

## The Effect of Computerized Dynamic Assessment of L2 Writing on Iranian EFL Learners' Writing Development

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### Abstract

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The present study investigated the effect of using a computerized dynamic test of writing (CDTW) on L2 writing performance of Iranian EFL students. 60 upper-intermediate junior EFL students from three different universities in Iran participated in this experimental study. Using an interventionist approach to DA, the researcher used CDTW as treatment providing students with a set of pre-formulated supportive hints embedded in three steps of pre-writing, writing-drafting, and reformulation during the test administration. It was found that through the interactive and strategy-based learning environment, CDTW could be used to assess students' writing development. Also, the performance of the students improved in terms of the development of four major sub-skills of writing. The findings also indicated that low achievers could benefit more than high achievers from the implementation of CDTW. Students' attitude as measured by a questionnaire confirmed the effective role of computerized dynamic assessment procedures in writing development.

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**Key words:** Interventionist dynamic assessment, L2 writing, writing development

### 1. Introduction

Dynamic assessment-based studies with more than five decades of experience in educational context and its current application in language pedagogy (Ableeva, 2008, Anton, 2009; Lantolf & Poehner, 2004; Poehner, 2005; Poehner & Lantolf, 2005) provide insights concerning cognitive development and modifiability in assessment needed for effective learning (Ableeva, 2010). Dynamic assessment is commonly viewed as an approach which provides a learning opportunity in the assessment. Additionally, students can, according to the concept of 'the zone of proximal development' (Vygotsky, 1978), potentially achieve further than they can on their own, thus making the assessment *dynamic*. (Jönsson, Mattheos, Svingby, & Attström, 2007).

It is claimed that much of the recent research does not take advantage of the power of this active procedural model to enhance the process of writing in large-scale assessment. Some researchers have conducted research on the effect of DA on the writing performance (e.g., Alavi & Taghizadeh 2014; Shrestha & Coffin, 2012; Xiaoxiao & Yan, 2010). However, it appears that much of the recent research does not take advantage of the power of this active procedural model from the interventionist approach to enhance the process of writing in large-scale assessment.

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A very good starting point in attempts to design a computerized dynamic test of writing (CDTW) is the adoption of the dynamic essence of process writing that facilitates the cognitive development of the students. Studies run so far indicate that the writing process is one effective way to teach students to be good writers (Flower, & Hayes, 1981). This study concentrates on the application of a computer-based dynamic assessment to writing courses.

Adhering to interventionist approach to dynamic assessment which is used in computer-based assessment and is well adapted to large-scale assessment and psychometric measures (Thouésny, 2010), learners are asked to self-modify their own written texts (independent performance) with different levels of assistance to progress towards their potential (dependent performance). Covering a repertoire of pre-planned strategies and hints, CDTW focuses on improving four major sub-skills of the most challenging part of their writing: Outlining and organization, logical development and content, cohesion and coherence, style and quality of expression (derived from the results of pilot study of the same writing essays assessed in CDTW). This article tries to provide answers to these questions:

*Research Question 1:* Do C-DA procedures in CDTW have any effect on the writing of Iranian EFL students with upper-intermediate level of proficiency in English?

*Research Question 2:* What is the effect of C-DA procedures in CDTW on students' learning over time across the tests?

*Research Question 3:* Would low achievers benefit more than high achievers from the implementation of CDTW?

*Research Question 4:* What are students' attitudes towards the effective role of C-DA procedures in writing development?

## 2. Literature Review

### 2.1 What is dynamic assessment?

By definition, DA, as an interactive assessment technique, provides the unity of assessment and instruction with the goal of learner development and suggests effective directions for instructions (Lidz & Pena, 1996). DA is a procedure for simultaneously assessing and promoting development that takes account of the individual's (or group's) zone of proximal development (Poehner & Lantolf, 2003). While traditional *static assessment* (non-dynamic assessment) is limited because it does not directly aim to stimulate learners into becoming independent knowledge constructors, and problem solvers (Johnsson, Mattheos, Swingby & Attstrom, 2007), DA procedure, regarded as a compliment for other test types, includes the *mediation* (Poehner & Lantolf, 2003) as a form of instruction that attempts to change, guide, or improve the students' ability to learn, and their potential for achievement.

According to Haywood and Tzuriel (2002), dynamic assessment as a subset of interactive assessment includes deliberate and planned mediational teaching and the assessment of the effects of that teaching on subsequent performance. As a useful assessment procedure for helping teachers and students during the learning process, DA reduces the problem of under-achievement in standardized tests. Almost all researchers working on DA have found that test performance improves after mediation through DA (Elliot, 2003, Haywood & Tzuriel, 2000).

### 2.2 Theoretical perspectives on DA

Xiaoxia & Yan (2010) stated that DA is a concept of socio-cultural theory practiced mainly by Feuerstein, but its theoretical forefather is Vygotsky whose notion of the zone of proximal development (ZPD) is one of the key constructs of the approach. DA models have been greatly influenced by Vygotsky's theory of cognitive development (Vygotsky, 1986) and Feuerstein's *mediated learning experience* (MLE, Feuerstein et al. 1979) which addresses the question of *what the origins of differential cognitive development are* (Feuerstein, Rand, & Hoffman, 1979).

Fundamental to Vygotsky's theory is the concept that "advanced human mental processes have their origin in collaborative activity, mediated by verbal- and/or non-verbal interaction with more competent persons" (Benjamin, 2008). Cognitive activities first learned in the inter-personal domain later become internalized and self-regulated within the intra-personal domain (Benjamin, 2000)

According to Feuerstein-based critical- thinking- skills studies, all DA studies have sought to investigate central aspects incorporated in these definitions as:

*Examine* how enhanced thinking skills yield accelerated improvement on standardized achievement tests.

*Identify* specific cognitive functions and operations that are optimal for change.

*Discover* learners' learning potential for cognitive changes.

*Develop* instructional strategies and lessons plans to accelerate cognitive-based programs to reduce the chances in which learning disabilities will inhibit learner achievement. The concept of "Intelligence is dramatically modifiable" by Feuerstein shifts focus from what the individual is able to do at a given moment in time to what the individual will be able to do now as well as in the subsequent interactions. MLE helps children understand the test tasks. When they learn linguistic strategies through MLE, they can transfer mediated skills across tasks (Birjandi & Najafisarem, 2012). With regard to the dynamism in Vygotsky's concept of ZPD or Feuerstein's MLE, development as the key concept should be structured within DA approaches as the product of assessments.

### 2.3 Dynamic Assessment Models

Typically, a dynamic assessment consists of three phases: *test*, in which the testee's individual abilities are observed in a task with minimal assistance from the examiner; *teach*, in which the examiner assists the testee in tasks similar to those used in the test phase; and *re-test*, in which the testee is once again tested independently. The success of the mediation is measured by changes made from test to re-test phases. Accordingly, there are two general approaches to dynamic assessment: *Interventionist and Inter-actionist*. Lantolf and Poehner (2004), in elaborating a theoretical framework for DA procedures, designate both types of mediation as interventionist or psychometric DA and inter-actionist or clinical DA, respectively. The primary difference between the two approaches is the way in which the mediation is given to students. One major feature is that the mediation between the learner and the teacher can be negotiated (interactionist), or be established in advance (interventionist) (cited in Thouésny, 2010).

## 3. Method

### 3.1 Participants

This study was conducted with 60 upper-intermediate junior EFL students (14 male, 46 female) from three different universities in Iran. They were Persian EFL speakers majoring either in English Literature or English translation. They were 20 to 26 years old. They had already passed a 2-credit course on paragraph writing. The participants were selected based on availability. The sample was selected from the pool of junior students using TOEFL as a screening test. On the basis of their scores, 60 students with scores between one standard deviation below and one standard deviation above the mean were selected. They were, then, randomly assigned to control and experimental groups.

### 3.2 Research Instruments

A number of instruments were used for the purpose of collecting the relevant data:

#### 3.2.1 TOEFL Test

A TOEFL test was used to determine the English proficiency level of the participants. This test consisted of three subparts of structure, vocabulary, and reading comprehension. The test was used to ensure the homogeneity of the participants in the experimental and control groups.

#### 3.2.2 Writing Test

A writing test was used as a pre-test to measure the participants' non-dynamic score. The topic for the writing was chosen from among the topics covered in IELTS book (*Improve Your IELTS Writing Skills*, McCater & Whitby, 2007). Also, a post test, parallel to the pre-test, was administered to measure participants' development and improvement in L2 writing tasks.

#### 3.2.3 Computerized Dynamic Test of Writing (CDTW).

As the focus of the study was the development of writing performance of the learners, a practical software was designed to mediate a set of pre-formulated supportive hints during the test administration, contingent on ZAD providing dynamic score. The main sections of CDTW framework is illustrated in Appendix A. CDTW consisted of three dynamic writing tests covering a repertoire of pre-planned strategies and hints. They were prepared in response to the errors derived from the results of the pilot study of essays on similar topics written by 58 students.

The writings were assessed in CDTW following some guidelines available in writing books; Real Writing3textbook series (Gower, R., 2008), Real Writing4 textbook series (Haines, 2008.), *Academic writing from paragraph to essay* (Zemach, & Rumisek, 2003), *Improve your IELTS writing skills* (McCarter, & Whitby, 2007) and many versions of IELTS, TOEFL preparation books. CDTW focuses on improving four major challenging sub-skills: outlining and organization, logical development and content, cohesion and coherence, style and quality of expression.

### 3.2.4 Questionnaire

An already validated questionnaire followed by eight questions was given to students to express their attitude towards the application of C-DA procedures in writing courses. This questionnaire, adopted from Student Attitude Survey by Nirmolakhandan (2007), was based on 5-point Likert Scale. The questionnaire was modified to suit the purpose of this study (Appendix B).

### 3.3 Procedure

This study was based on an interventionist approach of DA with pre-test, instruction (computerized intervention), and post-test procedures. A pre-test (a Non-dynamic test) was given to the participants in both experimental and control groups, and the results were compared with those of the post-tests both within and across the two groups. During three successive weeks, 90 minutes of class time were devoted to the administration of one of the three essays in CDTW. The participants were asked to type their first draft (independent performance) on computer in one session of 50 minutes followed by a 15-minute break before starting CDTW (dependent performance) in order to manage the time and to reduce the load of typing on the computer in favor of a relaxed, stress-free situation. The software package has been designed in such a way that it can be installed properly and easily on any computer provided that NET Framework software is installed on it. On the opening page of the software, test takers need to type their name or ID (student number). The next page of the software provides test takers with short instructions to start the test. During this dynamic test, students had the opportunity to learn from test. Having been guided to choose the essay topic, learners should go through steps to accomplish the task, with hints embedded in each step.

#### Step1: Pre-writing

It provides knowledge about a topic through info-graphics and leading questions that will let students retrieve and regenerate a network of useful knowledge. In order to discover key concepts to organize their writing, after answering and saving the items, the test takers are provided with hints to review and to improve their answers against a set of standard responses and indicators available in CDTW. These procedures in all steps of CDTW let them think through the process. Hence, there is also an ongoing self-evaluation while the test takers are going through the tasks.

#### Step2: Writing & Drafting

It was embedded in three parts of the introduction, body and conclusion sections of writing. For each part, the test-takers had to modify and then save their own early typed draft as their first dependent attempt following hint 2 in the introduction part, hint 3 in the body part and hint 4 in the conclusion part to improve their writing in the challenging sub-skills of essay writing: Outlining and organization, logical development and content, cohesion and coherence, style and quality of expression. In this step, the software improves (gives the test taker hints to improve) fluency in terms of coherence, and lexical complexity in terms of textual lexical diversity across paragraphs. Students can enhance their writing quality and sophistication by putting ideas into a complex network of relationships embodied in key phrases or through using the dictionary.

#### Step 3: Formulation

The third step was the step of *reformulation*. At the end of test, the software provided test takers with a similar explicit model essay (cause-effect) written by native or native-like proficient writers to help them notice special aspects (lexical, form, discourse and content) of a standard explicit model essay. These features were highlighted. Additionally, using the evaluation criteria, they could weight their own writing against this optimized model. Finally, the participants were asked to self-modify their saved writing and to handwrite the new modified essay as their final dependent performance.

The scores given to the final modified-writing products in handwriting format were considered as an indication of the test takers' progress following the hints in all steps of CDTW. After students develop the ability to tackle problems by ongoing self-modification and self-evaluation through CDTW, their ability to tackle similar problems can be assessed in other similar tasks. In fact, the researcher did not follow any more tasks because of the time-demanding nature of the CDTW's administration. The data collection ended when the learners began to show some improvements in writing as confirmed in Figure 1. illustrating students' growth across tests (pre-test, CDTW, post-test).

### 3.4 Pilot Study

This study included two pilot studies. The purpose of the first pilot study was to determine the potential problematic areas in essay writing. Some participants were given topics to write an essay. The errors students made on the non-dynamic test were used to prepare pre-planned hints for the computerized mediation. In this way, the probability of working within students' ZPD increased. The tests were piloted on 58 students at Hakim Sabzevari University who were similar in English proficiency to the participants of the study.

The purpose of the second pilot study was to receive students' feedback about the quality of software, the content of test and students' reactions to this type of dynamic test. One month prior to conducting the experiment, the researcher administered the second pilot test to a group of 10 students who had roughly the same language proficiency level as the participants of the study. After obtaining the results, the researcher made revisions and modifications to the test content and procedures and its time administration.

## 4. Scoring System

In this study, Bailey and Brown (1984) essay scoring criteria was used to score the students' essays analytically. Each paper was rated on these criteria. In large scale assessment, single rating of essays will be sufficient (Polio, 1997). One qualified rater, scored the papers, and the results were analyzed to estimate the intra-rater reliability. 30 essays were randomly selected and scored twice by a rater using the Bailey and Brown (1984) essay scoring criteria. Then the intra-rater was estimated.

## 4. Results & Findings

### 4.1 Results of the Post-test

The descriptive data of the TOEFL test are presented in Table 1.

**Table 1. Descriptive statistics for TOEFL Test**

Group	N	Minimum	Maximum	Mean	Std. Deviation
A	39	23	50	37	6.85
B	37	19	49	36.74	7.08
C	77			36.87	

*Note.* N = Number of participants; Std = Standard.

**Table 2: Independent Samples t-test for TOEFL Test**

Group	Mean	Std. Deviation	Std. Error	t	df	Sig. (2- tailed)
Pair A - B	34	9.57	1.55	.22	37	.82

*Note.* Std = Standard; T = Computed value of t test; Df = Degree of freedom; Sig = Level of significance.

As shown in Table 2, the estimated level of significance ( $\alpha$ ) is more than the probability value ( $\alpha = .82 > .05$ ). Therefore, it seems that there is no significant difference between the two experimental and control group in terms of proficiency.

## 4.2 Intra-rater Reliability

Intra-rater reliability was based on 30 re-scored randomly-selected essays computed by the essay scoring criteria of Bailey and Brown (1984). The reliability of the scores given to the essays was determined by Pearson product moment correlation coefficient formula. The estimated reliability was acceptable (0.77). The results of intra-rater reliability are presented in Table 3.

**Table 3 Reliability of Writing Test Scoring**

	X	Y
X Pearson Correlation	1	.77
Sig (2-tailed)		.00
N	30	30
Y Pearson Correlation	.77	1
Sig (2-tailed)	.00	
N	30	30

*Note.* Correlation is significant at 0.01 (2-tailed); N=Number of participants; X=Rating 1; Y= Rating 2; Sig = Level of significance.

## 4.3 Results for Pre-tests

Before treatment (i.e., CDTW), a writing pretest (NDA) was administered to the experimental and control groups in order to ensure the similarity of the two groups. The results are displayed in Tables 4 and 5. As shown in Table 5, the means of the experimental group and control group are 47.70, 44.80, respectively. On the basis of information provided in Table 5, the obtained level of significance (0.18) for both groups' pretest is more than the probability value (.05).  $P = 0.18 > 0.05$ . Therefore, there was no significant difference between the experimental and control groups in terms of their writing ability before the treatment.

**Table 4: Descriptive Statistics for Pretest Results on writing Test (NDA) for both Groups**

Group	Mean	N	Std. Deviation	Std. Error Mean
E	47.70	30	9.32	1.70
C	44.80	30	9.19	1.67

*Note.* E = Experimental group; C = Control group; Std = Standard

**Table 5 Independent Samples t-test for pretest**

	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
E - C	2.90	11.75	2.14	1.35	29	.18

*Note.* E = Experimental group; C = Control group; Std = Standard; T = Computed value of t test; Df = Degree of freedom; Sig = Level of significance.  $P < .05$ .

In order to answer the two main questions of the study, the researcher had to compute the following descriptive statistics to check the two null hypotheses related to these questions above:

*Null Hypothesis 1:* There is no relationship between C-DA procedures in CDTW and students' writing tasks compared with Non-DA.

*Null Hypothesis 2:* There is no significant improvement on students' learning development in four major writing skills focused in CDTW.

As shown in Table 4.6. and Table 4.7., the mean score of the experimental group changed from (M = 47.40) to (M = 55.23). Based on Table 7, the difference between the pretest and posttest mean scores of the experimental group (M = 7.53) indicated that the subject experienced significant writing improvement after treatment. The level of significance (.002) for the pre- and posttest is less than the probability value (.05).

It might be claimed that the participants in the experimental group took advantage of the intervention and gained reasonable increase in their posttest score.  $P = .002 < .05$

**Table 6 Descriptive Statistics of Pretest and Posttest for the Experimental Group**

Group	Mean	N	Std. Deviation	Std. Error Mean
E posttest	55.23	30	11.50	2.09
E pretest	47.70	30	9.32	1.70

Note. E = Experimental group; N = Number of participants; Std = Standard.

**Table 7.T-test for Determining the Development in Experimental**

Posttest/Pretest	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Pair 1 E – E	7.53	12.28	3.35	29	.002

Descriptive statistics of posttest for both groups are presented are presented in Table 8. The comparison of post-test mean scores of experimental and control through t-test indicates that there is a significant difference between the post-test mean scores of the two groups, indicating the superiority of experimental group over control group in terms of their performance on a writing test after the treatment period. This means that, with C-DA intervention as the independent variable and writing score (posttest) as the dependent variable and NDA (pre-test) as the covariate, the type of assessment-based instruction or mediation used (C-DA based versus NDA-based) at the level of significance (.007) makes a significant difference in the improvement of writing skills by Iranian EFL learners.  $P = .007 < .05$ (redundant)

**Table 8.Descriptive Statistics of Posttest for both Groups**

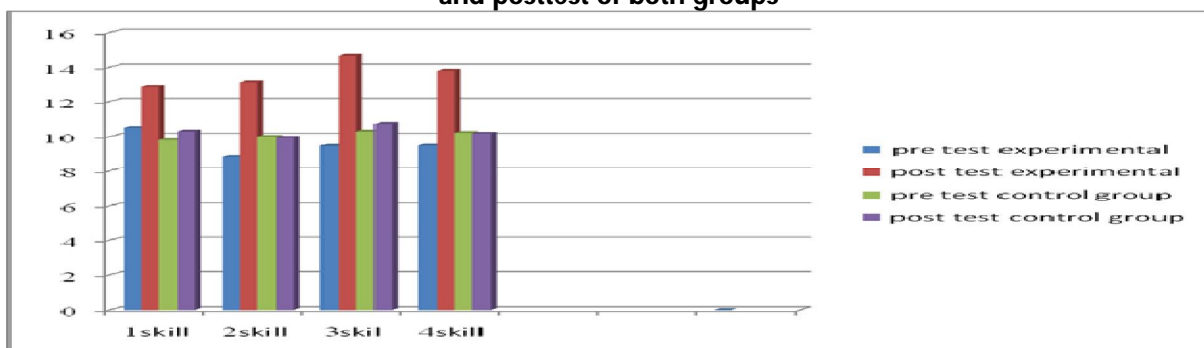
Posttest	N	Mean	Std. Deviation	Std. Error Mean
E	30	55.23	11.50	2.09
C	30	46.66	8.28	1.51

**Table 9 Independent Samples t-test for posttest**

Posttest	Mean	Std. Deviation	t	df	Sig. (2-tailed)
E-C	8.5667	16.21	2.89	29	.007

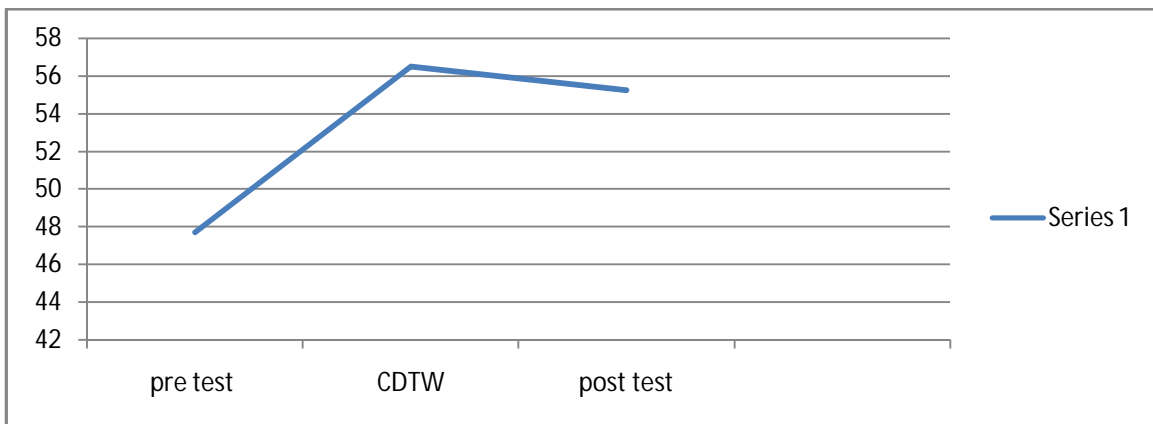
As the results of the statistical analysis shows, C-DA intervention had a positive influence on four components of writing. Figure1 displays the percentage of achievement in each component by the experimental group and the control group. It can be concluded that treatment was effective.

**Figure 1.Graphic Display of Results of weighted percentages' growth of four subskills of writing in pretest and posttest of both groups**



And finally, Figure 2 represents the raw mean scores obtained over the pre-test (NDA), CDTW(C-DA) and post-test (PDA) stages. It also presents the students' improvement over the period of experiment. As shown, the improvement turned out to be significant by the time they received treatment, moving from the mean score of 47.70 on the pretest (NDA) to 56, 57.60, and 56.50 on CDTW(C-DA) 1, 2, 3 respectively showing a substantial increase in their learning potential and the highest mean score obtained throughout all six assessment sessions. The mean score of posttest (PDA) 55.2333 represents a slight drop in performance, which can be explained by the absence of mediated portions of the assessment sessions as compared to the C-DA sessions. This latter fact, however, speaks in favor of the effect of C-DA interventions. That is, the learners were able to sustain their independent performance and obtained almost the same score as in C-DA despite the decreased degree of mean score. It should be pointed out that generally the means obtained during the post-test session are higher than those obtained in the pre-test. This significant difference can be attributed to the effects of mediation provided on writing achievement.

**Figure 2. Mean (raw) scores during the NDA, C-DA (Dependent performance) and PDA (Independent performance)**



Based on statistical accounts, the researcher can safely reject the two first null-hypotheses of the study and conclude that C-DA intervention contributes significantly to writing learning compared to NDA-focused sessions.

**4.4 Results for the Third Hypothesis**

The participants in our study were divided into two subgroups based on their scores on the pre-test (NDA): a high achiever sub-group with non-dynamic scores above 50(50-73) 55, a low achiever sub-group with non-dynamic scores below 50 (35-49).The means of high and low achievers' scores on pretest, CDTW and posttest are shown in Tables10and 11respectively.

The mean of the high achievers was found to be (57.84) and that of low achievers was (48.64). Also, while the high achiever subgroup could increase its mean score on dynamic test by 8.66 points and on posttest by 2.07, the low achiever subgroup could increase them by 12.47 on dynamic test andby 7.11 on post-test. That is, the low achievers, on average, had a bigger increase (e.g.5.03 points) than the high achievers did. This means that the benefits of mediation differed for high and low achievers. So the C-DA dynamic assessment can be marked by its relevance to measure the students' learning potentials that are not achieved by traditional and usefulness in instruction for the benefit of disabled students by providing learning opportunities for their poor performance.

**Table 10: Descriptive Statistics for Low Achiever Experimental Participants in Pretest (NDA), posttest**

Subgroup	N	Mean	Std. Deviation	Std. Error Mean	Mean Difference NDA, PT
LA (NDA)	17	41.52	4.96	1.20	
LA (CDTW)	17	53.99	7.36	1.78	7.11
LA (PT)	17	48.64	10.44	2.53	

*Note. LA = Lowachiever; PT = posttest.*



**Table 11.Descriptive Statistics for High Achiever Experimental Participants in Pretest (NDA), posttest**

Subgroup	N	Mean	Std. Deviation	Std. Error Mean	Mean Difference NDA, PT
HA (NDA)	13	55.76	7.28	2.01	
HA (CDTW)	13	64.43	8.49	1.35	2.07
HA (PT)	13	57.84	8.81	2.44	

*Note. HA= High achiever; PT = posttest*

The statistical analysis of the third research question revealed that there is a significant difference between the performance of high and low participants; therefore, the third null hypothesis stating that low achievers donot gain more progress in their scores in comparison to the high achievers through CDTW was rejected as well. It proves the usefulness of C-DA procedures in instruction for the benefit of weak students by providing learning opportunities for their poor performance. It is worth pointing out that this result is in line with previous research findings (i.e., Pishghadam, Barabady, &Mehrikamrood, 2011) concerning the effect of computerized dynamic assessment of L2 reading (CDRT) on high and low achievers.

#### 4.5 Results for the Fourth Hypothesis

An already validated questionnaire followed by eight questions was given to students to express their attitude to application of C-DA procedures in writing courses.This questionnaire, which was adopted fromStudent Attitude Survey by Nirmolakhandan, N., (2007),based on 5-point Likert scale, was developed and modified for the purpose of this study.Considering the last null hypothesis which assumes 'students do not have positive attitudes towards the effective role of C-DA procedures in learning of English', the data obtained are summarized in the form of the attitudes of the students towards C-DA procedures as a learning environment.These evaluations are generally in favor of the computer-based DA system, and most students agreed that such a system would be beneficial in learning of English as well so the last null hypothesis was rejected.

#### 5. Discussion &Conclusion

The results of this study, in line with the results of previous research on C-DA, highlights the positive effect of using C-DA procedures on improving students' learning and achievement. The effectiveness of such an approach can be described in term of students' development of the ability to tackle the problem and to improve their performance by ongoing self-modification and self-evaluation via CDTW which provides the test takers with pre-planned hints (mediation) embedded in three steps of pre-writing, writing, anddrafting and reformulation. The findings confirmedthat learners' writing ability can be comprehensively improved by using the situated and dynamic learning assessment environment for a short period of time. It seems that CDTW framework provides a degree of control over students' failure to write in non-dynamic tests by providing opportunities for learning that may lead to the improvement of the writing quality. Adding DA to the testing setting makes it more learner-friendly.

From the perspective of dynamic assessment, it reduces the fear of failure, gives learners extra motivation for further learning, and thenecessary confidence to go to higher levels of functioning through experiencing mastery in shed of intervention supports.

This study integrated DA to create a learning situationwith a program that makes available various kinds of mediation throughout the assessment procedure. An obvious advantage of using such technologies is that a large number of learners could be assessed simultaneouslyin terms of the extent to which they are realizing their potential. In this respect, DA is highly dependent on the meditational skills to reveal different patterns of learning abilities in problematic areas of writing. The implication is that learners can benefit a lot from a DA-based mediation and that C-DA based intervention can be very instrumental in the process of L2 writing instruction. DA talks of a new system of education designed to bring about significant learning outcomes.

This research highlights the importance of new instructional environments which can develop learners' analytical and critical thinking skills, and provides self-regulated learning strategies through self-assessment and self-modifications during interventionphase enabling students to learn more effectively while experiencing a challenging and motivating learning environment (Lee, Z., 2010).

One of the limitations of this study concerned how to provide profile of students' achievement through computer scoring system. It is recommended that other researchers develop and implement similar C-DA program. The results obtained in the present study show the students' learning potential in four major writing sub-skills in response to mediation provided during CDTW. In this respect, it would be necessary to conduct a range of empirical studies with a different mediational approach in order to reveal different patterns of learning abilities in problematic areas of writing. In addition, the intervention length of the present study was limited. This limitation may have also affected the study as the experiment lasted only four weeks. Furthermore, the long-term learning of the students was not measured. The collection of data ended when the learners began to show some improvements in writing tasks. Therefore, further investigations to track writing development over longer periods would offer more insights in writing development. Last but not least, the design of the CDTW proposed in this study intends to benefit from interventionist approach in order to assess large numbers of learners' texts written. Further studies will be required to integrate the dynamic process of interactionist approach in large-scale assessment for who asked for further explanations (interaction) and for whom the fixed mediation in CDTW would not be more effective.

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### Appendix B: Students' Evaluation of CDTW Program

Questions	SD%	D%	N%	A%	SA%
1. The CDTW is preferable to the traditional writing tasks.	0	0	0	38.7	58.1
2. The hints/helps provided by the CDTW were beneficial to me.	0	0	6.5	80.6	97.1
3. I would have preferred a teacher assistant to help me with the problems.	0	0	0	77.4	19.8
4. I would have scored better than I try alone my writing tasks.	0	0	12.9	67.7	16.1
5. I was able to understand the material well through this CDTW.	0	0	0	38.7	58.1
6. I value the CDTW as an effective learning experience.	0	0	0	32.3	64.5
7. The hints during exam stimulated me to activate what I know.	0	0	29	61.3	6.5
8. Overall, CDTW helped me developed my writing skills in traditional tasks.	0	0	16.1	80.6	0

Note: SD=strongly disagree; D=disagree; N=neutral; A=agree; and SA=strongly agree.  
Adopted from Nirmalakhandan, N., (2007)