Praxis-Based Grammar Instruction Using Social Media Networking: Mediational Feedback within ZPD

Azizullah Mirzaei* (iD)

Associate Professor of Applied Linguistics,
English Department, Shahrekord University, Shahrekord, Iran

Zohreh R. Eslami (iD)

Professor of ESL Education/Reading, Texas A&M University, USA

Gholamreza Salehpour (iD)

Ph.D. Candidate in TEFL,
English Department, Shahrekord University, Shahrekord, Iran

Abstract

Recent second or foreign language (L2) research has shown that the integration of form-focused instruction into collaborative, communicative activity is highly influential. Sociocultural theory (SCT) provides a praxis-oriented educational ecosystem wherein L2 grammatical knowledge and practical use can be effectively linked. This SCT-inspired study examined the effects of praxis-oriented grammar instruction and mediational feedback within the social media networking (SMN) platform (i.e., Telegram) on L2 learners' microgenetic development of grammatical knowledge. Participants were 30 EFL learners that were assigned to three different instructional conditions: (i) conventional teacher-fronted instruction as the comparison group, (ii) collaborative instruction attuned to learners' Zone of Proximal Development (ZPD) in an actual classroom as the first experimental group, and (iii) ZPD-based instruction in virtual Telegram space as the second. The groups were pre- and post-tested on a grammar test targeting subject-verb non-inversion in embedded WH-questions, which poses cross-linguistic challenges to Persian L2 learners of English. Collaborative whole-class, dyadic, or triadic talk-in-interactional activities were employed to engage learners in co-constructing educational praxis and providing contingent, ZPD-sensitive graduated mediation in both virtual and face-to-face settings. The results indicated that the two ZPD groups outperformed the comparison group. No significant difference was, however, found between the ZPD groups despite witnessing a developmental trend in favor of the virtual SMN setting. Post-intervention interviews revealed learners' positive attitudes towards using Telegram affordances for praxis-oriented grammar instruction. Further theoretical and pedagogical implications are discussed.

Keywords: ZPD, SMN, collaborative praxis-oriented grammar instruction, mediational feedback, microgenesis

*Corresponding author's email: fazizullah@yahoo.com

INTRODUCTION

The recent history of L2 learning research and pedagogy has witnessed a critical assessment of dominant individualistic presuppositions, methods, and concepts in second language acquisition (SLA) and, subsequently, a reconceptualization of SLA as a more socially oriented enterprise (e.g., Firth & Wagner, 2007; Infante & Poehner, 2019; Lantolf, Poehner, & Swain, 2018; Lantolf, Poehner, & Thorne, 2020; Thorne, 2005). On the one hand, the advent of Vygotsky's (1987) SCT of mind and learning has given special momentum to this wide-ranging trend. Amongst the SCT notions, mediated learning, ZPD, and collaborative dialogue or 'languaging' (Swain, Kinnear, & Steinman, 2010) have probably received the greatest attention. The central tenet pinning these notions together in education is that human cognitive development is the outcome of collaboratively constructed processes through which the learner's potential ZPD level of development is stimulated to function beyond his or her present or 'actual' developmental level. This higher-level transformation is mediated through ZPD-attuned instruction, languaging activities, and in collaboration with experts or more skilled peers (Vygotsky, 1987). As to language learning in SCT, in Swain and Lapkin's (1998) terms, this "co-construction of linguistic knowledge in dialogue is language learning in progress" (p. 321).

On the other hand, recent developments in theoretical accounts of integrated meaning-and-form-focused instruction (e.g. Dörnyei, 2009; Doughty & Williams, 1998; Long, 1991; Long & Robinson, 1998) and interactional feedback (Nassaji, 2015, 2016; Nassaji & Fotos, 2011) have reinstated the role of corrective (implicit or explicit) feedback targeting L2 grammatical forms. Nonetheless, Nassaji and Fotos (2011, p. vii), following Richards (2002), have argued that "the central dilemma" in language teaching has been "how to integrate most effectively a focus on grammatical forms and a focus on meaningful communication in L2 classrooms." According to Lantolf and Poehner (2014) and van

Compernolle (2014), the Vygotskyan notion of ZPD provides the 'dialectic' in which conceptual knowledge about form is directly linked to its meaningful usage through practical activity. Lantolf and Poehner (2014, p. 10) submit that instantiation of the ZPD notion as "the dialectical relation between theory and practice," knowledge and use, or form and meaning "renders it not only possible but imperative that the concept be extended to contexts in which the development of new capabilities is a concern" (p. 147). This dialectical relationship has been referred to as educational 'praxis' which is fundamental to any account of education and cognitive development (van Compernolle, 2014). According to Nassaji (2016), the Vygotsky-inspired SCT notion that "language learning is essentially a social process" has been a major "source of support for interactional feedback" (p. 4) along with 'focus on form' approaches. Therefore, this praxis-oriented educational framework can transform classroom settings into an optimal learning ecosystem in which mediational feedback on L2 form is directly linked to concrete communicative activity (Mirzaei & Eslami, 2015; van Lier, 2004).

Despite showing great potential for linking form-focused feedback to meaning-based activity, educational praxis has received little attention from L2 research, and only recently has it been appearing in relevant research work (e.g., Hadidi, 2021). This study intended, first, to address this lacuna in instructed L2 grammar. Second, it aimed to envision this educational potential alongside recent advances in information and communication technology (ICT) that can provide innovative praxis environments for L2 interactant-learners to communicate, engage with practical activity, and co-construct integrated experiential-conceptual knowledge of language meaning and form (Li, 2018; Poehner, 2017; Vakili & Ebadi, 2020). There are a wide variety of synchronous computer-mediated communication (CMC) tools such as chats, discussion boards, course management systems, and SMNs which can presumably be utilized in L2 teaching as they create optimal learning-and-activity spaces for learners. In sum, the current study sought to explore the educational

opportunities the interface between the application of SCT tenets and notions, on the one hand, and the rapid spread of ICT affordances for social interaction and communicative activity, on the other, can provide for L2 research and mediated L2 learning. More specifically, this study explored the possibility of optimizing EFL grammar instruction through praxis-oriented integration of mediational (form-focused) feedback with concrete (meaning-based) activity using both actual classroom and virtual SMN (i.e., Telegram) settings in Iran from an SCT perspective.

LITERATURE REVIEW

SCT was mainly developed based on Vygotsky's (1978, 1981) main epistemological stance on 'dialectics of brain and culture.' Accordingly, uniquely human cognitive development is microgenetically formed when cultural artifacts that humans have over time constructed to carry meaning, mediate life, and regulate the behavior of themselves or others create dialectical "new connections in the brain" (Vygotsky, 1997, p. 55). This brain-culture dialectic transforms the activity of basic neurobiologically endowed mental functions into "new superstructures in the developing system of human behavior" (p. 18). All cultures have invested in this dialectical capacity to create and use semiotic tools and systems, such as language and literacy, to mediate social life, cultural organizations, and internalize (or appropriate) intentional control over nature and brain functioning, what is basically called 'consciousness' (Lantolf & Poehner, 2014). Leontiev (1981), one of Vygotsky's leading successors, argues that "consciousness is not given from the beginning and is not produced by nature: consciousness is a product of society: it is produced" (p. 56).

For Vygotsky (1987), therefore, every higher-order mental function appears twice, initially between people on the social inter-psychological plane, through a process of 'other-regulation' or learner-adjusted supportive dialogue, which directs his or her attention to key features of the problem-solving task or the learning environment. This dialogically constituted

collaborative activity within the learner's ZPD eventually helps him or her 'self-regulate' new knowledge or skill on the mental intra-psychological plane (Mitchell, Myles, & Marsden, 2013; Thorne, 2005). The psychology's mission, especially at its time of 'crisis,' is to "show how the individual response emerges from the forms of collective life" (Vygotsky, 1981, p. 165), not in a piecemeal fashion "cobbling together a little of the scientific approach and a little of the humanistic approach," but in a completely unified form (Lantolf & Thorne, 2006, p. 198).

Neo-Vygotskyan SCT regards the role of activity as indispensable to human learning and development due to its linking of conceptual knowledge to practical use (van Compernolle, 2014). Activity is defined as any goal-directed behavior mediated through various (physical or symbolic) tools. From amongst these tools, language, as a semiotic system, mediates the human intellect and is considered to be the most important culturally constructed artifact ever and a game-changer for human development. According to Vygotsky, the development of higher-order psychological functioning is the result of social interaction mediated by languaging activity. In essence, social interaction provides a proximal dialectical space, or 'praxis,' in which social, practical activity links theory and practice, or knowledge and use, and shapes human cognition (Lantolf & Poehner, 2014; van Compernolle, 2014).

Another important concept within SCT, as noted earlier, is ZPD, which is defined as the distance between an individual's "actual developmental level as determined by independent problem solving" and his or her higher level of "potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). ZPD serves initially as a threshold indicator of an individual's learning or development—that is, where the teaching-learning process should begin its efforts from—and then as a dynamic process of collaborative thinking or action to diagnose and, in turn, promote (or mediate) the learner's emerging abilities to move from inter-psychological activity to more independent, intra-psychological functioning

(García, 2019a; Infante & Poehner, 2019; Lantolf, Poehner, & Swain, 2018). According to Lantolf and Thorne (2006), ZPD is future-oriented by highlighting the dynamics underlying the learner's microgenetic development in collaboratively mediated activity. The application of the ZPD notion presumes a dialectical relationship between the present 'mature' and future 'embryonic' states of cognitive development in the sense that "what one can do today with assistance is indicative of what one will be able to do independently in the future" (Lantolf & Thorne, 2006, p. 206). ZPD is thus grounded in the praxis-based 'ecosystem,' in van Lier's (2004) sense, wherein conceptual, regulatory knowledge arises (or accumulates) from collective engagement with the concrete (communicative) activity nested within its social, cultural context of use. Such a social ecosystem (e.g., community, family, school, classroom, or group), enriched with macroecological dynamics of activity, engagement, languaging, co-construction, and instruction, systematically provides other micro mediational affordances as a result of active participation and dialogic collaboration in it. Ecologically, then, microgenetic "learning emerges as part of affordances being picked up and exploited for further action" (van Lier, 2004, p. 8).

As one of the pioneering applications of L2 microgenesis and the ZPD-based expression of praxis to integrated meaning and grammar instruction in the field of SLA, Aljaafreh and Lantolf (1994) developed a strategic regulatory scale in order to provide negotiated corrective feedback based on the tutor's close scrutiny of learners' potential developmental levels. Their 'collaborative frame' of feedback becomes operative in (written or oral) L2 use context guided by parameters of "need for *intervention*, *noticing* of error, and *correcting* the error," alongside an implicit-to-explicit cline, 'contingent' and 'graduated' to the learner's ZPD while engaged in a dialogic activity (Aljaafreh & Lantolf, 1994, p. 470; italics in original). Learning within ZPD, in this sense, is then based on expert-novice social interaction in which an expert (i.e., the teacher or a more capable peer) assists the novice learner's L2 microgenetic growth

based on moment-to-moment, 'just-right' and 'just-in-time' scaffolding prompts and mediational interventions (van Lier, 2004). Similarly, Nassaji and Swain (2000), Mirzaei and Eslami (2015), and Rassaei (2014) applied SCT mediational notions to L2 learning and traced learners' L2 microgenesis in talk-in-interactions. In terms of the notion 'praxis', only recently, Hadidi (2021) employed SCOBA, or 'schema for the complete orientating basis of an action,' in the educational praxis, created through C-BLI (i.e., concept-based language instruction), to mediate the cognitive processes that underlie the production of written argumentative discourse. He then reported evidence in support of the framework for improving the learner's cognitive processes of composing and the quality of his texts both during and after instruction. Also, Buescher and Strauss (2018) found that combining cognitive linguistics and SCT through the C-BLI framework helped early intermediate French L2 learners better understand the French prepositions of *à*, *dans*, and *en*, and use them appropriately. Nonetheless, praxis-oriented studies are still rare in L2 research. Future research should thus focus on this pedagogical potential to contribute to integrated meaning-and-form-focused instruction, linking conceptual knowledge on L2 form to the practical experience of meaning through concrete communicative activity.

Another promising application of SCT-based praxis to the teaching-learning-assessment dialectic has been achieved under the rubric of 'dynamic assessment' (DA). In this view, besides assessing the learner's actual developmental level, his or her potential level, that is, his or her responsivity to mediated performance is also appraised. Inspired by SCT tenets, DA integrates instruction and assessment in a dialectical fashion to eventually serve and promote L2 development (García, 2019a). Placing the learner at the center of the teaching-learning activity characterized by differential participation, DA seeks to determine sources of learner difficulty as learners jointly engage in the ZPD activity with the mediator-assessor to uncover the emerging abilities and co-construct a potential future; benefit from different forms of support or interactional moves such as reminders,

hints, feedback, provision of a model, and leading questions; and, eventually, move towards more independent functioning (Infante & Poehner, 2019; Poehner & Wang, 2020). In this sense, the mediator-examiner's bi-dimensional 'assessing while assisting' prompts are 'dynamic,' or diagnostically suited to the learner's evolving needs rather than static and 'symptomatic' (Anton, 2012; Poehner, 2008, 2009; Lantolf & Poehner, 2011). Cumulative L2 research has over the years tended to explicitly reference DA in its efforts to diagnose the full range of learner abilities or better understand and promote learner development of language abilities in various instructional settings. This line of inquiry has well demonstrated that the mediator-assessor's use of ZPD-based regulatory prompts helped uncover a larger picture of L2 learners' development in terms of the results of their previous learning ('summative assessment') as well as those relevant to their potential to learn and develop based on subsequent instruction or mediating feedback ('formative assessment') (e.g., Ahmadi & Barabadi, 2014; Ebadi & Saeedian, 2015; Herazo, Davin, & Sagre, 2019; García, 2019b; Infante & Poehner, 2019; Poehner & Wang, 2020; Rassaei, 2020; Zhang & Lu, 2019). However, the bulk of research in this domain, according to Lantolf and Poehner (2011), has mostly focused on case studies between the mediator-examiner and the learner rather than on larger studies in regular or virtual L2 classroom settings.

Interestingly, recent developments and innovations in ICT and CMC have provided efficient, yet uncharted, praxis-oriented languaging platforms and collaborative learning frames which, if envisioned more profoundly, can mark a turning point in the continued application and expression of SCT tenets and notions for social sciences, in general, and education, in particular. Amongst the widely affordable CMC spaces, SMNs (e.g., Facebook, Twitter, and WhatsApp, and Telegram) provide some easy-to-access platforms to different communities of users for connecting, informing, interacting, brainstorming, and sharing feedback in an effective and engaging manner. SMNs, as popular Web 2.0 (i.e., second-generation) applications, offer technological affordances of immediacy, interactivity,

and accessibility that can motivate many people to use them (Pempek, Yermolayeva, & Calvert, 2009). SMNs involve real-time, telepresence interaction of co-participants, using online CMC tools such as chat rooms, instant messaging, video, and audio conferencing, voice calls that entail the participants' immediate responses and prompt feedback. Given such functions, SMNs can be innovatively incorporated into SCT-inspired L2 educational praxis to effectively link conceptual, metalinguistic knowledge directly to the practical, communicative activity. Through goal-oriented activity in SMN-facilitated praxis spaces, learners are ecologically provided with diverse, proximal macro collaborative as well as micro mediational processes to grow self-regulated and autonomous. Recent L2 research has properly reacted to this perceived intermediary role of CMCs, mobile AR (i.e., augmented reality) activities, and SMNs in the meaning-and-form-integrated praxis by applying the available and innovative social platforms for different instructional and assessment purposes where the provision of mediational feedback is a cornerstone (e.g., Chen, 2016; Karlström & Lundin, 2013; Li, 2018; Mehri Kamrood, Davoudi, Ghaniabadi, & Amirian, 2020; Mirzaei & Taheri, 2016; Thorne, Hellermann, & Jakonen, 2021). Further research is needed though to address this potential interface that can bring ZPD-based educational praxis and SMN-assisted interactive affordances together on a proximal educational platform to efficiently integrate a dialectical focus on grammatical forms and meaningful communication in L2 classrooms.

PURPOSE OF THE STUDY

As noted above, exploring the efficacy of popular SMNs for the application of SCT-inspired educational praxis to integrated meaningful grammar instruction, in Nassaji and Fotos's (2011) as well as Nassaji's (2016) sense, can be revealing for L2 learning and teaching. This study examined Telegram affordances for an integrated ZPD-based meaning-and-form-focused instruction and learners' microgenetic development of L2 grammatical knowledge in EFL classrooms in Iran. In addition, ZPD

learners' attitudes and perceptions were explored with regard to virtual SMN affordances for operationalizing the educational praxis through interactive form-focused instruction. Specifically, the following research questions were addressed:

1. What are the effects of employing praxis-based, integrated meaning-and-form-focused instruction using virtual interactive SMN affordances on EFL learners' microgenetic development of grammatical knowledge?
2. What are Iranian EFL learners' perceptions and attitudes towards the use of praxis-oriented mediational feedback in mobile-assisted Telegram and face-to-face classroom settings?

METHOD

Participants

The current study employed a group of 30 EFL learners attending a private language institute in an Iranian central province where Pearson's Top Notch courses were taught three times a week, with each session lasting 2 hours. They had already attended English courses for about three years. Due to social-institutional regulations in Iran, they were all females, between 15 and 22 years old, with an average age of 16. It is important to note that these were the participants of the main instructional phase of the study selected based on their scores on the Quick Oxford Placement Test (QOPT) (i.e., within a range of ± 1 SD from the mean). They were then assigned randomly to one comparison and two experimental groups (10 in each group). The participants all expressed their consent to take part in the study. Although they knew they were participating in a study, they did not know about the instructional differences involved. Moreover, pseudonyms are used to refer to individuals' identities in the analytic or descriptive phases. Finally, the learners who attended all the stages were rewarded with a gift.

Instrumentation

Measures and Materials

Two tests were used to measure learners' L2 knowledge at different points in time. First, in order to ensure the homogeneity of the groups in terms of prior general language knowledge and, also, to estimate the concurrent validity of the constructed grammar test, the paper-delivered QOPT was employed. The reliability of the test has been reported to be around 0.9 for the 60 item test (e.g., Geranpayeh, 2003). In this study, the estimated reliability was 0.84. Second, a 20-item multiple-choice grammar test was developed to be used as the pretest and posttest (see Appendix A for typical items). The test was specifically used for evaluating the participants' grammatical knowledge of embedded, indirect WH-questions. This test was judged as suitable by two experts (a university lecturer and an M.A. holder in TEFL teaching English in the same language institute). Its concurrent validity was accounted for by administering the instrument along with the structure section of the QOPT to 20 EFL learners in a similar language institute. The computed Pearson product-moment correlation coefficient was rather high, $r = .89$, $p < .01$. The test also enjoyed a satisfactory reliability estimate, $\alpha = .78$, using Cronbach's Alpha.

Furthermore, post-instruction learner diaries were kept, and semi-structured interviews (see Appendix B for the script) were conducted to explore the ZPD participants' attitudes and perceptions, especially, about employing SMN affordances for delivering integrated meaning-and form-focused L2 grammar instruction.

Grammatical Structure

The target of grammar instruction and the grammar test was English embedded, indirect WH-questions, which is one of the grammatical points covered in the Top Notch series (Pearson), commonly used as EFL coursebooks in most Iranian private language institutes. The structure is highly frequent in English lexical bundles (Biber, Conrad, & Cortes, 2004)

and, contrary to their direct WH-interrogative counterparts, such statement-embedded indirect questions do not follow the English rule of subject-auxiliary inversion. Meanwhile, this L2 from feature generally lacks perceptual salience in input and, as a consequence, escapes the learner's attention and processing. In addition, in Persian, embedded, indirect questions preserve the original interrogative tone and structure, and moving across to English, Iranian EFL learners commonly experience profound cross-linguistic differences and run into difficulty producing correct forms due to negative L1-L2 transfer.

SMN Platform

Telegram, which has over the years been the most commonly used mobile-mediated SMN (i.e., social media networking) platform in Iran, was employed as the virtual praxis environment for integrated meaning-and-form-focused grammar instruction as well as social interactions between the teacher (a Ph.D. candidate-teacher officially hired by Education Ministry) and 10 learners in one of the experimental ZPD settings. Telegram is a cloud-based instant messaging and voice-over IP service developed by Telegram Messenger LLP, a privately held company registered in London and founded by the Russian entrepreneur Pavel Durov. Telegram client applications are available for Android, iOS, Windows Phone, Windows NT, macOS, and Linux. Through Telegram, users can send messages and exchange photos, videos, stickers, audio, and files of different types. Learners were ensured to know how to communicate and jointly work on the assigned tasks with their peers (or the instructor) in Telegram using their smartphones connected to the internet. To further illustrate the process, the learners were asked to observe and trace ZPD-based mediational sessions coordinated between the teacher and a student for two sessions.

Activities and Exercises

Apart from the coursebook's exercises, six types of instructional activities were devised and used in the ZPD classes: (i) whole-class role-playing, (ii) brainstorming discussions, (iii) dyadic or triadic completion of cloze passages, (iv) co-construction of a larger textual context (e.g., reported stories) using WH-clauses in an embedded, indirect form, (v) collaborative rendering of typical sentences from L1 to L2, and (vi) unscrambling words to make meaningful sentences using the appropriate forms of WH-clauses. All these class activities were designed to collaboratively create the learning-and-activity educational praxis needed to link L2 conceptual, metalinguistic knowledge to experiential, practical use (Lantolf & Poehner, 2014; van Compernolle, 2014). It should be noted that the environmental differences involved between the two ZPD settings (i.e., face-to-face vs. virtual SMN) naturally resulted in procedural differences in terms of how each activity schema was practically operationalized by the ZPD groups. To illustrate, the screenshot in Figure 1 portrays a typical ZPD-attuned mediational activity conducted in one session within the Telegram-assisted educational praxis.
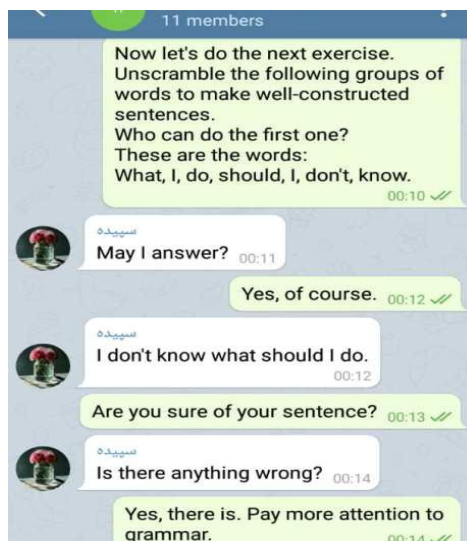
Note: Student's pseudonyms in Persian.

Figure 1: ZPD-attuned form-focused mediation within SMN

DATA COLLECTION PROCEDURE

Mixed quantitative and qualitative data collection procedures were employed to address the research questions. A group of 30 language learners were selected based on their scores on a QOPT (scores between -1 to +1 SD from the mean) at an Iranian language institute and were randomly assigned to one comparison and two experimental ZPD groups. To further ensure their homogeneity, the results of a one-way ANOVA conducted on the QOPT scores of the formed groups indicated no significant difference in their general language knowledge, F (2, 27) = .226, $p > .05$. Then in the first session, the grammar test of indirect WH-questions was administered as the pretest to the three groups.

In the non-ZPD conventional setting, learners underwent the mainstream teacher-fronted instruction, mainly focusing on the coursebook exercises and using a non-collaborative presentation-practice-production (PPP) instructional approach. In terms of grammar, for instance, the instructor deductively explained the structure to the class using metalanguage and then examples. For all subsequent sessions, the learners were individually engaged with the related exercises as it is mostly practiced in mainstream EFL classrooms in the country. Any form of corrective feedback was provided in a traditional, teacher-fronted, and (indiscriminately) explicit manner, regardless of the learner's ZPD.

As to the face-to-face ZPD setting, a collaborative ZPD-sensitive mediational approach was adopted to grammar instruction and feedback employing, as noted, six types of whole-class and pair/trio activities. Initially, two training sessions were separately held between the teacher (one of the researchers) and five 'more capable' learners of both ZPD classes practicing Aljaafreh and Lantolf's (1994) ZPD-based implicit-to-explicit regulatory scale. After that, the teacher conducted a whole-class series of indirect reported speech events in which originally direct questions were required to be reported to a third person, for instance, role-plays involving a doctor, a patient, and a secretary/companion. Then,

whole-class brainstorming discussions were held working out the underlying grammatical rule. Additionally, learners worked as dyads or triads unscrambling words to make meaningful sentences using the appropriate forms of indirect or reported WH-clauses. They were sometimes asked to collaboratively render typical sentences with embedded questions from L1 to L2. Dyads or triads also completed sentences with embedded reported questions within larger cloze passages designed deliberately to induce indirect WH-clauses. Occasionally, the teacher introduced a WH-question in class and asked the ZPD groups to co-construct a larger textual context (e.g., reported stories) containing the WH-clause in an embedded, indirect form. All these class activities were intended to trigger learners' interactive written or oral L2 outputs using the structure of interest. As noted, mediational feedback was provided by the teacher and the more skilled peers after being trained to put Aljaafreh and Lantolf's (1994) ZPD-based regulatory scale to use in different contexts. The only difference between the face-to-face and virtual ZPD groups was the different delivery platforms of instruction (i.e., real face-to-face vs. virtual Telegram-assisted).

In the virtual, Telegram-assisted ZPD setting, a similar collaborative praxis-oriented approach was adopted to grammar instruction employing the aforementioned tasks and activities; however, Telegram's interactive and activity affordances were used as the instructional platform for teacher-learner and learner-peer social interactions. Every session, L2 learners were preplanned to log onto their virtual whole-class and, at times, intra-sessional dyadic/triadic groups, guided by the instructor on how to follow social interactions or activities, and jointly performed the assigned tasks. They exchanged both oral and written talk-in-interactions as they were working collaboratively on the assigned tasks and activities employing accessible Telegram affordances. The activities in the ZPD groups required constant negotiated interactions, the teacher's ZPD-attuned mediation, and collaboration between (or among) the peers to achieve the desired outcome. Pair/trio work opportunities were occasionally planned

using the SMN platform. Figure 2 illustrates exemplary graduated, dialogic ZPD-adjusted mediation of produced grammatical structures within the collaborative Telegram space. This instructional phase continued for five 30-minute sessions.

Note: Student's pseudonyms in Persian; Persian Sentences: من یادم نمی آید معلم دیروز معلم در چی گفت (I can't remember what the teacher said in class yesterday); امروز چی (How are you?); حالت چطوره (What did you eat today?).

Figure 2: Praxis-based grammatical mediation in virtual activity space

After the instructions, the learners in all the groups were given the same

aforementioned grammar test as the posttest. The collected data from the three groups were statistically analyzed to compare possible differential effects for different instructional approaches (or modalities). ZPD learners' written diaries reflecting upon the praxis-oriented instruction were also collected. Finally, semi-structured interviews were held with the participants of the ZPD groups using open-ended questions to explore the learners' attitudes towards ZPD-based talk-in-mediations, specifically, focusing on the mobile-mediated Telegram platform for L2 grammar instruction.

RESULTS

Effects of Praxis-based L2 Grammar Instruction

Quantitative data analysis was employed to examine the effects of ZPD-based educational praxis in face-to-face and virtual settings on EFL learners' development of L2 grammatical knowledge, thereby addressing the first research question. To this end, descriptive statistics, as well as a one-way analysis of covariance (ANCOVA), were computed. Table 1 summarizes the related descriptive statistics.

Table 1: Descriptive Statistics for Groups' Pretest-Posttest Grammar Scores

Group	Test	*N*	Min	Max	Mean	*SD*	Skewness	Kurtosis
Non-ZPD	**Pretest**	10	4.00	9.00	7.20	1.55	-.86	-.63
	Posttest	10	6.00	10.00	7.80	1.32	.09	-.75
FtF-ZPD	**Pretest**	10	5.00	10.00	7.60	1.50	.18	-.37
	Posttest	10	13.00	19.00	15.30	1.95	.60	-.29
SMN-ZPD	**Pretest**	10	5.00	10.00	7.50	1.58	.33	-.89
	Posttest	10	15.00	19.00	16.90	1.20	.23	-.36
Total	**Pretest**	30	4.00	10.00	7.43	1.50	-.28	-.48
	Posttest	30	6.00	19.00	13.33	4.30	-.49	-1.29

As displayed in Table 1, the Kurtosis and Skewness values of both pretest

and posttest scores were well within the acceptable normality range of ±1.5. Regarding the grammar pretest scores, the mean scores were roughly similar, that is, 7.2, 7.6, and 7.5 for the conventional non-ZPD, face-to-face ZPD, and virtual ZPD groups, respectively. This further supported the QOPT homogeneity results in terms of learners' prior L2 grammatical knowledge. However, the difference among the posttest scores looked rather large (i.e., 7.8 for the non-ZPD, 15.3 for the face-to-face ZPD, and 16.9 for the Telegram-assisted ZPD groups), which was submitted to further inferential statistical analysis.

Subsequently, an ANCOVA was conducted to compare the developmental effects of the three instruction types on students' grammar posttest performances (i.e., as the dependent variable), while simultaneously controlling for pretest differences as the covariate in the analysis. The grouping variable in the analysis was a type of grammar instruction. The ANCOVA test is specifically useful in such contexts to probe if the posttest mean differences were statistically significant while simultaneously controlling for the pre-existing differences between the groups as measures by the pretests. Furthermore, according to Pallant (2013), ANCOVA is also very useful in situations where there are rather small sample sizes and it is not possible to randomly assign participants to the different groups. Preliminary analyses were run to ensure no violation of the assumptions of normality, linearity, and homogeneity of variances.

Table 2: Tests of Between-Subjects Effects (ANCOVA)

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	480.340a	3	160.113	76.625	.000	.898
Intercept	127.949	1	127.949	61.234	.000	.702
Pretest-Grammar	8.273	1	8.273	3.959	.037	.132
Group	453.780	2	226.890	108.586	.000	.893
Error	54.327	26	2.089			
Total	5868.000	30				
Corrected Total	534.667	29				

The ANCOVA results in Table 2 demonstrate that there were significant differences among the three instructional groups' post-instruction grammar test scores, $F (2, 26) = 108.59$, $p < .05$. Further, the obtained partial eta squared result was sufficiently high (.89), indicating that the variance in the dependent variable (posttests) is explainable by the type of instruction employed for different groups. There was also a rather strong relationship between the pretest and posttest scores on the grammar test with a partial eta squared value of .13. Complementary pairwise analyses were obtained to exactly probe where and between which groups the difference occurred. Multiple-comparison results, Bonferroni-adjusted to minimize the 'inflated Type I error,' are shown in Table 3 below.

Table 3: Pairwise Comparisons for Grammar Posttests

(I) Group (J) Group	Mean Difference (I-J)	Std. Error	Sig.(a)	95% Confidence Interval for Difference(a)	
				Upper Bound	Lower Bound
FtF-ZPD --- Control	7.357(*)	.650	.000	5.692	9.021
SMN-ZPD --- Control	8.993(*)	.649	.000	7.333	10.653
SMN-ZPD --- FtF - ZPD	1.636	.647	.053	-.019	3.291

Based on estimated marginal means

*The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

The post hoc comparative results in Table 3 indicate that both the face-to-face ZPD and virtual ZPD groups outperformed the conventional non-ZPD group in their post-intervention grammar achievement scores. However, there was no statistically significant difference between the two ZPD groups although the obtained significance value showed a developmental trend in favor of the virtual Telegram-mediated ZPD setting, $p = .053$. This issue however needs further investigation. In simpler terms, the SCT-inspired praxis-based grammar instruction provided within learners' ZPD via both virtual and face-to-face interactive settings has shown to significantly

improve EFL learners' L2 grammatical knowledge of embedded, indirect WH-questions without subject-auxiliary inversion that pose great challenges to Persian EFL learners.

Learners' Attitudes Towards SMN-assisted ZPD Setting

As noted earlier, an interpretive analytic approach was adopted to address the second research question and explore Iranian EFL learners' attitudes and perceptions about the use of praxis-oriented ZPD settings, especially the virtual SMN platform (i.e., Telegram), employed for implementing mediated grammar instruction. For that purpose, besides learners' diaries, five learners from each of the face-to-face and virtual ZPD settings were randomly interviewed, and their retrospective views were audio-recorded. The interviews (as well as the diaries) were done in their L1 (i.e., Persian) for their convenience to freely reflect upon what they had experienced.

Both the diaries and the interviews from the Telegram-assisted ZPD group commonly revealed positive attitudes towards the innovative use of the potentially interactive, collaborative SMN platform for educational purposes. Specifically, they pointed to their increased willingness, enjoyment, and less anxiety to engage with the language learning activities, to ask questions, to request or provide feedback, and to socialize with peers or the teacher in the more leisurely-paced Telegram-assisted praxis environment than that in the conventional classroom setting. They also stated that both the teacher's and peers' feedback and 'pursuit of the matter' in the SMN setting were more exemplar-based, intensive, problem-based, and goal-directed. Therefore, they felt that activity-and-learning-integrated potentials of virtual SMN or cyberspace ought to be more prudently exploited for complementary pedagogical ends. The following are typical SMN-oriented ZPD learners' attitudes.

Excerpt 1

To me, it is cool to do grammar or vocabulary exercises through social

networks with the peers and teacher. SMN platform brings L2 teaching and learning home and everywhere with you. … (Laughing) It is a portable class. We feel more relaxed to ask questions about our problems or misunderstandings. … Our teacher provides a lot of examples to clarify the grammatical or lexical points. He ensures we master everything. We are paired with different classmates. … Learning becomes fun when you see you are using modern technology to constantly advance your English proficiency. …

Excerpt 2 (diary)

… At some points the teacher seems to be really more patient and supportive, and he trusted our understanding more than he does in real classes. I could learn more effectively as the teachers and we peers cooperatively share friendly clues to help each other notice the errors and correct them. We tend to be more caring towards each other in Telegram when we try to provide more little-by-little help to fix the grammatically wrong sentences. …

As envisioned in the interview/diary excerpts above, L2 learners really liked the talk-in-interactions with their teacher and peers in Telegram as they were given graduated and semantically contingent assistance to correct their errors. When they were asked how they felt while interacting in cyber space and if the activities conducted worked or helped them learn better or not, they all stated that they felt very comfortable while doing the more leisurely-paced class activities and exercises.

Excerpt 3 (diary)

… I was relaxed during the class time and at the same time I was attentive to the interactions between the teacher and other learners and tried to take part in them whenever needed. In fact, I learned from their discussions as well. …

Excerpt 4

… The activities provided within Telegram space were really interactive and collaborative to us in the sense that … (reflecting) we were given group work and activities to do as dyads or triads or even larger groups rather than individuals as it is mostly done in school. It was interesting to jointly care and look for the correct response. It gave us more enjoyment when we together found the answer and corrected the sentences. …

Similarly, the participants in the face-to-face ZPD group in an actual classroom environment expressed positive attitudes towards the praxis-based grammar instruction as well as the collaborative learning activities coordinated between the teacher and the class and, in turn, between or amongst the peers. They emphasized that this collaborative form of instruction and learning seemed innovative and interesting compared to their usual experience with more formal, teacher-fronted grammar instruction in a non-collaborative milieu. In brief, they enjoyed the dialogic activities that unfolded between the pairs in class and the way peers were given graduated assistance and supportive prompts whenever they had produced an erroneous form of embedded WH-clauses. This way, they felt, more recognition or trust was put in their abilities, agencies, and developing L2 knowledge.

DISCUSSION

The results of the current study revealed that, firstly, praxis-oriented grammar instruction and mediational feedback provided in both mobile-mediated Telegram and face-to-face classroom settings led to greater improvement in EFL learners' grammatical knowledge of embedded WH-questions than the conventional teacher-fronted language instruction. The main distinctive feature between the mainstream EFL setting and the collaborative learning environments was the educational praxis-oriented framework, instructional activities, and mediational dynamics employed in

the latter. As noted, this educational praxis is quintessentially grounded in Vygotsky's approach to educational psychology and epistemologically aims to bridge the so-called theory-practice, knowledge-use, and, in this case, a form-meaning gap in (language) education (Lantolf & Poehner, 2014; van Compernolle, 2014). In fact, this SCT notion seeks to represent the dialectical genesis or nature of humans' development of cognitive functions, including grammatical knowledge, by bringing naturally specified mental abilities and culturally constructed artifacts or mediational processes together through engagement with social others and contextualized, practical activity. In other words, contrary to non-praxis individualistic SLA accounts, which have for long oscillated between conscious, explicit attention to form and unconscious, implicit acquisition of knowledge through focusing on meaning, the ZPD-based settings under study envisioned a dialectical relation between form and meaning through collaborative mediation of practical activity within the created praxis.

In praxis domains, the instruction practically engaged ZPD learners in whole-class, dyadic, or triadic goal-directed activities (e.g., doctor-patient-companion/interpreter role-playing) the regulation of which, like all higher forms of culturally based psychological processes, required learner-mediator's or learner-peer's collective talk-in-interaction and contingent, graduated use of mediational means (e.g., Aljaafreh & Lantolf, 1994; de Guerrero & Villamil, 2000). These mediational means and processes, according to Vygotsky (1978), emerge over time in the form of culturally constructed physical tools, (e.g., marker, smartphones) or symbolic artifacts, such as ZPD-activated languaging, upon which the learner-agents collaboratively act to co-construct their own indirect, 'auxiliary' relationship with the activity and, in turn, with the world (van Compernolle, 2014, 2019; Wertsch, 2007). This type of auxiliary inter-psychological relationship, when microgenetically internalized, "transfers the psychological operation to higher and qualitatively new forms and permits humans, by the aid of extrinsic stimuli, *to control their behavior from the outside*" (Vygotsky, 1978, p. 40; italics in original).

It is thus argued that the ecological praxis framework adopted in this study, unlike theory-driven dualistic (implicit or explicit) approaches, envisioned language instruction and feedback as essentially collaborative, semantically contingent, and ZPD-based. These mediational processes came into play, not as strict, doctrinal feedback rules of thumb targeting the individual's solo performance, but rather as variably instantiated through dynamic, diagnostic assessment and mediation of the co-participant-learners' emergent needs and their potentials to microgenetically benefit from progressively less other-regulated, explicit assistance (Antón, 2012; Lantolf & Poehner, 2011; Lidz, 1991; Poehner, 2008, 2009). This collaborative, dialogic, or, in modern SLA terminology, interactional feedback (e.g., Mackey, 2007, 2020; Nassaji, 2015) tended to be ecologically contingent (Aljaafreh & Lantolf, 1994; Lidz, 1991; van Lier, 2004). That is, it arose from conversational discourse at a point where meaning and form were being processed (Nassaji, 2016) on the co-participant-mediator's side to assist joint construction of meaning or direct peer-learners' attention to matters of L2 from which were less salient and might otherwise have been left unnoticed. More importantly, praxis-oriented feedback was 'graduated' and incrementally fine-tuned to learners' potential developmental levels within ZPD. In Nassaji's (2016) words, it "begins with indirect feedback and then moves progressively and in a scaffolding manner towards more direct feedback moves as needed" (p. 20).

Secondly, another important finding was that, despite the developmental trend witnessed in favor of the application of the virtual Telegram-assisted ZPD setting, no significant difference was statistically evidenced between the two virtual and physical ZPD settings. It thus seems imperative for L2 research to further explore this issue. Nonetheless, this finding is by itself worthwhile as it demonstrates that mobile-mediated SMN inter-activity domains, if not more engaging, are at least as equally useful as the classroom-based face-to-face ZPD setting. Meanwhile, all SMN diaries and interviews revealed positive attitudes towards the innovative alignment of originally classroom-based learning activities,

instruction, and feedback with Telegram's interactive affordances. Specifically, similar instructional activities and Aljaafreh and Lantolf's (1994) mediational scale were employed within the virtual space which, although lacks the potential face-to-face rapport-building chances, offers no less leisurely-paced and goal-directed interactivity opportunities and, perhaps, more managerial ease and accessories. For instance, it was much more convenient to share task rubrics, activity directions, role-playing scenarios, narratives, cloze passages, or dyads/triads; regulate mediational feedback prompts; or direct leaner's attention, at times, using simple interactive emoticons. Moreover, it was easier to keep a close watch on the ZPD groups' task-oriented social interactions, intervene to assist less obtrusively, and, in van Lier's (2004) metaphorical sense, even dismantle the scaffold when no longer needed. On the other hand, interviewed learners found it more self-paced and manageable to get engaged in talk-in-mediations, process the incoming stimulus or prompts, reflect more deeply on the metalinguistic point at hand, restructure their conceptual L2 knowledge, and, in Vygotsky's (1978) sense, microgenetically "grasp the process in-flight" (p. 68). Further, they experienced more fun and felt more at home with interactivity, collaboration, and reaching out to others (i.e., peers and the teacher) for assistance in the new virtual learning-and-activity ecosystem. This study thus adds to the cumulative interest in exploring the application of CMC, or much recently, mobile-mediated communication to collaborative L2 learning which is commonly witnessed in L2 research and pedagogy (e.g., Eslami & Kung 2016; Fuchs, 2016; Godwin-Jones, 2008; Kessler & Bikowski, 2010; Lee, 2008; Li, 2018; Rassaei, 2020; Sauro, 2009; Vakili, S. & Ebadi, 2020; Zeng & Takatsuka, 2009).

CONCLUSION AND IMPLICATIONS

The findings pointed to the effectiveness of collaborative ZPD-activated praxis for L2 grammar instruction and mediational feedback in both virtual and physical inter-activity spaces. Further, only a developmental trend was

observed in favor of the mobile-mediated SMN setting. The findings lent support to the SCT view that social, mediational relations instantiated within practical activity "genetically underlie all higher human cognitive functions and their relationships" (Vygotsky, 1978, p. 57). In essence, the ZPD-based collective interactivity envisioned in the form of whole-class, dyadic, or triadic educational praxis pointed to a dialectical relation between L2 form and meaning quintessentially mediated through activity-based collaborative dialogue (or languaging) in L2 instruction and feedback.

As noted earlier, the fundamentally SLA-oriented conception of this trend is increasingly being referred to as interactional feedback (Nassaji, 2015). In sum, the neo-Vygotskyan integrative notion of praxis, through which conceptual, metalinguistic knowledge can be effectively linked to its relationship with practical activity and language experience (van Compernolle, 2014; Vygotsky, 2004), provides an educational framework through which a focus on grammatical forms and a focus on meaningful communication can be most effectively integrated into L2 classrooms.

For further research in this area, it is suggested that the mediating role of mobile-mediated SMN to the educational praxis be explored under Engeström's (2001) as well as Thorne's (2005, p. 395) rubric of 'knotworking,' proposed as the unifying direction for the evolving third-generation SCT, to develop "conceptual tools to address dialogue, a multiplicity of participant perspectives, and the interrelations between defined activity systems" across different points in time and space. Furthermore, digitally mediated SMN affordances can be even approached as categories of Thorne et al.'s (2021) 'rewilding' conception of instructed language education, a recent call for creating goal-oriented material-interactional conditions for outside-the-classroom language use and learning, with an eye to "the heterogeneity, complexity, and unpredictability of interaction in the wild" (p. 108). In this research, ZPD learners' positive attitudes towards praxis-oriented collaboration, specifically in the SMN space, attested to the variable extramural knotworking or rewilding affordances third- or fourth-generation SCT practitioners may aspire to

build into language education, affordances such as innovativeness, inter-activity, meaning-making, multivocality, pair/trio nodes, ease, playfulness, care, and rapport.

Last but not least, there were certain limitations characterizing this research. First, a rather small number of only female participants were employed both at large and in each group due to the accessibility issue, especially considering regulations in private language institutes in Iran. Second, Telegram SMN has recently been filtered in the country, and practical safeguards had to be put in place to meet the concerns of individuals, parents, and the institute, which further exacerbated the accessibility problem. Also, part of the comparative picture was missing in the interpretive results as the control group's interview data were not elicited for practicality concerns. Finally, as noted, no significant difference was spotted between the virtual/physical ZPD groups despite tracking a developmental trend for the virtual praxis-oriented context, which awaits further research.

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ORCID
Azizullah Mirzaei   http://orcid.org/0000-0002-8436-0390
Zohreh R. Eslami   http://orcid.org/0000-0003-2969-5056
Gholamreza Salehpour   http://orcid.org/0000-0002-7597-688X

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Appendix A: Typical Grammar Test Items

Direction: Choose the best option (a, b, c, or d) that best completes each sentence.

1. What did you say to your friend when he ask where ………………….?
      a. did you spend your weekend b. you had spent your weekend
      c. your weekend did you spend d. had your weekend been spent
2. "Did he eat a sandwich for lunch?" "I don't remember what ………… ."
      a. did he eat   b. had he eaten   c. he had eaten   d. he ate
3. Can you tell me how far …………. from here to your university?
      a. there is   b. it is   c. is it   d. is there
4. I don't know ……………….. .
      a. where they come from   b. where do they come from
      c. where did they come from   d. where are they from

Appendix B: Interview Script
Questions for the Virtual ZPD Settings
1. How did you find the Telegram environment for learning English?
2. How was the social network environment different from the previous classes you had had?
3. How did you feel during the class activities?
4. How did you feel while interacting in cyber space and did the activities conducted work or help you learn better or not?

Questions for the face-to-face ZPD Settings

1. How did you find the classroom interactions for learning English?
2. How were the class activities different from the previous traditional classes you had had?
3. How did you feel during the class activities?
4. How did you feel while interacting with your classmates or teacher and did the activities conducted work or help you learn better or not?