compositions while helping from others' mediation to rectify and adapt it till it was modified into an acceptable writing performance. The results of this study are also commensurate with the findings of previous related studies supporting DA and web-based systems (Akçay & Arslan, 2010; Campbell, 2005; Kessler & Bikowski, 2010; Yim & Warschauer 2017).

The results of this study are also congruent with the results of the study done by Zafarani and Maftoon (2016), which investigated the impact of DA on L2 writing using the Web 2.0 tool. Their study exhibited that applying weblogs to make assistance leads to the improvement of the general writing performance. DA processes are applicable by computer and are helpful in EFL learners' writing skills, recommending that students and teachers consider incorporating technology into teaching and learning systems employing DA.

The present study results are in line with the result of Hassaskhah and Javan Haghparast (2012) so that both interventionist and interactionist models of DA are useful in students writing achievement, and no one has priority over the other. As the researcher of this study (Hassaskhah & Javan Haghparast, 2012) stated that the findings are impressionable to some context and limitations of this study might put at risk their complete generalizability, and the results of this study should not be considered as an effective instrument of assessment for all sorts of learning and teaching contexts.

However, the result achieved on the first research question is partially in line with Lee, Wong, Cheung, and Lee's (2009) study that the application of the DA system may boost the writing quality of the learners as in their research, no sign of immediate improvement on the length of the paper and the total score of the essays was reported.

Regarding the attitudes investigation in the light of computer-based dynamic assessment, the results represented that more than %81 of the learners held a positive attitude towards CBDA. This finding is in line with Mohd Sallehhuddin's (1994), Mahreez's (1994), Latifah et al.'s (2011), and Galloway's (2011) studies which revealed positive attitudes and perceptions toward learning English and the acquisition process. To add more, this result is also consistent with the outcomes of Al Mamun et al., 2012; Bobkina & Fernandez, 2012; Chalak & Kassaian, 2010; Goktepe, 2014; Tahaineh & Daana, 2013) in all of which the learners' perspectives showed to positive towards the target language education. Furthermore, the present study corroborates with Wang, Shang, and Briody's (2013) study that learners represented positive attitudes in using a computer to boost writing. Given the less comparability of these studies and the current study, the findings may support the efficacy of computer-based dynamic assessment in enhancing positive attitudes to and motivation in EFL learners' writing.

In terms of learners' attitudes towards the use of CBDA, the result of this study is also consistent with the result of Hassaskhah and Javan Haghparast (2012) so that they showed that EFL learners have positive attitudes towards DA and feel more satisfied via CBDA instruction than traditional-based strategies in which learners are not much heard. In general, it can be said that EFL learners who used CBDA felt more satisfaction on writing tasks more than before.

CONCLUSION

It is now concluded that EFL learners feel more satisfied with DA of writing than with the

conventional procedures. Learners who experienced DA had a positive attitude towards computer-based DA too, liked writing activities more, and believed they could develop their writing quickly when computers and technology were integrated into the program. These findings in the realm of both academic achievement on the one hand and emotive and attitude change on the other are further contributions to the field. The effectiveness of computerized writing assessment feedback can be attributed to appropriate feedback and improved pupil independence and inspiration.

Additionally, the findings open reliable pedagogical grounds for the instructors, researchers, practitioners, policymakers, and syllabus designers interested in writing skill instruction for combining new dimensions into their tasks and language teaching to improve learners' writing.

Regardless of the positive outcomes, the generalizability of the findings has to be cautiously approached due to the small number of participants, their specific age range, and the complexity of the sound application of DA in terms of time and feasibility considerations on the other.

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Appendix A

Open-ended Attitude Questionnaire

1. What is the role of CALL in offering suitable materials for language skills development in classroom activities?
2. How can computer-assisted teaching offer freedom in learning to the learners?
3. How does the application of technological tools help develop writing skills?
4. What are the motivational benefits of the application of technological tools in writing class?
5. How can CALL programs facilitate collaborative learning in developing writing skills?
6. How can CALL facilitate a teacher's teaching and feedback-giving process in teaching writing?
7. How can CALL programs facilitate the interactive writing process?
8. What is the role of CALL in using learning strategies in the process of developing writing?

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