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EDUCATIONAL ASSESSMENT & EVALUATION | REVIEW ARTICLE

Implications of Vygotsky's sociocultural theory for second language (L2) assessment

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Abstract: Dynamic assessment (DA) research, still in its infancy, takes its roots from Vygotsky's concept of zone of proximal development (ZPD) to account for learner's developmental process. Breaking away from a static, incomplete and, thus, unethical assessment of learner's abilities, DA came to the fore to better crystallize learner's levels of abilities in terms of both independent (present) and assisted (potential) abilities. The main foci of this paper are fourfold: first, to discuss DA not as alternative but complementary to traditional psychometric assessment; second, to highlight main distinguishing features of two dominant DA procedures, interventionist, and interactionist in second language (L2) assessment; third, to discuss three debatable psychometric properties of assessment namely validity, reliability, and generalizability in the context of DA and, finally, to call for a change in teacher's overall approach to the concept of L2 assessment and aspire to a more "ethical" assessment procedure.

Subjects: Education; Educational Research; Research Methods in Education; Theories of Learning; Theory of Education; Language Teaching & Learning

Keywords: dynamic assessment; zone of proximal development (ZPD); interventionist; interactionist

1. Introduction

Dynamic assessment (DA) refers to a procedure that integrates assessment and instruction into a unified enterprise aimed at simultaneously understanding and promoting learners' abilities through



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PUBLIC INTEREST STATEMENT

Despite having a rich and robust literature in developmental psychology, dynamic assessment (DA) with its roots in Vygotsky's Sociocultural Theory is still in its infancy in the context of second language learning and assessment. The main purpose of this paper is to examine the implications of Dynamic Assessment for second language learning and assessment. Dynamic assessment is presented as an innovative and ethical approach which has the double function of evaluation and development of learners' underlying abilities. Finally, by describing two forms of dynamic assessment namely computerized DA and group DA as two innovative and promising avenues for research and practice the paper calls for a change in language teachers' perception of second language learning, teaching and assessment.

mediated interaction in the zone of proximal development (ZPD) (Poehner, 2008a). DA as a fledgling realm of research sets its radical departure from traditional static testing by its monistic approach to the concepts of assessment and instruction. Embedded in DA's mission is the assumption that assessment should be presented in a supportive, interactive atmosphere in which learner's actual and emergent abilities are both fully taken on board (Lantolf, 2005).

While for some traditional assessment practitioners, an ethical testing practice implied an equal educational procedure for all students in order to prevent discrimination and unfair practices, in DA learners are conceived as being cognitively, emotionally, and developmentally different and, hence, a need for providing appropriate forms of interventions. In other words, fairness in DA context should be redefined as catering for learners' individualized needs providing them with fine-tuned forms of mediation at different stages of their development processes. One preliminary step towards this goal is to truly identify learners' underlying abilities (Guthke, Beckmann, & Dobat, 1997).

Poehner and Lantolf (2005) explain that to provide a full picture of learners' abilities, we need not just an account of a person's solo performance, but two additional pieces of information namely; the person's performance with assistance from someone else and the extent to which the person can benefit from this assistance not only in completing the same task or test, but in transferring this mediated performance to different tasks or tests.

According to Vygotsky (1998), the main architect of DA, determining the actual level of development not only does not cover the whole picture of development, but very frequently encompasses only an *insignificant* part of it. Relying upon a foundation of sociocultural theory and social constructivism, DA procedures take an account of both the current independent performance ability of the learner and his potential development, i.e. they measure not only current cognition but provide trajectories for future learning.

DA rests on Vygotsky's (1955/1978) famous notion of ZPD which refers to the distance between learner's independent performance and assisted performance actualized with the aid of a more capable guide. The guide serving as a collaborator/scaffolder leads the learner into awareness of basic principles and strategies of task solution in such a way that problem approach and solution become internalized by the learner. DA creates such a zone, with the assessor as guide (Lidz, 1995).

Given its humanistic appeal and goal of assisting disadvantaged individuals, DA, as Luria (1979) describes, is perhaps more in line with "romantic science". This perspective eschewing psychometric measurements prefers in-depth case studies that rely on observation, caring relations, and interaction to understand human beings. Therefore, for its due attention to learners' underlying abilities, identification of learning deficits, and attempts to offer remedial instruction/mediation in a stress-free, interactive environment, DA is conceived a more ethical and fair assessment procedure.

2. DA and Vygotsky's developmental psychology

DA proceeds from an ontological perspective on human abilities developed by the famous Russian psychologist, L.S. Vygotsky. Vygotsky (1994) construed the development of human functioning not as innate abilities to automatically grow up when exposed to the environment but as dynamic potentials amenable to change which develop as a result of interaction with the social world in a microgenetic atmosphere. Deeply rooted in Vygotskian social constructivism, DA is not concerned with how much development can be attributed to the individual and how much to the environment. In fact, the individual and the environment form an inseparable dialectical unity that cannot be understood if the unity is broken and interpersonal functional system formed by people and cultural artifacts act jointly to bring about development (Poehner & Lantolf, 2005).

As an illustrative concept to explain cognitive development, Vygotsky introduced the notion of ZPD which he defined as “The distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable others” (Vygotsky, 1955/1978, p. 85). Calling the difference between individual’s *unassisted* and *assisted* performance as his/her ZPD, Vygotsky claimed that what the learner is able to do with assistance today indicates his future unassisted performance. Therefore, through collaboration with the individuals in learning tasks, the scaffolder (teacher) can stretch their independent performance levels to higher dependent functioning.

In his depiction of learning process, Vygotsky (1955/1978) noted that human mental abilities emerge twice—first on the intermental (interpsychological) plane of social interactions and then on the intramental (interpsychological) plane. He further claimed that observation of individuals’ independent performance ability does not adequately reflect the full range of their abilities. Noting that intermental functioning precedes intramental functioning, Vygotsky began to critique conventional approaches to assessment on the grounds that asking individuals to perform without dialogic interaction with a mediator limits the scope of assessment to only those functions that have already fully developed and stops short of tapping functions that are still in the process of forming (Vygotsky, 1997). Highlighting the “dynamic” character of learners’ abilities, Vygotsky echoing Spinoza, his favorite philosopher, argued that “it is only in movement that a body shows what it is” (Lidz & Gindis, 2003, p. 99).

Vygotsky’s conception of cognitive development as ZPD progression rests on two interrelated constructs: mediation and internalization. According to his espoused sociocultural theory (SCT), Vygotsky (1986) argued that learning occurs first interpsychologically on social plane in a mutually cooperative interaction between the learner and a more capable other who provides appropriate mediation and then intrapsychologically on an individual plane and those abilities originally residing in an individual’s social interactions become internalized and reemerge as new cognitive functions. Following the intrapsychological development, the learner no longer relies on the external environment for mediation but is able to self-mediate his cognitive functioning.

In an attempt to quantify ZPD, Vygotsky proposed the “difference score” representing the difference between learner’s pretest (before intervention) and his posttest (after intervention) scores, or it may be the score on the posttest considered alone (Sternberg & Grigorenko, 2002). He used this score to convince testers to shift their attention from testing current state of learner’s development to prognosis of their potential (i.e. future) development. In his characterization of assessment, Vygotsky was concerned with the pivotal notion that development was an emergent process “masked by intermediate outcomes” (=actual level of development) (Valsiner & van der Veer, 1993, p. 43). He further claimed that a learner’s actual level of development as a result of independent performance reveals only an “insignificant” part of learner’s overall development (Vygotsky, 1998, p. 200). Learner’s responsiveness to mediation is indispensable for understanding cognitive ability because it provides insight into the learner’s “future” development and through assessing the ZPD we can take stock not only of today’s completed process of development, not only the cycles that are already concluded and alone, not only the processes of maturation that are completed; we can also take stock of processes that are now in the state of coming into being, that are only ripening, or only developing (Vygotsky, 1955/1978).

According to Minick (1987, p. 118), the point of assessment in the ZPD is to externalize those processes that are still maturing and by externalizing them the mediator can intervene in their development in an interactive, clinical assessment. As the mediator engages cooperatively in a task they become transformed and internalized.

In the context of DA, the interpretation of learners' abilities and development include both the mediator's moves during mediation as well as learners' contributions. Lidz (2002) called learner's contributions more technically "learner reciprocity" and devised a scale to evaluate the quality of reciprocity. They regard the change in reciprocity over time as an indicator of learner development.

Likewise, to provide a lens for interpreting mediator-learner interactions, Van der Aalsvoort and Lidz (2002) offered a scale to capture various dimensions of learner reciprocity which include such categories as individual responsiveness to the mediator, self-regulation of attention and impulses, comprehension of activity demands and reaction to challenge. The authors believe that the learner profiles generated from such an interactionist procedure provide us with insights that would clearly augment the picture of learners' developing abilities.

Kozulin and Garb (2002) offer a whole range of possible interactive interventions to be used during ZPD assessment such as asking leading questions, modeling, starting to solve the tasks and asking students to continue, and so on. They note that DA tasks are similar to those used in standard psychometric tests, but the assessment procedure is radically changed to include a learning phase along with a total change in philosophy of assessment.

3. Dynamic assessment vs. non-dynamic assessment

The inherent properties of non-dynamic assessment (NDA) include efficiency in terms of cost, time, and data generation which enhance its user-friendliness, but these assessments often fall short in measuring true learning potential (Yildirim, 2008).

Despite underrepresenting testees' underlying abilities, NDA is still being used globally. Some reasons for why the language testers are preoccupied with traditional standardized testing are: (a) such tests can be simultaneously administered to thousands of individuals; (b) individuals can take them several times; (c) they enjoy a high "replicatory" function indicating that the required instrument and procedures can readily be used anywhere in the world; (d) the test scores for individuals and entire populations can be compared with relative ease; and, finally their objectivity is so high due to their standardized procedure (see more in Poehner, 2007, 2008a; Poehner & Lantolf, 2005).

According to McNamara and Roever (2006), the oddity in NDA arises when it sets to observe learners under assessment conditions but, then, draw inferences about their underlying abilities to make statements regarding their probable performance in non-assessment situations. McNamara (2004) referred to this problematic scenario as Labov's Observer's Paradox because learner's performance under assessment conditions can never be a true indicator of his performance in non-assessment situations mainly due to its change as a result of being observed.

For Vygotsky (1998), the conventional procedures provide an "empty" medical diagnosis in which the doctor merely rephrases technically what is already apparent to the patient and such void assessment should be replaced with a "true diagnosis" that includes an explanation, prediction and scientific basis for practical prescription" (Vygotsky, 1998, p. 205).

Some language testers may call multiple choice non-dynamic and oral proficiency test dynamic. But such a dichotomy is incorrect. Discussing the methodological conceptualization of DA, Yildirim (2008) warns against the fallacy of reducing dynamic testing methods into a couple of ways of testing. He claims that "the notion of DA does not refer to any particular way of testing. In fact DA is a whole different approach, to the issue of testing in the classroom and this approach can be applied to any way of testing ranging from multiple choices to essay writing." Quite conterminously, Lantolf and Thorne (2006, p. 331) contend that "what makes a procedure dynamic or not is whether or not mediation is incorporated into the assessment process." In other words, fill in the blanks, multiple choices, open-ended essay, or even oral proficiency tests in themselves may or may not be dynamic. Their status is determined by the goal of the procedure and the format in which it is subsequently administered. In other words, there are no DA instruments per se; there are only DA procedures."

DA can also be distinguished from traditional testing or NDA by the role of the assessor who is no longer a neutral recorder of totally prescribed events. In DA context, the assessor acts as an interactive assessment tool and works to move the learner toward competence and derive in-depth understanding of the nature of the obstructions to more successful problem-solving (Lidz, 1997). A salient feature of DA concerns the “focus of assessment.” The focus of attention in DA changes from what the learner is able to perform independently, that is, products, to his responsiveness to the interventions and interventions provided. The process of learning becomes prominent. We no longer ask “what does the learner now know,” but “how does the learner approach new tasks” (Lidz, 1997).

Since the goal of DA is to promote learner development, interpretation of learner’s performance on assessment tasks is made neither with reference to a set of standards (as in criterion-referenced) nor to the performance of the individuals in a population (as in norm-referenced). Instead, in DA learners’ progress and abilities are determined with reference to their development in the course of instruction or mediation. Therefore, it is development-referenced or development-centered (Poehner, 2008b).

Lidz (1987a, 1987b) argues that DA should not replace traditional testing but should be used in conjunction with it because it can provide further information. According to Caffrey, Fuchs, and Fuchs (2008), DA provides a less-biased measure of achievement for certain student groups because it is less dependent on mainstream language skills and unlike most traditional tests which are based on *right* or *wrong* items, reflecting an all-or-nothing perspective, DA gives multiple opportunities based on a continuum of success. Clinically oriented DA may inform instruction so that educational interventions can be more readily designed. Research-oriented DA measuring both level of performance and rate of growth has the potential to predict future student achievement.

4. Interactionist and noninteractionist DA

Lantolf and Poehner (2004) propose the terms *interventionist* and *interactionist* to represent two main orientations DA practitioners follow in providing mediation. *Interventionist* DA pursued the following goals; first, to optimize the measurement of intellectual abilities by measuring both the actual and maturing cognitive structures and functioning and on this basis, improve the diagnosis of learning difficulties; second, to provide estimates of learning potential that will predict future progress and thereby improve recommendations of appropriate special, remedial, or mainstream instruction; and, finally, provide foundations for the construction of the cognitive education programs and teaching materials which reflect, in their sequencing and structure, the underlying diagnostic dimensions of the assessment models (Allal & Pelgrims Ducrey, 2000). Despite its sublime DA-based goals, *Interventionist* procedure didn’t distance itself from traditional psychometric assessment and expressed concerns over psychometric properties in its assessment procedures. In contrast, *interactionist* DA fully echoed Vygotsky’s insistence on cooperative dialoguing as an exigency for the progression of ZPD and cognitive development. Whereas *interventionist* DA is concerned with quantifying the amount of support required for a learner to reach a prespecified endpoint, *Interactionist* DA focuses on an individual learner or a group of learners without concern for predetermined endpoints.

Interactionist DA pursuing its purpose of understanding and promoting development makes it incumbent upon teacher-assessor to attune mediation to learners’ changing needs and this requires extreme sensitivity to learners’ “reciprocating acts” during DA.

Poehner (2008a, p. 42) reports an example of an interactionist DA procedure in an L2 context providing protocol from L2 learners of French in which the learners were asked to orally compose narratives based on video clips. A recurring problem in his subjects was their ability to control verbal tense and aspect. He explains that although none of the learners was able to perform completely independently, their reciprocating actions indicated that the linguistic features under consideration were in the process of ripening which implied they lied in their ZPD. In his DA procedure, he focused on five forms of reciprocity namely; negotiating mediation, use of mediator as a resource, creating opportunities to develop, seeking mediator approval, and rejecting mediation. Through

implementing such an inventory of mediating moves and reciprocating acts he was able to diagnose more precisely the sources of performance breakdown, offer more appropriate cues/mediation and fulfill his assessment task more appropriately.

Researchers like Sternberg and Grigorenko (2002) classify interventionist approaches to DA as being either in *sandwich* or *cake* format. In the *sandwich format*, the DA procedure resembles that of traditional NDA in which the learners are administered a test after that they receive an intervention designed to help them with problems they experienced. Finally, the posttest with a parallel form is given to observe any changes in learners' performance. Quite contrarily, the *cake format* embeds intervention (instruction) in the test administration itself and learners receive assessor's mediation for each test item or task that they find difficult. In this context, mediation is usually very tightly scripted and often arranged as a menu of hints, prompts and cues that must be followed in a pre-determined sequence, from most implicit to most explicit. Throughout the mediation, hints and cues are continuously offered until the learner either overcomes the problem or until the final hint is reached. The process begins afresh with the next test item.

Moreover, the *sandwich* format reflects the traditional experimental research designs comprised of a pretest and a posttest with a mediation phase which is "sandwiched" between them and administered in a non-dynamic manner. The learners' differential performance on the posttest is taken as indicators of their improvement as a result of mediation. On the other hand, the *cake* format amalgamates the two procedures of mediation and assessment. The mediator focuses his support on helping learners identify and overcome errors following each assessment task or item (Sternberg & Grigorenko, 2002, p. 27).

Different versions of interventionist models have contributed differently to the establishment of DA procedures, the most dominant of which are Budoff's (1987) Learning Potential Measurement Approach that pioneered the sandwich format of DA offering the claim that cognitive abilities are dynamic and not stable. Guthke's (1982) Lerntest Approach that pursued the feasibility of incorporation of mediation into the test itself and, thus, discarding the pervasive assessment-instruction dualism, Carlson and Wiedl's (1992) Testing-the-Limits Approach that introduced a more illuminating assessment procedure than the previous two by asking the learners to verbalize their thought processes during and after task performance and Brown's Graduated Prompt Approach (Brown & Ferrara, 1985) that included transfer tasks in their assessments in order to generate learner profiles across different transfer tasks and to discover how far the individuals can transfer their new abilities to novel problems.

The fuzzy gray borderlines among *non-dynamic*, *interventionist*, *interactionist* approaches to assessment will become clear when their positions are clarified in relation to the concepts of assessor's mediation and learners' contributions. Drawing on Poehner (2008b, pp. 34–40), both interventionist and interactionists pursue a common goal that is to help stretch along learners' current capabilities, not for the sake of helping them to complete the language task or earn a better score but to promote learner development. This makes them different from NDA in which any mediation is absent. However, the main difference between the two DA approaches lies in the extent to which they take learner's contribution or reciprocity into account. In interventionist DA, there is no room left for the learner to have contributions to his process of learning or task completion because standardized prompts are determined prior to administration and offered on implicit-explicit basis and no diversion from the procedure is permitted as this would jeopardize its psychometric properties. While in interventionist DA, counting the number of mediating moves or prompts learners need to perform tasks is an indication of their ZPD, in an interactionist framework, the focus shifts from measurement to cooperation such that interaction between mediator and learner creates a ZPD whereby learners' reasoning provides important insight into their level of understanding of the underlying principles involved helping mediators to fine-tune their support. Without understanding the reasons why the learners failed to solve the problem, the mediator cannot appropriately hint and guide their development.

5. Psychometric notions of validity, reliability, and generalizability

In an attempt to highlight DA's Achilles' heels, critics generally raise three shortcomings in DA which are namely its construct fuzziness because of presenting unclear theory, purpose, procedures, and uses, its lack of enough literature on the reliability and validity of DA measures and its labor-intensive character of administration and scoring. Critics suggest that the time required to develop protocols and train examiners may not be worth the information DA provides (Caffrey et al., 2008).

NDA procedures criticize DA procedures on the grounds that their commitment to promoting learner development during assessment jeopardizes the internal-consistency reliability and regard the possibility of an individual learning during an assessment procedure a threat to *reliability*. Individuals' learning and development in interaction with mediators during assessment jeopardizes test-retest reliability because an individual may receive more or less help at two points in time.

Most of the criticisms leveled against DA have addressed the interactionist procedures advocated by Feuerstein, Rand, and Hoffman (1979) whose models thoroughly reflected Vygotsky's ontological perspective on development. However, interventionist DA procedures have been less subjected to such criticisms due to their adherence to the same traditional psychometric properties of standardization in their procedures. Feuerstein et al.'s (1979) version of assessment was based on the following premises:

- (1) The student' cognitive pressures are highly modifiable. The task of assessment is to ascertain the degree of modifiability rather than the manifest level of functioning.
- (2) the reduced modifiability is the result of insufficient type or amount of mediated learning experience (MLE) received by a student.
- (3) DA, which includes a mediated learning phase provides better insight into students' learning capacity than unaided performance.
- (4) The evaluator plays an active role by mediating cognitive strategies during unaided performances.
- (5) The goal of DA is to reveal the students' learning potential and to formulate optimal educational intervention.

As we understand from the foregoing assumptions, at the heart of *Feuerstein's* approach is the vitality of mediation in learning process. Feuerstein et al. (1979) explains that since understanding learners' dynamic abilities for the purpose of bringing development during assessment is the priority, reliability is an undesirable outcome for DA procedures and a highly reliable assessment is problematic in DA context because it suggests that the assessment procedure failed to accomplish its purpose i.e. to promote development. This statement could also be traced in Vygotsky's writings claiming that in the ZPD, instruction leads development and assessment that considers independent problem-solving as the only valid indication of mental functioning is misleading.

Whereas traditional statistically based assessment consider "change" and "modifiability" in the person's performance during the administration of the assessment as a threat to the test *reliability* (Bachman, 2004), DA practitioners consider any assessment that fails to provide an account of the extent to which person's performance is modifiable incomplete (Lidz, 1991).

According to Caffrey et al. (2008), a major shortcoming in traditional tests is their inability to identify the "floor effects" and truly interpret the scores of two low-achieving students who obtain a score of zero. In other words, such tests cannot truly show whether a zero score is indicative of an unskilled learner not yet ready to acquire beginning skills or it signals a currently unskilled learner ready to learn after pertinent instruction.

In support of DA, Guterman (2002) argues that any assessment is *valid* when it is relevant to instruction and useful and beneficial to learners. Lantolf and Poehner (2008) argue that the future is always emergent and can only be understood in an interaction between mediator and learner. Therefore, collaboration must be envisaged as an indispensable component of any DA procedure and, accordingly, validity of a DA procedure is best understood as the extent to which it promotes development.

Guthke (1977) claims that DA procedures are highly *valid* because their techniques can identify more validly the current status of a mental trait and its modifiability by systematically eliciting and determining intraindividual variability during the course of a test. This procedure makes DA procedures avoid a major source of invalidity namely construct underrepresentation. They consider the determination of the range of any trait by means of multiple measurements as inevitable during DA and therefore frown upon the conventional one-time administration of test procedures in assessment work.

Poehner (2008b) argues that most of the NDA criticisms of DA originate from their misunderstanding of DA's theoretical principles and assessment goals. Unlike NDA testing which treats the object of assessment (i.e. abilities) as stable attributes and, thus, a room for claiming about consistency and *reliability*, DA defines abilities as emergent and modifiable. This modifiability of human cognitive abilities rules out any possibility for claiming about the concept of reliability. A brief reference to Vygotsky's goal of assessment reminds us of a different purpose in DA. The goal of assessment, as Vygotsky argues, is not to *measure* (as in NDA) but to *interpret* the abilities, which requires new criteria to understand and report the learners' outcomes and, evaluate the outcomes of the procedures. Therefore, the traditional psychometric property of *reliability* is irrelevant to the goals of DA.

The concept of test-retest *reliability*, while relevant to the pretests and posttests of DA becomes irrelevant to the DA procedure as a whole. Such an assumption that the pretest is a reliable predictor of the posttest is discarded. Instead, an open-ended question of where can the learner go in response to the interventions provided is raised. In contrast to traditional testing, wherein assessor agreement (i.e. interrater reliability) is being sought, in DA it's the issues of measuring change, the issue of *treatment validity* (Messik, 1995) that becomes the ideal. In DA, validity is ensured through presentation of instruction and intervention and then the observation of the progress on the part of the learners in terms of reduced impulsivity (Cormier, Carlson, & Das, 1990), provision of justification for task solution or accuracy in problem perception and definitions (Goikoetxea & Gondra, 1995).

Minick (1987) vying for the realization of an *asymptomatic* assessment procedure criticizes traditional testing as being so preoccupied with such psychometric properties as generalizability, reliability, and validity that loses sight of the explanatory power of ZPD. He goes on to name the traditional testing procedures as descriptive or symptomatic that fail to illuminate the developmental process and, therefore, offering no insight into how the learners' deficiencies can be remedied.

With special focus on the concept of development, DA marks such a radical departure from NDA that the well-known traditional terminologies like norm-referenced and criterion-referenced assessments cannot adequately convey its role in assessment. Norm-referenced assessment describes the success or failure of testees against some prespecified criteria. Criterion-referenced assessment determines testees' performance level in relation to other testees. In both contexts, standardization and lack of interaction are assumed and both measures locate only the testee's zone of actual development. This is even true of all curriculum-based approaches to assessment. Quite contrarily, DA moves the assessment into the "next" or "proximal" zone of development and wants to define not the present ability but "instructional level" of the testee. (Lidz, 1991) Therefore, assessment in DA context is more development-referenced (Poehner, 2008a). This movement or paradigm shift (Hilliard, 1990) in assessment takes us away from "focusing on where to place learners" to "focusing of what to do with them wherever they are placed" (Lidz, 1991, p. 108).

Another criticism of DA concerns generalizability its assessment. Generalizability refers to extent to which one can make inferences about individuals' future performance in non-assessment contexts based on his performance in assessment context (Bachman, 2004).

Generalizability as a traditional psychometric property rests on the assumption that contexts are homogeneous and contextual variables are the same across different instructional and assessment situations. In other words, it assumes a match between instructional tasks and assessment tasks. However, in practice, to increase the reliability of assessment, NDA practitioners try to control the sources of variances the individuals perform in isolation, forbidding the use of all subsidiary materials like computers, calculators, reference materials, and other aids, so that standardization is secured and the risk that interpretation of the results is contaminated by factors external to the examinee is weakened. Quite paradoxically, such contrived procedures during assessment are never found in instruction phase and learners benefit from all kinds of resources including cues or support from the teacher, collaboration with peers, subsidiary textbooks or internet, etc. Therefore, any claim about generalizability of learners' performance from their assessment context to non-assessment context seems problematic (Poehner, 2008b).

According to DA researchers, any attempt to generalize the examinees' scores taken from their independent, unassisted performance in assessment tasks to a broader domain without identifying adequately the breadth and depth of underlying potential constructs introduces a major threat to the construct validity named "construct underrepresentation" (McNamara & Roever, 2006).

Poehner (2007) discusses different aspects of generalizability in DA context arguing that ecological generalizability (the extent to which one can generalize from one context to another) of learner performance gets a different interpretation in DA context since it construes the relationship between the individual and context differently. Whereas NDA takes performance as the provenance of the individual and context as a backdrop to that performance, DA approaches the performance as a result of the interplay among individuals, activities and cultural artifacts. In fact, what gets prominent in DA interpretation of generalizability is the social nature of human cognition which is absent in NDA paradigm, wherein performance is the result of competence alone rather than the result of interactions among individuals, task, and social context.

What seems more relevant in DA context is Feuerstein's concept of transcendence. Transcendence, unlike the concept of generalizability, rests on the assumption that contexts are highly variable. Transcendence (TR) refers to the learner's ability to transcend their learning to new contexts and the extent which they can recontextualize their learning. TR is not considered as training oriented toward a specific content but rather as "a series of procedures designed to help learners continuously move beyond their abilities and the here-and-now demands of a given problem" (Poehner, 2007, p. 327). Therefore, the issue in DA, as Poehner states, "is not to generalize to hypothetical contexts but to track learner development from one DA interaction to the next" (Poehner, 2008b, p. 75). According to Poehner (2007, p. 334), "transcendence is fundamental to tracking development because it involves going beyond the test as learners endeavor to recontextualize their abilities while engaging in new tasks" because the difference between learners become manifest as they ask for different kinds of support during transcendence tasks which become increasingly difficult.

From an ethical standpoint, an educational context should provide a non-threatening learning environment in which teachers develop a stress-free climate, provide peer-support networks, promote self-confidence, reflect on counseling skills and management of affect, reflect a holistic, affective, student-centered view of language learning, and act as learning resources (Finch, 2001). Therefore, any generalization or prediction about learners' future performance based on their performance in stressful assessment contexts where they can't genuinely manifest their potential abilities mostly due to Observer's Paradox phenomenon seems unfair. But, DA procedures paying special heed to learners' cognitive, affective and personal rights during instruction and assessment can offer a more ethical assessment procedure.

6. Applications of DA in L2 context: A review

Applications of DA to second/foreign language contexts are scarce but promising (Antón, 2009; Poehner, 2008a). There is a robust literature on DA in psychology and general education but a scanty one in the area of L2 pedagogy. However, we currently observe a growing tendency to use DA in L2 context, mostly pioneered by Poehner and Lantolf who have been claimed to be responsible for introducing DA theoretical concepts (especially the interactionist principles) to the Applied Linguistics community and prompting DA as a pedagogical tool among L2 educators (Ableeva, 2010). The following lines describe the DA works which have been recently reported in the literature.

One study that has focused on DA in L2 context is Schneider and Ganschow's (2000). The authors underscored instructor/student interaction as a way to teach and assess students' awareness of metalinguistic skills. Schneider and Ganschow asked instructors to incorporate instruction of learning strategies into their teaching practices and at the same time helping students through self-discovery with assisting questions and other verbal and non-verbal hints. They suggest that through interaction in the classroom and providing learners with a metalinguistic awareness—knowledge of the linguistic system and knowledge of strategies for applying that metacognitive system—L2 learners can be helped to develop the knowledge and skill necessary to improve their performance.

Kozulin and Garb (2002) conducted a study on the effects of DA on EFL text comprehension. Following an interventionist test–mediation–retest design, they assessed the students' ability to learn and use effective strategies during reading comprehension. First, the students were given a static test. Then, the teacher reviewed the test with the students, mediating for them the strategies required in each item and telling them how to transfer strategies from one task to another. Finally, a retest was administered to indicate how students benefited from the mediation. The results demonstrated that students with similar performance levels demonstrated differently in the posttest. Kozulin and Garb (2002) devised the following scoring formula to operationalize the students' learning potential (LPS):

Figure 1. Regulatory scale—implicit (strategy) to explicit (Aljaafreh & Lantolf, 1994, p. 471).

0. Tutor asks the learner to read, find the errors, and correct them independently, prior to the tutorial.
1. Construction of a "collaborative frame" prompted by the presence of the tutor as a potential dialogic partner.
2. Prompted or focused reading of the sentence that contains the error by the learner or the tutor.
3. Tutor indicates that something may be wrong in a segment (e.g., sentence, clause, line)—"Is there anything wrong in this sentence?"
4. Tutor rejects unsuccessful attempts at recognizing the error.
5. Tutor narrows down the location of the error (e.g., tutor repeats or points to the specific segment which contains the error).
6. Tutor indicates the nature of the error, but does not identify the error (e.g., "There is something wrong with the tense marking here").
7. Tutor identifies the error ("You can't use an auxiliary here").
8. Tutor rejects learner's unsuccessful attempts at correcting the error.
9. Tutor provides clues to help the learner arrive at the correct form (e.g., "It is not really past but something that is still going on").
10. Tutor provides the correct form.
11. Tutor provides some explanation for use of the correct form.
12. Tutor provides examples of the correct pattern when other forms of help fail to produce an appropriate responsive action.

$$LPS = \frac{S_{post} - S_{pre}}{\max S} + \frac{S_{post}}{\max S} = (2S_{post} - S_{pre}) / \max S \quad (1)$$

where S_{pre} and S_{post} are pre and posttest scores and $\max S$ is a maximum obtainable score. This formula provided them with a quantitative procedure to distinguish between low learning potential and high learning potential students.

Another DA-focused research is reported by Aljaafreh and Lantolf (1994) who, following a tutorial, one-to-one interactionist (clinical) methodology, studied the effect of negative feedback and scaffolding on adult ESL learners' development of English tense, articles, prepositions, and modal verbs. Their assessment procedure included the process of jointly working out appropriate mediation to continuously assess the learners' needs and abilities and the tailoring of help to emergent needs. They reported significant development in learners' ZPD leading them to independent performance. Throughout the assessment procedure, upon students' failure to accomplish the task and when making errors, the tutor offered gradual feedbacks. Following the analysis of tutor-learner interactions they came upon a regulatory scale consisting of 13 types of feedback which started from the most implicit to the most explicit (see Figure 1).

At the most implicit end of the scale, the mediator asked the learner to merely read the sentence containing an error without even hinting that there is an error. Upon the learner's failure to catch the error, the next prompting took the form of "Is there anything wrong in this sentence?" If this also failed to prompt the correct response in the learner, the tutor moved towards the more explicit types of prompts until the learner was able to find the error and make corrections. If all forms of prompts failed, the tutor would provide the solution accompanied by a detailed explanation which represented the explicit end of the scale. The authors' main assumption was that "microgenetic development is evidenced whenever the negotiated feedback moves from the bottom to the top of the regulatory scale" (Aljaafreh & Lantolf, 1994, p. 471). The outstanding advantage of using this scale was that it enabled the mediator to track the learners' developing capability (microgenetic growth) on the concerned grammatical points. They found that the learners required different mediatory prompts from the mediator and as the study proceeded the number and quality of requested feedback (mediation) changed and learners showed a tendency towards self-correction which indicated the reduction of their dependency on the mediator and improvement towards self-regulation.

Similar to Aljaafreh and Lantolf (1994), Poehner (2005) conducted an interactionist procedure to observe the effect of DA on his learners' oral proficiency. His concern was to explore the effect of DA on advanced L2 learners of French by asking the learners to construct a past-tense narrative in French after watching a short video clip. During the pretest, learners received no feedback or mediation. Following the pretest, they were asked to watch the same clip and repeat the same task. This time they were offered mediation from the teacher in the form of hints, suggestions, leading questions or prompts. During the mediation stage, Poehner noticed that although none of the learners

Figure 2. Mediation typology (Poehner, 2005, p. 160).

- | | |
|-----|------------------------------------|
| 1. | Helping Move Narration Along |
| 2. | Accepting Response |
| 3. | Request for Repetition |
| 4. | Request for Verification |
| 5. | Reminder of Directions |
| 6. | Request for Renarration |
| 7. | Identifying Specific Site of Error |
| 8. | Specifying Error |
| 9. | Metalinguistic Clues |
| 10. | Translation |
| 11. | Providing Example or Illustration |
| 12. | Offering a Choice |
| 13. | Providing Correct Response |
| 14. | Providing Explanation |
| 15. | Asking for Explanation |

Figure 3. Mediational strategies (Ableeva, 2010, p. 260).

1. Accepting Response
2. Structuring the text
3. Replay of a passage
4. Asking the Words
5. Identifying a Problem Area
6. Metalinguistic Clues
7. Offering a Choice
8. Translation
9. Providing a Correct Pattern
10. Providing an Explicit Explanation

was able to use past tense completely independently, their reciprocating actions indicated that the knowledge of the concerned linguistic features was in the state of ripening. Following the mediation which contained almost six weeks of tutoring, the participants were shown the same clip and asked to repeat the same narration task plus two transcendence (transfer) tasks to examine their performance in new contexts. He developed the following mediation typology after observing the mediational moves exchanged between the mediator and learners (see Figure 2).

Ableeva's recent DA study is also illuminating. Unsatisfied with NDA approach for its failure to let L2 students achieve sufficient understanding of texts, Ableeva (2010) followed an interactionist DA procedure in her study to diagnose/assess L2 learners' comprehension difficulties when listening to authentic audio texts. During the mediation process, she observed that important differences among learners were masked in non-dynamic procedures because some learners found the text too difficult but others failed to provide the correct answer simply because of a failure to recognize a single lexical item or a bit of cultural information. The results of her experiment confirmed the gaps in phonological, grammatical, lexical, and cultural knowledge as the main potential problem triggers during listening comprehension of authentic texts. She found that through DA one can uncover the source of comprehension problems and reveal that learners' abilities are more developed than one would have surmised from unmediated performance and through fine-tuning the mediation to learners' specific needs and difficulties one can help promote those abilities.

As with Aljaafreh and Lantolf's (1994) and Poehner's (2005), Ableeva's regulatory scale was developed a posteriori following the mediator's interactions with the learners to assess and enhance their listening abilities (see Figure 3).

Ableeva pointed out that the detection of mediational strategies and putting them into a scale helped her to quantitatively and qualitatively explain the learners' improvements. The detection of mediator's tendency towards the use of implicit types of mediational strategies provided her with an understanding of the learners' progress towards agency and independent functioning.

7. Conclusions and future directions

DA espousing a monistic conception of assessment and instruction takes its roots from Vygotsky's writings on the ZPD. As an improvement over traditional, static testing which aims at assessing the learners' isolated performances and independent functioning in stressful settings, DA adopts a more valid, humanistic, and ethical approach to the assessment of learners' underlying abilities giving due attention to both developed and developing attributes.

DA as a variant of static testing represents some degree of evolution in that it takes on board both the product and process of learners' development and identifies the conceptual or performance related deficits of learners in order to provide remedial instruction in later interventions.

Following Vygotsky's explication of ontological perspective on human mental abilities and their development in terms of mediation and internalization, DA has directed the attention of testing practitioners at the importance of a new construct namely learner development as the main reference to interpret learners' abilities.

Lantolf and Poehner (2004), echoing Vygotsky, contend that learners' cognitive abilities are not stable but always in the state of flux implying that they can change through mediation and as educators we must feel accountable for their development. It is, therefore, unethical to act as "gate-keepers" only (see Shohamy, 1998).

Despite the presence of a rich and robust research literature reflecting more than 40 years of professional works in psychology and general education, the DA approach in the context of second language studies is still in its infancy. However, given its strong epistemological background, it can serve as potential site to trigger innovative works on different aspects of L2 research and even teacher education.

One application of DA could be observed in the area of computer-based testing (CBT) and, more specifically, computer-adaptive testing (CAT). Using CAT technology, testing practitioners have long been engaged in electronically measuring students' language knowledge and proficiency. Likewise, DA researchers are beginning to explore the possibility of electronically delivering mediation that could be attuned to learners' needs.

Poehner (2008a) highlights some distinct advantages of computerized DA (C-DA) claiming that: (a) it can be simultaneously administered to large numbers of learners; (b) learners may be reassessed as frequently as needed; (c) reports of learners' performances are automatically generated.

Computerized dynamic assessment or C-DA as a new compelling line of research could be used to explore the effect of finely tuned computerized mediation and support in the form of a series of hints arranged in the implicit-explicit order on learners' gains. Through computer-aided assessment, DA practitioners can test the effect of human-computer collaboration and/or computerized mediation (C-DA) on learners' gains. Below are a few examples of works in this line.

An example of computerized mediation has been recently reported by Jacobs (2001) in the domain of language learning. Using a program known as KIDTALK (Kidtalk Interactive Dynamic Test of Aptitude for Language Knowledge), Jacobs taught a group of pre-school and school-age children a series of computer-based activities to see how they affect children's language proficiency. Following the video presentation of vocabulary and morphological rules, children were given a set of questions. If they couldn't respond correctly, they were asked to attempt the question again for a limited number of times. Then, the computer skipped to another item on the test. Upon completion of the assessment, computer provided two sets of reports for each child. One report indicated each child's overall standing obtained from his correct responses and the other provided a more detailed profile of the child with even the number of times he tried to find the correct response for the item.

Another use of DA in the context of applied linguistics is the effect of peer-to-peer mediation on learners' mastery of different components of L2. Peer mediation could provide opportunities for learners to engage in interactive dialogs in which they can notice one another's weak points and cooperatively think of appropriate strategies to resolve their linguistic uncertainties. Through joint interaction, the peer with more knowledge in the concerned domain could take the lead and mediate his partner and in this way they can take turns to assist one another and help each other achieve greater gains. Such peer mediation paves the way for the blossoming of those potential abilities that would remain hidden and inchoate if the peers are asked to do the tasks individually. However, what seems essential is the way mediators provide assistance which needs special training. The exploration of such lines of research would hold considerable promise for guiding L2 researchers, theoreticians and language teachers to more fairly assess and interpret learners' achievements.

An example of C-DA is a program developed by Guthke and Beckmann (2000) which is a computerized version of the Leipzig Lernetest (LLT) and an improvement over KIDTALK. In computerized LLT, learners are given a couple of language problems to solve. If they don't answer the items correctly a series of training tasks are offered to help them perform the task. This procedure differs from computer adaptive tests in that it provides assistance so that learners are able to perform increasingly more difficult tasks. In this way, this program tries to individualize, to some extent, the mediation by offering the learners multiple routes to arrive at the solution. By presenting standardized mediations to learners to overcome the difficult items, this computerized program is claimed to have made a compromise between more radical interactionist DA and traditional testing. However, a more individualized, interactionist version of computerized LLT has not been tested yet. The effect C-DA procedures on different aspects of L2 development like listening, speaking, pronunciation, etc. would, doubtless, glitter innovative avenues for further exploration and it is to be hoped that next explorations will not be too long in coming forward.

A fledgling line of research concerns the group-based format of DA which takes on board the instruction and assessment of a group of ZPDs in the classroom context. In Vygotskian perspective, the chronic obsessions during classroom-based assessment are how the mediator should undertake the diagnosis of a group of ZPDs, how collective scaffolding can facilitate the co-construction of knowledge among L2 learners and whether the low and high ZPD learners would benefit from each other's mediation (Donato, 1994; Poehner, 2009).

Drawing on Poehner (2009), through group dynamic assessment (G-DA) which places respectable premium on collaborative negotiation of language tokens, one can engage a group of learners in collaboratively co-constructing a group's ZPD while catering to each individual's ZPD. Moreover, G-DA postulates that through joint efforts the group might function in ways that are beyond the present capabilities of any individual member (Gibbons, 2003; Poehner, 2009).

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