



A Comparative Study on Computerized vs. Face-to-Face Dynamic Assessment on Turkish EFL Learners' Autonomy, Self-regulation and Cognitive Engagement

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ABSTRACT

The current study was an endeavor to compare the effect of computerized and face-to-face dynamic assessment on Turkish EFL learners' autonomy, self-regulation, and cognitive engagement. To this end, 81 Turkish male and female EFL learners were selected randomly in a university in Turkey. Then, OPT was administered and as the sample, 60 learners were selected and divided into two equal groups as C-DA group, and Face-to-Face DA group. The data collection procedure began with conducting the pretests (i.e. LAQ, cognitive engagement questionnaire, and autonomy questionnaire). The learners had 30 minutes for completing the pretests. Next, the treatment for each group of the participants started. After finishing the course, LAQ, cognitive engagement questionnaire, and autonomy questionnaire, as posttests were administered for the two groups. To analyze the data, one-way ANCOVA was conducted. The results showed that compared to face-to-face DA, computerized DA had a significantly positive effect on Turkish EFL learners' autonomy and cognitive engagement. However, the finding revealed that no significant difference was found in terms of the learners' self-regulation. Eventually, some theoretical and pedagogical implication are provided.

Keywords: *Autonomy; Cognitive Engagement; Computerized Dynamic Assessment; Dynamic Assessment; Face-to-Face Dynamic Assessment; Self-regulation; Turkish EFL Learners*

1. INTRODUCTION

The process of assessment, as a fundamental aspect of education and language learning since their inception, has undergone significant changes influenced by various approaches to language teaching. During the mid-20th century, behaviorism dominated assessment practices, emphasizing discrete points, grammar, vocabulary, and multiple-choice tests (Yörüdü, 2021). However, this approach was later replaced by Oller's (1980) concept of language competency, which emphasized a unified set of interactive skills. By the mid-1980s, Canale and Swain's (1981) communicative competence framework brought a shift toward communication-focused assessment tasks. This shift was fueled by the growing belief that traditional assessment methods lacked authenticity and failed to reflect real-life language use.

Building on this idea, Bachman and Palmer (1996) highlighted the importance of strategic competence and advocated for the inclusion of pragmatic and strategic abilities in language testing. Consequently, test developers began designing tasks that mirrored real-world scenarios, emphasizing authenticity and realistic texts. Traditional tests, being less reflective of real-life contexts, were deemed unsuitable for all students and skills. This led educators to adopt alternative assessment methods, such as portfolios, journals, self and peer evaluations, and reflections.

In modern times, language education has embraced a student-centered curriculum, bringing dynamic assessment, pragmatic competence evaluation, and the integration of technology into assessments to the forefront of discussions (Brown & Abeywickrama, 2010; Yılmaz, 2022). Despite its importance in education, assessment remains an underexplored topic. Green (2020) notes that teacher training programs often neglect assessment, dedicating only limited attention to it. As technology advances rapidly, alternative assessment methods are becoming more prevalent, prompting educators and researchers to focus on these innovative approaches (Ünal, 2021).



Cheng and Fox (2017) outline several purposes of assessment: categorizing students for instructional planning, tracking their progress, identifying strengths and weaknesses in teaching methods, motivating learners, and determining final grades. McKay (2006) emphasizes that assessments allow educators to select instructional materials and evaluate whether students meet curriculum objectives. Rea-Dickins and Gardner (2000) further distinguish between low-stakes and high-stakes decisions derived from assessments, highlighting the significant impact high-stakes decisions can have on students' lives. Moreover, they stress that many assessment processes carry greater consequences for students than initially perceived.

From Vygotsky's perspective, assessment should aim to explore the full spectrum of learners' abilities. To achieve this, he introduced the well-known concept of the Zone of Proximal Development (ZPD), which represents the gap between a learner's current level of development, determined by independent problem-solving, and their potential level of development, assessed through problem-solving with guidance from an adult or collaboration with more skilled peers. Additionally, adopting a dynamic assessment approach aligns with Vygotsky's emphasis on integrating assessment with instruction. Applying this unified approach in educational contexts enables evaluators to guide learners' performance, providing a more comprehensive understanding of their abilities (Üçok Atasoy, 2019). By assessing within ZPD, teachers can leverage classroom interactions not only to evaluate students' skills but also to foster their growth through targeted support (Poehner, 2009). Vygotsky critiques traditional educational practices, which focus solely on observing learners' independent problem-solving abilities. He argues that such methods only reveal fully developed skills, overlooking those that are still emerging. A deeper understanding arises when learners are offered various forms of assistance, which ultimately facilitate their development (Vygotsky, 1978).

The emergence of Computerized-Dynamic Assessment (C-DA) has brought a new perspective to this approach by utilizing technology to provide standardized, pre-designed, and automated interventions, often via computer-assisted platforms. This method presents several benefits. Firstly, C-DA ensures timely and consistent delivery of guidance and feedback, allowing learners to receive support precisely when needed. Secondly, it offers flexibility, enabling learners to interact with the assessment at their own pace and convenience. Lastly, C-DA simplifies record-keeping by automatically generating detailed learner profiles and performance data after each task (Ebadi & Saeedian, 2015). This comprehensive tracking allows for more accurate monitoring of learner progress and provides insights for shaping future instruction. Unlike traditional static assessments that evaluate learners' independent abilities, C-DA emphasizes their learning potential by analyzing how they respond to mediated assistance provided through computer-based tools (Poehner & Lantolf, 2013). C-DA has several distinct features that set it apart from conventional assessment methods: Interactive Feedback (Teo, 2012), Scaffolding (Poehner, 2008), Customization (Lantolf & Poehner, 2011), Use of Technology: C-DA employs digital platforms such as software or online systems to administer assessments and facilitate learning interactions (Shabani, 2016), and a Formative Approach (Poehner & Lantolf, 2005).

Utilizing C-DA in language education has been approved in few number of studies in EFL contexts, especially in Turkish EFL settings (i.e. Budanır, 2022; Bural, 2021; Estrada-Araoz et al. 2023; Emadi & Arabmofrad, 2025; Kahveci, 2023). Although research has extensively explored various methods of dynamic assessment (DA) in language learning, there remains a gap in examining the comparative effects of C-DA and face-to-face DA on EFL Turkish learners. Specifically, no study to date has investigated how these two approaches influence learners' autonomy, self-regulation, and cognitive engagement. This lack of research highlights a critical need for further exploration to understand the potential benefits and limitations of each method in fostering essential skills for language acquisition. To this end, the following research question was proposed:

Is there any significant effect of C-DA and face-to-face DA on EFL Turkish learners. Specifically, no study to date has investigated how these two approaches influence learners' autonomy, self-regulation, and cognitive engagement?

2. Review of the Literature

2.1. Theoretical Framework

Vygotsky's socio-cultural theory, which emphasizes understanding cognitive development within social and cultural frameworks, forms the basis of dynamic assessment (Ajideh & Nourdad, 2012). This theory focuses on the processes through which learning and development occur. Students often need assistance from others to complete new tasks, but once they become familiar with these tasks, they can perform them independently. Social interactions, therefore, play a crucial role in facilitating learning. Sociocultural theory offers valuable insights for researchers studying mental development, educational methods, and cognitive processes. A key



aspect of this theory is its emphasis on the dialogic nature of teaching and learning within the Zone of Proximal Development (ZPD) and the design of studies that highlight this element (Lavin, 2023).

The ZPD is another concept central to understanding this research. It refers to the gap between a learner's current level of independent problem-solving and the potential level they can achieve with guidance from adults or collaboration with more experienced peers (Vygotsky, 1978). According to this framework, cognitive development occurs at both independent levels (past to present) and assisted levels (present to future). While a child can perform tasks independently at their current level, they require support from a mediator to achieve tasks at their potential level (Vygotsky, 1986). The scaffolding process helps nurture emerging abilities that are still developing, revealing a child's latent potential, which is significant for both diagnosis and future learning. The ZPD encompasses tasks a child can complete on their own as well as those they can accomplish with guidance from more skilled individuals. Vygotsky described the ZPD as encompassing both a learner's current abilities and the higher levels they can reach with the help of semiotic tools, environmental resources, and competent adults (Shabani et al., 2010). Collaborative learning with peers is believed to enhance understanding as learners internalize new concepts and skills through these interactions. From a Vygotskian perspective, effective teaching involves keeping students engaged in their ZPD by involving them in problem-solving and learning activities that are slightly beyond their independent capabilities (Roosevelt, 2008). After completing these activities collaboratively, students are likely to master the tasks independently, thereby expanding their ZPD for that specific task. As their abilities grow, more challenging tasks are introduced to align with their expanded ZPD (Azizi & Namaziandost, 2023).

2.2. Empirical Background

In a recent study, Emadi and Arabmofrad (2025) conducted a meta-analysis to provide a thorough evaluation of research on C-DA in the field of English language teaching and learning, addressing the demand for a systematic review considering recent technological advancements. After systematically searching three databases—ERIC, Web of Science, and Scopus—2807 articles were initially identified, but only 22 studies met the inclusion criteria after screening. The analysis revealed that C-DA significantly improved language learning outcomes, particularly in reading, listening, and writing skills, with large effect sizes observed across multiple studies. The most frequently used approaches were interventionist methods and quasi-experimental designs, emphasizing the powerful role of mediation in bridging learners' current and potential abilities. While C-DA showed notable improvements in skill-based outcomes, its influence on affective factors such as anxiety and intrinsic motivation was less pronounced. These findings underscored the potential of C-DA as a game-changing tool in language assessment and teaching, especially when mediation is customized to fit learners' needs.

Akbari et al. (2025) explored the effects of AI-assisted feedback using ChatGPT combined with teacher-mediated Dynamic Assessment (TMDA), referred to as AI-DA synergy, on the academic writing development of Iranian nursing students enrolled in a university-level EFL course. Grounded in Vygotsky's Sociocultural Theory (SCT), the study aimed to assess both the effectiveness of AI-DA synergy and students' perceptions of its use. Using a mixed-methods approach, the study included 60 B1-level nursing students who were randomly divided into three groups: AI-DA, DA-only, and a control group, each consisting of 20 participants. Students completed two CEFR B1-aligned timed descriptive writing tasks during pretest and posttest phases to measure their writing proficiency quantitatively. Qualitative data were gathered through semi-structured interviews to delve into students' writing progress and their reflections on the AI-DA feedback. ANOVA results showed that the AI-DA group significantly outperformed both the DA-only and control groups in writing proficiency. Thematic analysis of student feedback identified five main themes: the importance of teacher mediation, emotional engagement, skill development, limitations of AI assistance, and trust negotiation. Students valued the dual support system, noting that teacher feedback provided contextual understanding and emotional support, while AI delivered instant, personalized suggestions.

Wei and Shin (2025) explored the impact of computer-assisted Interventionist Dynamic Assessment (IDA) and Hybrid Dynamic Assessment (HDA) on enhancing the organizational skills in L2 writing among Chinese university students, addressing limitations in traditional writing instruction that focuses on final products. A total of 84 participants were divided into IDA and HDA groups and completed three argumentative writing tasks (a pretest, a DA test, and a posttest) over a five-week period. The IDA group received standardized, computer-mediated prompts (Mediational Moves), while the HDA group experienced a combination of these prompts with personalized, instructor-led mediation. Both groups showed notable



improvement, but the HDA group achieved greater progress in organizational skills. This was attributed to its interactive scaffolding approach, which aligns with the Zone of Proximal Development (ZPD) from sociocultural theory. A repeated-measures ANOVA demonstrated significant improvement over time, although slight declines in posttest scores suggested that cognitive development is a gradual process. Analysis of mediational moves revealed that HDA's adaptive support promoted deeper cognitive engagement, as evidenced by higher Learning Potential Scores (LPS). The findings emphasized the effectiveness of HDA in enhancing organizational skills by integrating computer-assisted mediation with teacher-guided interaction.

Kargar Behbahani et al. (2024) investigated the impact of Computerized Dynamic Assessment (CDA) on the pronunciation skills of Iranian EFL learners, focusing on how Digitalized Corrective Feedback (CF) influenced the outcomes. Sixty lower-intermediate EFL learners from three intact classes at a language institute in Shiraz, Iran, were randomly assigned to either control or experimental groups. The experimental groups received interventions involving either CDA alone or CDA combined with Digitalized CF, while the control group underwent traditional online instruction without mediation. To measure progress, a teacher-made pronunciation test was administered as both a pretest and a posttest. The results showed that the experimental groups significantly outperformed the control group in improving pronunciation skills. Notably, the CDA-only group achieved marked improvements in pronunciation accuracy, while the CDA-plus CF group demonstrated even greater progress. The combination of Digitalized CF with CDA was particularly effective, offering tailored and precise feedback that led to significant advancements in learners' pronunciation proficiency. These findings highlight the value of technology-based approaches like CDA and Digitalized CF in enhancing pronunciation instruction. They provide important insights for language educators, curriculum developers, materials designers, and policymakers. Adopting dynamic assessment strategies and integrating technology into language education policies can create more effective and engaging learning opportunities for EFL students.

Estrada-Araoz et al. (2023) examined the effects of computerized formative assessment (CFA) and C-DA on students' motivation, reading self-concept, autonomy, and self-regulation. Using a convenience sampling method, three groups—one control group and two experimental groups (dynamic and formative)—were randomly formed. Before the intervention, all three groups completed pretests to measure their reading motivation, reading self-concept, autonomy, and self-regulation. Each group then received different treatments: the control group underwent traditional assessment methods, the first experimental group participated in computerized dynamic assessment (CDA), and the second experimental group engaged in computerized formative assessment (CFA). After the treatments were completed, all groups took posttests to reassess their reading motivation, reading self-concept, autonomy, and self-regulation. The data were analyzed using one-way ANOVA and the post hoc Scheffé test. The results revealed significant differences in the posttest scores among the three groups. The analysis indicated that the CDA group performed better than the CFA group in terms of reading motivation, reading self-concept, autonomy, and self-regulation. The findings suggested that CDA is particularly effective in enhancing EFL students' motivation, self-concept in reading, autonomy, and self-regulation.

Emre Kahveci (2023) provided an overview of postgraduate research on second language assessment in Türkiye, aiming to serve as a resource for future studies in this area. The importance of the study lies in its inclusion of the most recent data related to second language assessment. Furthermore, he identified and discussed gaps in the research, such as underexplored sub-topics, research methodologies, and sampling techniques, which could offer new directions for scholars. For this purpose, master's theses and doctoral dissertations on second language assessment, published in the National Dissertation and Thesis Database of the Council of Higher Education (CoHE) between 2018 and 2023, were analyzed. A total of 96 theses and dissertations were examined. The study presented various numerical findings and interpretations concerning the distribution of research across years, sub-topics, methodologies, sampling approaches, and the conclusions derived.

Abassy Delvand and Mashhadi Heidar (2021) investigated the impact of computerized group dynamic assessment (GDA) using software on the listening comprehension skills of Iranian male and female learners. The study involved 140 participants, divided equally into male and female learners across experimental and control groups, with 35 males and 35 females in each group. Learners in the experimental groups engaged with GDA to collaboratively work on selected listening comprehension tasks, receiving necessary assistance from the teacher. Statistical analysis of pre- and post-test results using two-way ANOVA and ANCOVA revealed that learners in the experimental groups performed significantly better than those in the control groups. However, no notable differences were found between male and female learners within the experimental groups. The findings emphasized the effectiveness of GDA via software in enhancing listening comprehension skills,



suggesting that educators should utilize technological tools to create interactive learning environments that foster language skill development.

3. Methodology

3.1. Participants

The minimum sample size of participants in the study was determined based on power analysis. The power analysis was conducted using G*Power 3.1.9.7 software (Faul et al., 2009). The results of power analysis (.66, $p=.05$, effect size=.544) revealed that at least 60 participants were needed to run statistical analysis. The population included 81 EFL female and male learners, selected randomly in a university, Turkey. Then, 60 out of 81 were chosen as the sample of the study were administered based on the placement test, and randomly divided into equal groups as C-DA group ($n=30$), and Face-to-Face DA group ($n=30$), ranging from 19 to 28 years old. In addition to EFL learners, one experienced teacher was selected for both experimental and control groups. She had more than ten years of teaching English, holding M.A. in English language teaching.

3.2. Instruments

3.2.1 Oxford Placement Test

The researcher used Oxford Placement Test to select the participants of the study (Appendix A) (Allan, 2004). The assessment tool consists of 80 multiple-choice questions, divided into three primary sections including: a sentence completion exercise, a grammar evaluation, and a vocabulary assessment. According Allan (2004), as a standard test, it possess acceptable levels of reliability and validity. The participants were supposed to answer the test within 70 minutes.

3.2.2. Learner Autonomy Questionnaire (LAQ)

In this study, the Learner Autonomy Questionnaire (LAQ), developed by Spratt, Humphreys, and Chan (2002), was utilized to evaluate the participants' level of autonomy in learning English as a foreign language. The questionnaire consisted of 21 items. Participants responded using a Likert questionnaire, with section one requiring them to rate the frequency of behaviors from "not at all" to "completely"; section two involved rating from 1 ("very poor") to 5 ("very good"); section three asked them to mark their choices with an "X"; and section four involved frequency ratings ranging from "never" to "always." The total scores ranged from 52 to 260, with higher scores indicating greater autonomy. For this study, the authors reassessed the internal consistency of the questionnaire using Cronbach's Alpha, which yielded a reliability coefficient of .81, deemed satisfactory for the research objectives.

3.2.3 Self-regulation Questionnaire

The Self-Regulation Questionnaire (SRQ) is a commonly used self-assessment tool designed to evaluate learners' self-regulated learning strategies at a course-specific level. For this study, the researcher utilized the version of the SRQ translated and developed by Tsuda and Nakata (2013). The validity and reliability of this questionnaire have been verified and confirmed (Tsuda & Nakata, 2013). It was translated into Persian, and its validity and reliability were undergone further evaluation.

3.2.4 Cognitive Engagement

Reeve and Tseng (2011) created the Student Engagement Questionnaire, which consists of four subquestionnaires: behavioral engagement, agentic engagement, cognitive engagement, and emotional engagement. The questionnaire includes 22 items divided into three dimensions: cognitive (items 1-7), emotional (items 8-14), and behavioral (items 15-22). The validity of the questionnaire was confirmed by Reeve and Tseng (2011), and its reliability was later assessed in Iran by Hajalizadeh (2016), who reported a reliability coefficient of 0.87, demonstrating an acceptable level of reliability.

3.3. Procedure



To do the study, first, 81 Turkish male and female EFL learners were selected randomly in a university in Turkey. Then, OPT was administered and as the sample, 60 learners were selected and divided into two equal groups as C-DA group, and Face-to-Face DA group. The data collection procedure began with conducting the pretests (i.e. LAQ, cognitive engagement questionnaire, and autonomy questionnaire). The learners had 30 minutes for completing the pretests. Next, the treatment for each group of the participants started. The materials of the study were *American English File 1*. Each unit of *American English File 1* is composed of four sections plus two-page practical English and writing, and a two-page review & check section. The experimental group was taught through C-DA. In this group, the researcher developed the C-DA program using the Viewlet Quiz software, integrated evaluation with mediation. This software utilized Adobe Flash technology. The C-DA program recorded students' responses, tracked their mistakes, and noted the mediations they triggered. It allowed students to engage with and respond to pre-designed computerized interventions. The C-DA method included four levels of mediation, ranging from implicit to explicit guidance. After completing a text, learners were presented with inferential questions, followed by five multiple-choice answers, from which they had to select the correct one. If students answered incorrectly, the program provided increasingly explicit mediations. Once the correct answer was selected, the mediation ceased immediately. In contrast, in Face-to-Face DA group, the instructor provided individualized feedback to each student based on their test performance. Students in this group were encouraged to reflect on their learning through self-assessment and peer evaluation. Moreover, the instructor played a pivotal role by offering detailed and constructive feedback, which included techniques such as meta-linguistic cues, repetition, adjustments, elicitation, clarification requests, and recasts. The instructor was supportive of students' mistakes and used these opportunities to guide them effectively. Additionally, this group engaged in various DA activities, including quizzes, exams, comprehension summaries, multiple-choice questions, homework tasks, and fill-in-the-blank exercises. Throughout the teaching process, the researcher monitored students' progress and provided feedback on their strengths and areas for improvement. Feedback was deemed essential as it helped students correct errors and inspired educators to refine their teaching methods based on effectiveness. Consequently, all forms of dynamic assessment were accompanied by constructive responses during the experiment. After finishing the course, LAQ, cognitive engagement questionnaire, and autonomy questionnaire, as posttests were administered for the two groups. To analyze the data, first, the descriptive statistics including mean and standard deviation of each group were calculated and reported. Then, to ensure the normality of data distribution, skewness and kurtosis indices of normality were measured. Finally, the assumptions of conducting parametric tests were met, and groups were compared via one-way ANCOVA.

4. Results

To have a homogeneous sample of the participants, OPT was run, and analysed. The descriptive statistics of OPT results are illustrated in Table 1.

Table 1. *Descriptive statistics of OPT*

	N	Min	Max	M	SD
OPT	81	46	72	59	1.708
Valid N	81				

According to Table 1, the mean and standard deviation of OPT scores were 59 and 1.708, respectively. Based on OPT results, those who scored from 48 to 70 were selected, and administered as the main participants. Accordingly, 60 out of 81 Turkish EFL learners were randomly selected and put into two equal experimental and control groups. Then, to ensure the normality of data skewness and kurtosis indices of normality were measured. The absolute values of the ratios of skewness and kurtosis over their standard errors were lower than 1.96. Therefore, an absolute value greater than 1.96 is significant at $p < 0.05$, above 2.58 is significant at $p < 0.01$, and above 3.29 is significant at $p < 0.001$. Based on the results displayed in Table 2, it can be concluded that the present data did not show any significant deviation from a normal distribution.



Table 2. Descriptive statistics; Testing normality of data

Group		N	Skewness		Kurtosis		
			Statistic	Std. Error	Ratio	Statistic	Std. Error
Experimental	Pretests	30	.324	.374	0.87	-.549	.813
	posttests	30	-.334	.374	-0.89	.188	.813
Control	Pretests	30	.209	.374	0.56	-1.132	.813
	Posttests	30	-.087	.374	-0.23	.415	.813

After estimating the normality, one-way ANCOVA test was run for each dependent variable in order the answer the research question. Table 3 presents one-way ANCOVA results for the the two groups' autonomy.

Table 3. The ANCOVA test results for the control and experimental groups' autonomy scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Squared	Eta
Pretest	1.57	1	1.57	1.044	.315	.019	
Group	168.66	1	168.66	112.44	.000	.654	
Error	84.44	58	1.55				
Total	1109.00	60					

a. R Squared = .662 (Adjusted R Squared = .651)

As illustrated in Table 3, after adjusting the posttest scores for the possible effects of the pretest, a significant difference was found between the two groups on the scores ($F(1,58) = 112.44, p = .000 < .01$, partial eta squared = .65 representing a very large effect size). Therefore, there is a significant difference between two groups' means on the autonomy posttest, while controlling for the possible effects of the pretest. Table 4 also presents the adjusted mean report on autonomy scores for each group. Here, the effect of the pretest scores has been statistically removed.

Table 4. The adjusted marginal means on autonomy scores

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	4.08	.29	1.68	2.55
Control	2.66	.29	4.88	5.92

The results provided in Table 4 show that the effect of pretest scores was controlled; the mean of the scores for the control and experimental groups were 2.66 and 4.08, respectively. It can be concluded that there was a significant difference between the autonomy between control and experimental groups (Mean Difference = 3.518, $p = .000 < .01$, 95%), confirming the efficacy of C-DA on increasing EFL learners' autonomy. Further, the results of the two groups' cognitive engagement were calculated by another one-way ANCOVA (Table 5).

Table 5. The ANCOVA test results for the control and experimental groups' cognitive engagement scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Squared	Eta
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Pretest	1.52	1	1.52	1.041	.312	.017
Group	161.69	1	161.69	108.47	.000	.633
Error	81.48	58	1.59			
Total	1105.00	60				

a. R Squared = .669 (Adjusted R Squared = .654)

According to Table 5, after accounting for the potential influence of the pretest, a significant difference was identified between the two groups' posttest scores ($F(1,58) = 108.47$, $p = .000 < .01$, partial eta squared = .63, indicating a very large effect size). This demonstrates a significant disparity in the posttest means of cognitive engagement between the two groups, with the pretest effects statistically controlled. Additionally, Table 6 provides the adjusted mean scores for cognitive engagement for each group, with the impact of the pretest scores effectively removed.

Table 6. *The adjusted marginal means on cognitive engagement scores*

Group	Mean	Std.Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	3.29	.26	1.52	2.37
Control	2.05	.26	4.66	5.43

The data presented in Table 6 indicates that pretest scores were accounted for, with the mean scores for the control and experimental groups being 2.66 and 4.08, respectively. This suggests a notable difference in autonomy between the two groups (Mean Difference = 3.488, $p = .000 < .01$, 95% confidence interval), supporting the effectiveness of C-DA in increasing cognitive engagement among EFL learners. Finally, the two groups were compared for their self-regulation.

Table 7. *The ANCOVA test results for the control and experimental groups' self-regulation scores*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pretest	1.48	1	1.48	1.569	.398	.018
Group	144.09	1	144.09	107.55	.655	.721
Error	72.65	58	1.37			
Total	1095.00	60				

a. R Squared = .643 (Adjusted R Squared = .690)

According to Table 7, after considering the potential impact of the pretest, no notable difference was found between the posttest scores of the two groups ($F(1,58) = 107.55$, $p = .000 > .01$, partial eta squared = .65). This indicates that there was no significant variation in the posttest means for self-regulation between the groups, with the pretest effects statistically accounted for. Furthermore, Table 8 presents the adjusted mean scores for self-regulation for each group, with the influence of the pretest scores effectively removed.



Table 8. *The adjusted marginal means on self-regulation scores*

Group	Mean	Std.Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	3.62	.25	1.39	2.65
Control	3.48	.25	4.08	5.91

Table 8 shows that pretest scores were taken into consideration, with the mean scores for the control group and the experimental group being 3.48 and 3.62, respectively. This indicates no significant difference in self-regulation between the two groups (Mean Difference = 3.591, $p = .000 > .01$, 95%). This finding suggests that C-DA does not have a notable impact on EFL learners' self-regulation.

5. Discussion

The present study aimed to explore the comparative effect of effect of C-DA on Turkish EFL learners' autonomy, cognitive engagement and self-regulation. The findings indicated that, in comparison to face-to-face dynamic assessment, computerized dynamic assessment had a notably positive impact on the autonomy and cognitive engagement of Turkish EFL learners. However, the results also showed that there was no significant difference in the learners' self-regulation. The outcomes of the study can be interpreted through the lens of cognitive psychology, which suggests that the mediation process observed in the C-DA group may have played a key role in enhancing participants' comprehension and thinking abilities, crucial for successful learning. Mediation becomes even more significant when considering that test-takers may respond differently to computer-based tasks, which can impact their performance. This highlights the potential of computer-mediated mediation to be tailored to individual learners, engaging them more effectively in language use (Ghenaat et al., 2022). The results can also be associated with the unique features of C-DA. A central aspect of DA models is the close interaction between learners and instructors, which places emphasis on the learners' capacity to learn. These interactions allow students to activate their existing knowledge and progress to higher levels with the support and guidance of instructors or skilled peers (Lantolf & Poehner, 2011). The concept of ZPD, which combines teaching and assessment, is a foundational element of DA's effectiveness. Through ZPD, interactions between students and instructors stimulate learning potential.

As Lantolf and Poehner (2011) noted, the success of the DA group can also be linked to an increased engagement with language use in DA-based instruction. A correlation exists between higher levels of language input and improved learning outcomes (Kasper & Rose, 2002). Additionally, as Poehner (2008) observed, DA-focused interactions help students enhance their performance and social engagement. These findings further demonstrate that tailored mediation aligned with learners' ZPD leads to significant improvements in their abilities, enabling them to transfer their knowledge to more challenging contexts. However, learners with lower proficiency levels required additional mediation to achieve progress.

The engaging and motivating aspects of C-DA also play a role in promoting language production (Taguchi, 2019). By fostering interest and creativity, eliminating outdated classroom practices, and integrating learning inside and outside the classroom, C-DA accelerates instruction and enhances student performance (Gonzalez-Lloret, 2018). The gradual development facilitated by C-DA provides students with opportunities to refine their skills. The positive impact of C-DA on language proficiency can also be attributed to the complex cognitive processes underlying neurological responses in the brain, which contribute to both receptive and productive skills (Taguchi, 2019).

Furthermore, the C-DA framework empowered teachers to monitor students' reading progress effectively by creating learning opportunities that help them become better communicators. The study emphasizes the importance of innovative learning environments in helping students regulate their learning strategies through self-adjustment and C-DA during the intervention period. This approach enables students to learn more effectively in a challenging yet motivating setting (Lee, 2010). Additionally, DA's focus on continuous growth and learning while considering students' ZPD further validates these findings.



C-DA provided a thorough evaluation of the skills required by learners and mediators within ZPD to facilitate effective mediation. The focus shifted from merely assessing final outcomes to understanding the processes that develop students' abilities. By offering specific prompts and cues, C-DA helps identify hidden learning challenges and supports teachers in predicting future performance. Consequently, DA offers a more accurate representation of learners' genuine capabilities and their development over time (Hidri & Roud, 2020).

The integration of C-DA has also made the learning environment more student-centered. By showcasing mastery of intervention strategies, C-DA reduces students' fear of failure, boosts their motivation and confidence, and encourages them to progress to higher levels (Ebadi & Saeedian, 2015). Unlike traditional assessments that focus solely on evaluating abilities, C-DA emphasizes both assessment and skill development while considering learners' ZPD (Zangoei et al., 2019). C-DA also allowed students to learn at their own pace, reduced biases and errors linked to human emotions, minimized test-related stress, and removed barriers such as time, location, and accessibility that teachers might impose. These findings align with Tzuriel and Shamir's (2002) comparison of students who received computerized mediation versus those who only received human assistance. Their research showed that learners benefitted more from C-DA mediation. This supports the notion that using computers for mediation is advantageous as it eliminates the need for extensively trained teachers while ensuring fairness and transparency in dynamic assessments.

The study's findings align with recent research. For instance, Snijders et al. (2020) explored how dimensions like relationship quality and affective commitment mediate student engagement. Education modality emerged as a factor influencing this relationship. Similarly, Galikyan and Admiraal (2019) investigated student engagement in asynchronous online discussions. Their findings revealed that online discourse reflects cognitive engagement levels in teacher education courses and that engagement in integration and resolution predicts academic performance. However, contrary to their study, this research suggests that face-to-face interaction enhances cognitive engagement more effectively than online discussions. Similarly, Xu et al. (2020) examined how teacher roles influence student engagement in WeChat-based online learning. Their results highlighted that teacher involvement fosters cognitive and behavioral engagement but not emotional engagement. Furthermore, Moreira and Lee (2020) demonstrated that teacher and school support could reduce student disengagement—a conclusion supported by this study's finding that as students became deeply engaged in school activities, their need for teacher assistance diminished.

6. Conclusions and Implications

In conclusion, while technology-mediated learning offers promising tools and interactive environments for enhancing students' learning experiences, its effectiveness and satisfaction levels are not solely determined by the medium itself. Instead, these outcomes are largely influenced by students' cognitive engagement, self-regulation, and autonomy within these digital platforms. The integration of C-DA has transformed language learning, fostering interaction and raising important questions about their impact on the learning process. Ultimately, the modality and the way the technologies are utilized play a critical role in shaping the success of technology-mediated education. This study offers several theoretical and practical contributions. Firstly, it sheds light on the efficacy of utilizing C-DA. To summarize, the research establishes a connection between speaking modalities and students' engagement during language activities. Traditional education is often constrained by pre-determined curricula, which focus on ensuring students acquire specific knowledge. However, this focus can sometimes hinder creativity. Numerous studies have highlighted the stark contrast between the creative nature of participatory learning methods and the rigid structure of conventional classroom learning (Liu et al., 2017). The findings of this study support the idea that the modality used to complete a task significantly influences the outcome. From a practical perspective, the research suggests that students' autonomy, and cognitive engagement can be influenced and enhanced. One potential strategy to boost engagement without excessive teacher intervention is to utilize platforms like Viewlet Quiz softwares, where teacher involvement is minimal. This encourages students to independently manage discussions, thereby fostering greater engagement (Baker et al., 2017).

Generalizing the findings of the study has to be carefully attended as the sampling and context setting do not represent the entire population of foreign language learner in Turkey. The study was also limited to the context of a Turkish university for participants' selection. Moreover, the participants constituted a small number of language learners. Another limitation was time, since the data collection occurred over the course of a few months. However, it is difficult to know whether this amount of time was enough to witness changes. Moreover, having no control group in decreases the strength of the arguments about the effectiveness of two types of instructions on students' autonomy, cognitive engagement, and self-regulation. Therefore,



future studies should be conducted with a larger sample size, and a control group should be included in a more solid way.

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