

Teaching College English Listening through Computerized Dynamic Assessment

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Abstract: *In traditional listening instruction, measuring learners' listening ability solely through independent performance fails to capture their developmental potential. Dynamic Assessment (DA)—grounded in Vygotsky's sociocultural theory—addresses this limitation by assessing both matured abilities and emerging capacities through dialogic mediation. Computerized Dynamic Assessment (CDA) extends this framework by automating graduated prompts, combining the scalability of interventionist approaches with the responsiveness of interactionist ones. This study investigates the effects of a CDA-based listening approach on Chinese undergraduate EFL learners' comprehension performance. Adopting a single-group pretest-posttest design, the research measured both independent and mediated scores, and further disaggregated outcomes by proficiency level to examine differential mediation effects. Paired-samples t-tests, Cohen's d effect sizes, and subgroup analyses were employed. Results indicate that CDA not only facilitates immediate comprehension gains through contingent mediation but also provides differentiated diagnostic information about learners' listening difficulties across proficiency bands. Pedagogical implications for integrating CDA into college listening curricula are discussed.*

Keywords: *Computerized dynamic assessment, L2 listening, sociocultural theory*

1. Introduction

Listening comprehension is widely acknowledged as a fundamental yet demanding component of second language (L2) acquisition. Unlike reading or writing, it entails real-time processing, rapid phonological decoding, and the simultaneous integration of linguistic and contextual cues^[1]. Despite its critical role in communication, listening proficiency often receives inadequate pedagogical attention in Chinese tertiary education, where grammar and reading comprehension tend to dominate instructional priorities^[2]. Such a product-oriented approach, while administratively convenient, affords little insight into the cognitive processes underlying successful or failed comprehension, nor does it offer learners the mediated assistance necessary to move beyond their current level of functioning.

This pedagogical reality points to a fundamental limitation of conventional listening assessment—measuring learners' independent performance at a single point in time, without providing any form of assistance^{[3][4]}. Dynamic Assessment (DA), grounded in Vygotsky's (1978) sociocultural theory, offers a theoretically robust alternative by embedding assessment within an instructional dialogue^[5]. DA seeks to identify learners' Zone of Proximal Development (ZPD)—the distance between independent and mediated performance—thereby providing a more complete picture of their emerging abilities and learning potential^[6].

Two operational models of DA have been extensively discussed in the literature. The interventionist approach operationalizes mediation through a fixed menu of pre-scripted, graduated prompts, ordered from implicit hints to explicit explanations, with the level of assistance determined by the number of incorrect attempts. This model is practical for large-scale implementation but risks overlooking individual learner differences in the mediation process. The interactionist approach, in contrast, relies on flexible, dialogic exchanges between the mediator and the learner, enabling mediation to be contingently calibrated to the learner's moment-to-moment performance. While interactionist DA is more responsive to individual needs, it is also considerably more time- and labour-intensive, making it difficult to implement in regular university classrooms where student-to-teacher ratios are high and instructional contact hours are limited^{[7][5]}. In response to these practical constraints, researchers have turned to technology-mediated solutions, giving rise to computerized dynamic assessment (CDA). By providing pre-scripted graduated prompt sequences, CDA offers a scalable alternative that facilitates standardized yet adaptable mediation within digital learning environments.

Within the Chinese regular undergraduate context, CDA holds particular pedagogical promise. The large-class configuration common in college English programs means that individualised mediation—whether in the interactionist or interventionist mode—is rarely feasible on a routine basis. CDA, by embedding mediation directly into the digital task environment, offers a practical mechanism for providing immediate, strategy-oriented support that can be deployed alongside regular instructional activities^[8]. More importantly, the diagnostic data generated through CDA can inform teachers' pedagogical decisions: patterns of learner response to different prompt levels can reveal not only specific linguistic deficits—such as failure to recognise phonological reduction or misinterpretation of discourse markers—but also strategic deficiencies, such as lack of inferencing or ineffective attention allocation^[9]. Despite these theoretical and practical merits, the integration of CDA into regular university listening curricula remains underexplored. To date, empirical investigations of CDA have largely been conducted in controlled research environments or with relatively small learner samples^[10]. Few has systematically investigated in the Chinese regular higher education context, where the challenges of large-class instruction and limited pedagogical resources make the need for scalable, diagnostically informative approaches especially acute.

2. Dynamic Assessment: Theoretical Foundations

Dynamic assessment (DA), grounded in Vygotsky's (1978) sociocultural theory and the concept of the Zone of Proximal Development (ZPD), offers an alternative paradigm. DA integrates assessment and instruction by embedding graduated prompts or mediation within the assessment process, thereby capturing not only what learners can do independently but also what they can achieve with assistance^[10]. This approach conceptualizes ability as emergent and malleable rather than fixed, making it particularly suitable for educational contexts where the ultimate goal is learner development^[5]. The core concept of DA is that the ZPD—the gap between independent performance and mediated performance—provides crucial diagnostic information about learners' emerging abilities and the kinds of scaffolding that most effectively promote development^[11]. By systematically offering support at increasing levels of explicitness, DA enables teachers and researchers to identify learners' "microgenetic" developmental trajectories and tailor instruction accordingly^[3].

3. Computerized Dynamic Assessment (CDA) in Listening Comprehension and research gaps

Recent research has increasingly turned to computer-based platforms to deliver dynamic assessment, giving rise to computerized dynamic assessment (CDA)^[10]. CDA offers distinct advantages over traditional, human-mediated approaches and has been successfully applied across various L2 skills, including reading^[10], writing^[12], grammar^[4], and listening^{[8][13]}. While subsequent studies have adapted and extended Poehner and Lantolf's^[10] framework to diverse EFL settings, two issues remain unresolved in listening comprehension study.

First, the long-term effects of CDA interventions, which is process-oriented, needs further investigation in other large-scale context. Most CDA listening studies have been conducted with Iranian or Turkish university EFL students^{[14][15][16]}. Only a handful of studies have touched upon Chinese contexts^{[17][18][19]}. Conducting long-term CDA teaching and assessing method among Chinese EFL learners could provide a practical and targeted example for the Chinese universities in Chinese mainland. Especially most of the listening classes are at large-size scale.

Second, most existing studies have treated participants as a homogeneous group, reporting aggregate gains without disaggregating outcomes by initial listening ability^{[8][10]}. This approach obscures whether CDA benefits low-, intermediate-, and high-proficiency learners equally, despite Vygotsky's (1978) ZPD suggesting that readiness to internalise assistance varies across learners. Few study has systematically compared CDA-mediated listening development across proficiency subgroups in the Chinese EFL context. This gap warrants investigation, bearing both on the theoretical understanding of ZPD-sensitive mediation and on the practical deployment of CDA in diverse college classrooms.

To address these gaps, the present study implemented a 10-week CDA teaching and assessing for college English listening instruction and examined its effects on both developed (independent) and potential (mediated) listening abilities (performance).

Specifically, the study addressed the following research questions:

(1) To what extent does CDA-based listening instruction affect college EFL learners' overall listening proficiency and their use of comprehension strategies?

(2) How do learners at different proficiency levels respond to graduated mediational prompts during CDA listening tasks, and what patterns of prompt responsiveness can be identified?

4. Method

4.1 Participants

Participants were first-year undergraduate students enrolled in a compulsory College English course at a Chinese university. In accordance with the institution's leveled teaching policy, all freshmen were categorized into three tiers—Levels A, B, and C—based on their English scores from the National College Entrance Examination. The current study involved two Level A classes (Class 1 and Class 2). Students at Level A were considered to be of intermediate English proficiency, roughly corresponding to the level of the College English Test Band 4 (CET-4), a national standard that influences graduation and employment qualifications in China^[20]. Thus, participants were recruited from the Level A student pool. All participants completed a CET-4 listening test and provided informed consent prior to the study. Class 1 was randomly selected as the experimental group.

Preliminary analyses confirmed that the assumptions for parametric testing were met, as the normality test yielded p-values of 0.55 for Class 1 and 0.52 for Class 2, and the homogeneity of variance assumption was satisfied ($p=0.20$). Consequently, an independent samples t-test was deemed appropriate. The results indicated that the mean scores of Class 1 ($M=18.62$) and Class 2 ($M=18.48$) were comparable, with no statistically significant difference between the two classes ($p=0.71$). This suggests that the two classes were statistically equivalent in their baseline listening proficiency.

4.2 Research Design

A single-group pretest-post-test design was employed in this study. Participants underwent a ten-week intervention integrating the CDA teaching and assessment approach, which comprised a pretest, Enrichment Program (EP), and a post-test. Week 1 served as the pretest to capture students' baseline listening proficiency, while Week 10 functioned as the post-test to examine the extent to which students' listening abilities had developed. The EPs were every other week, during which the experimental group received instruction and assessment grounded in the CDA framework. In each EP week, the majority of class time was dedicated to CDA-based exercises, with materials and mediational strategies informed by teacher-student interactions throughout the EP. Following each exercise, the teacher selected a particularly challenging item for whole-class discussion. As students had already reviewed the correct answers and corresponding explanations beforehand, the teacher's discussion focused specifically on persistent difficulties that students continued to raise after scrutinizing the scripts and explanations. In the non-EP week, students had access to the previous listening items provided by the CDA program. The CDA program generated individualized learning profiles for students, including both actual scores and mediated scores, thereby enabling comparisons of independent progress as well as the mediation effect across the CDA period.

4.3 The Computerized Dynamic Assessment program

A custom-built CDA platform was developed for this study. Prior to the main experiment, a pilot study was conducted in the form of one-on-one teacher-student dynamic assessment interactions to identify the most effective mediational strategies for the subsequent CDA program. The system delivered listening comprehension tasks (multiple-choice questions) with embedded mediation following a "graduated prompt" hierarchy, adapted from Aljaafreh and Lantolf's^[11] regulatory scale. Given that each test item comprised four options, two mediational prompts and one explanatory prompt were deemed pedagogically and structurally appropriate. The three-tier prompt structure is outlined below. Level 1 provides the most implicit hint: "Listen again, pay attention to the item question." Level 2 guides learners to independently narrow down key information: "Focus on the part about (the target information), and listen again." Level 3 offers answer with explanation. The scoring system was designed to incentivize independent problem-solving while still acknowledging mediated success: a correct answer without prompts earned 3 points (independent score), while correct answers after using prompts earned progressively lower scores (mediated score). This "score deduction" mechanism has been validated in

previous CDA research^[4] as an effective way to encourage learners to attempt independent responses before requesting help.

5. Data analysis and discussion

5.1 Data analysis

Table 1 shows the following information. First, mediated scores consistently exceeded independent scores in both pretest and post-test. Second, both independent and mediated scores increased from pretest to post-test, with mean gains of 2.48 and 2.30 points, respectively. Third, standard deviations decreased for mediated scores from pretest (SD=4.54) to post-test (SD=3.79). To exam whether the CDA approach was effective in helping narrow the performance gap among learners when mediation was available, the paired-samples correlations and paired-sample t-test were analyzed (see Table 2). The high correlations between independent and mediated scores within each time point indicate that learners who performed better independently also benefited more from the mediational prompt, which is consistent with prior DA research^[21]. Notably, the correlation between pretest and post-test independent scores was weak and non-significant, suggesting considerable rank-order instability. That is, some low-performing learners made substantial gains, while some initially high performers showed little improvement or even declines. This pattern was further examined in the individual trajectory analysis (see Table 3).

Table 1. Descriptive Statistics

Variable	Mean	SD	SE Mean	Minimum	Maximum
Pre-actual	18.39	6.53	0.96	3.00	30.00
Pre-mediated	26.24	4.54	0.67	17.00	34.00
Post-actual	20.87	6.69	0.99	6.00	33.00
Post-mediated	28.54	3.79	0.56	18.00	35.00

Table 2. Paired-Samples Correlations (N=46)

Pair	Variables	Correlation	Sig.
1	preactual & premediated	.913	.000
2	postactual & postmediated	.843	.000
3	preactual & postactual	.253	.090
4	premediated & postmediated	.293	.048

Table 3. Paired-Samples t-Tests and Effect Sizes

Pair	Comparison	Mean Diff	SD Diff	t	df	p	Cohen's d
1	premediated – preactual	7.85	3.03	17.59	45	.000	2.59
2	postmediated – postactual	7.67	4.04	12.87	45	.000	1.90
3	postactual – preactual	2.48	8.08	2.08	45	.043	0.31
4	postmediated – premediated	2.30	4.99	3.13	45	.003	0.46

The increase in independent scores of Pair 3 from pretest to post-test was statistically significant. The effect size (Cohen's $d=0.31$) falls between small and medium by conventional standards^[22], indicating a modest but educationally meaningful improvement. This finding suggests that the 10-week CDA approach enhanced learners' listening ability. The increase in mediated scores of Pair 4 was also significant, with a medium effect size ($d=0.46$). The stronger effect for mediated scores suggests that the mediational prompts of CDA program may have been more effective or more consistently beneficial than the general instructional intervention alone. The effect size of Pairs 1 and 2 were large, confirming that the graduated mediational prompts provided substantial immediate performance boosts.

Table 4. Gain Scores by Proficiency Group

Group	n	Preactual Mean	Postactual Mean	Mean Gain	Min Gain	Max Gain	Improving%
Low	10	10.20	17.70	+7.50	-3.00	+24.00	70.0%
Medium	23	18.78	20.17	+1.39	-15.00	+18.00	56.5%
High	13	26.08	24.62	-1.46	-15.00	+9.00	38.5%

The slight reduction in effect size from pretest to post-test suggested a possible trend toward "internalization" or reduced reliance on mediation over time^[3]. To have a better understanding of students'

learning, their learning trajectories were investigated (see Table 4). Participants were divided into three groups based on their pretest independent scores: Low-proficiency group ($n=10$, $\text{preactual} \leq 14$), Medium-proficiency group ($n=23$, $15 \leq \text{preactual} \leq 23$) and High-proficiency group ($n=13$, $\text{preactual} \geq 24$). The low-proficiency group showed the largest mean gain, with 70% of students improving. The high-proficiency group, conversely, showed a slight mean decline, and only 38.5% improved. This pattern may reflect a ceiling effect, as several high-proficiency group students scored near the maximum on the pretest. However, the decline observed in some high-proficiency group learners suggests that the mediation may not have been optimally challenging for advanced learners, potentially leading to reduced engagement or motivation.

5.2 Discussion

The significant improvement in independent listening scores provides empirical support for the effectiveness of CDA in enhancing L2 listening ability. This finding aligns with previous CDA research in other skill domains and extends the evidence base to the understudied domain of listening.

From a theoretical perspective, the results support Vygotsky's (1978) claim that learning occurs through mediated activity within the ZPD. By systematically exposing learners to pre-scripted graduated mediational prompts over ten weeks, the CDA program appears to have facilitated the internalization of listening strategies and phonological processing skills. This internalization is evidenced by the significant post-test improvement in independent performance—learners were able to perform better even without mediation, suggesting that the mediation had developmental rather than merely facilitative effects^[4].

The medium effect size for mediated growth and the smaller effect for independent growth suggest that the CDA method was particularly effective in strengthening learners' performance when mediation remained available. This pattern is consistent with the ZPD concept: learners can always perform better with assistance, but the transfer of those assisted gains to independent performance requires more extended or more intensively targeted mediation^[21]. While the effect size remained large at both pre- and post-test points, the slight reduction in the mediating gap from pretest to post-test suggests a potential movement toward "internalization"^[3]. That is, as learners progressed through the 10-week intervention, their independent performance began to catch up with their mediated performance, narrowing the gap between what they could do alone and what they could do with help. The pretest independent-mediated performance correlation was higher than the post-test correlation, suggesting that the relationship between independent and mediated performance became slightly looser over time. One possible explanation is that some learners developed more efficient strategy use, while others became more reliant on prompts—a divergence that future research should investigate with process-tracking data.

The finding that low-proficiency learners gained most from the mediation while high-proficiency learners showed slight decline has important implications for both theory and practice. The observed performance decrease among high-proficiency learners warrants careful interpretation. One plausible explanation is a ceiling effect: with maximum scores ranging from 30 to 35 out of a possible 36 points, some learners in the high-proficiency group had limited scope for improvement, which may have contributed to statistical regression toward the mean. Additionally, the mediation may have been mismatched to their needs, as the graduated prompts were originally designed to address difficulties commonly encountered by intermediate learners. Advanced learners, by contrast, may have required qualitatively different forms of mediation that were not adequately provided in the current intervention.

5.3 Limitations and Future Directions

This study has several limitations that should be acknowledged: (1) the research employed a single-group pre-test/post-test design without a control condition, which constrains the extent to which the observed improvements can be unequivocally attributed to the CDA intervention rather than to extraneous variables such as practice effects or learner maturation. (2) the intervention was implemented over a ten-week period within a single semester. This relatively short timespan, though comparable to many previous CDA studies, may not be sufficient to capture the full trajectory of learners' internalization and autonomous transfer of mediational strategies. (3) the participant sample was drawn from one intermediate-level EFL class at a Chinese university, which inevitably limits the transferability of the findings. Replication studies involving diverse proficiency groups, institutional types, and geographical regions are essential to establish the broader applicability of CDA in college listening instruction.

Future research should address these limitations while exploring additional questions: (1) How does the type of prompt (e.g., semantic vs. phonological vs. strategic) differentially affect learners at various

proficiency levels? (2) How does CDA compare with human-mediator DA in terms of effectiveness and learner experience?

6. Conclusion

This study investigated the effects of a 10-week computerized dynamic assessment approach on college EFL learners' listening performance. The findings provide evidence that CDA can significantly enhance learners' listening comprehension, with particularly strong benefits for low-proficiency learners. The immediate mediation effect was remarkably robust, confirming that CDA effectively activates learners' ZPD. However, the observed individual variability and the lack of improvement among high-proficiency learners underscore the need for adaptive, proficiency-tailored CDA designs.

The study contributes to the growing body of CDA research by extending the evidence base to the L2 listening domain and by providing a detailed analysis of individual developmental trajectories. It also offers practical guidance for educators and instructional designers seeking to integrate CDA into listening curricula.

Ultimately, the findings support the view that assessment and instruction can be productively integrated through CDA, offering a principled, scalable, and effective approach to promoting L2 listening development.

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