

Mediation and Reciprocity in Online L2 Dynamic Assessment

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Abstract

Dynamic Assessment (DA) originated from Vygotsky's (1978) theory of the mediated mind. It offers learners assistance as necessary during the performance of the assessment task through collaborative dialogue. This study intended to address the possibility of applying DA to the Web 2.0 technologies in Synchronous Computer Mediated Communication (SCMC) with two L2 learners studying in different universities across the world to observe their microgenetic development of grammatical ability in written narratives of picture stories and video clips over Web 2.0 tools of Skype and Google Wave. Applying microgenetic and thematic analysis as the general framework for data analysis, this research aimed at generating new mediation and reciprocity taxonomies for the interactionist SCMC-based DA based on emergent patterns of learners' behavior in collaborative interaction with the mediator. The results of the study highlighted the point that DA mediation and reciprocity patterns provided a more accurate picture of the learners' potential for future functioning in online DA.

Keywords: Dynamic Assessment, ZPD, Mediation, Reciprocity, SCMC, Web 2.0

Introduction

Theoretically framed within Vygotsky's theory of the mediated mind, DA is a new approach to classroom assessment offering mediation to help learners perform beyond their level of independent functioning. In this way, it explores the learner's ongoing developmental processes and provides insight into her or his potentials for future development. Vygotsky (1998) indicates that non-dynamic assessment approaches (NDAs) reflect only the products of development revealing little about the process of its formation and only provide a snapshot of learners' current capabilities. On the other hand, DA focuses on learners' zone of proximal development (ZPD) and prioritizes future development. Poehner (2005) indicates that DA targets maturing abilities and offers the possibility of intervening to promote functions that are maturing.

At the heart of Vygotskian and sociocultural approaches to language learning are the concepts of mediation and social learning (Lantolf 2000; Lantolf & Thorne, 2006). The concept of mediation, a fundamental concept of sociocultural theory, is the process in which social and mental activity is regulated by culturally constructed artifacts, concepts, and activities (Lantolf & Thorne, 2006). These key components have taken on special relevance with the advent of social networks and online communities through synchronous computer mediated communication (SCMC). During problem-solving the collaborative features and visibility of learners' thoughts on computer screen in SCMC result in a joint construction of knowledge that creates a new manifestation of Vygotsky's notion of mediation in ZPD which forms the basis of DA. (Beauvois, 1997)

The growing body of research on L2 dynamic assessment through collaborative dialogue is confined to the written or oral interaction in traditional classroom context (Ableeva, 2010; Aljaafreh & Lantolf, 1994; Antón, 2003; Nassaji & Swain, 2000;; Poehner 2005, 2009). Yet, the emerging SCMC possibly helped learners extended their mind beyond tightly bounded confines of the classroom. Assessing learners' progress in the socially-distributed dynamic virtual context of SCMC calls for a new approach to assessment based on close collaboration and two-way interaction in SCMC context. DA focusing on the process rather than on the product seems to be congruent with the collaborative nature of cyberspace to assess the learners' potential for future development. However, research devoted to interactionist DA in this area is limited (Birjandi & Ebadi, 2012; Darhower, 2002, 2007; Osoz, 2003, 2005; Poehner et al., 2014; Shrestha & Coffin, 2012).

This study intended to explore the possibility of applying interactionist DA to SCMC context in which the taxonomies of learners' reciprocity and the mediator's mediation moves were uncovered through thematic analysis. The taxonomies served as the criteria to observe learners' potential level of development and obtain a richer and more complete understanding of their microgenetic development of their grammatical ability namely the use of English modals and prepositions as target structures in L2 context. The following research questions guided the study:

1. What types of mediation moves diagnose and promote the development of learners' grammatical structure in SCMC-based DA?
2. What do learners' reciprocity patterns reveal about their microgenetic development of target structures in online DA?

Theoretical Background of the study

Theoretically originated from Vygotsky's Socio-cultural Theory (SCT) in general and his concept of ZPD in particular, DA focuses on the learning processes and serves as a means of measuring the ZPD and learners' development is evaluated based on their progression in the ZPD. Vygotsky (1978, p. 86) defined the ZPD 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 peers." Vygotsky's primary concern was for ZPD and he argued that instruction should be adjusted to the learners' potential for development in ZPD and not to the past abilities at the actual level of their development.

The underlying premise of SCT is that the human mind is mediated by using symbolic or psychological and physical tools to interact with world. Lantolf and Thorne (2006, p.79) define mediation as "the process through which humans deploy culturally constructed artifacts, concepts, and activities to regulate (i.e., gain voluntary control over and transform) the material world or their own and each other's social and mental activity". Mediation in DA is offered in two general approaches of interventionist and interactionist which include a wide array of assistance provided in the forms of standardized and nonstandard hints and prompts (Lantolf & Poehner, 2004). The interventionist approach (e.g., Guthke, Heinrich and Caruso 1986) includes mediation which is standardized and prespecified and administered during the test procedure. Interactionist DA

includes interaction between examiner and examinee in which the examinee is provided with unscripted help which is not preplanned, but rather emerging from the collaborative mediation to solve his problems. In the interactionist DA mediation is provided through "the mechanism of effective help" which requires that assistance provided to learners be graduated, contingent, dialogic and tailored to the learners' ZPD (Aljaafreh & Lantolf, 1994). Sternberg and Grigorenko (2002) have described two formats for structuring DA procedures as sandwich and cake metaphors. They indicate that in sandwich format the mediation sandwiched between pre-test and post-test. Within the cake format mediation is administered while the assessment session is in progress and it lends itself to individual assessment administration. In the context of this study, this mechanism was implemented by contingently providing leading questions, hints and prompts both orally and in written form graduated from implicit to explicit in a dialogic manner to evaluate the learners' level of internalization of assistance provided in SCMC-based DA through cake format.

The process of participating in mediation with another person can bring about internalization. Lantolf (2000) defines internalization as the process of "reconstruction on the inner, psychological plane, of socially mediated forms of goal-directed activity." Internalization is in essence "the process through which higher forms of mentation come to be." (p. 13). Vygotsky (1962) states that any higher mental function goes through an external social stage in its development before becoming internal. Thus, the function is initially social and internalization is the process through which social function becomes individualized. This is what Vygotsky called genetic law of development. In SCT, microgenetic development illustrates how mental activity is mediated through interaction with others on the level of microgenesis which is defined as "changes occurring in mental functioning over the span of weeks, days, hours, or even seconds" (Block, 2003, p. 100).

Research on online interactionist DA

Following Vygotsky's preference for cooperative dialogue between novice and expert, a number of researchers have recently embraced DA as the general framework to investigate L2 development in SCMC context (Birjandi & Ebadi, 2012; Darhower, 2002, 2007; Oskoz, 2003, 2005; Poehner et al., 2014; Shrestha & Coffin, 2012).

Poehner et al. (2014) reported on an ongoing project of designing online multiple choice tests of Chinese reading and listening comprehension. They combined the interactionist and interventionist approaches to DA to develop computerized tests on the basis of which scores representing learners' independent and mediated performance were automatically generated. The scores in conjunction with learner profiles provided a more accurate diagnosis of L2 development which highlighted the key role of mediation in computerized DA.

Shrestha and Coffin (2012) investigated the effect of DA on academic writing via email in the form of text-based mediation. They conclude that DA can serve as an effective tool for supporting learners with their academic writing. One of the drawbacks of their study was the lack of transcendence tasks which include more complex and difficult tasks to expand learners' cognitive capabilities beyond the here and now demands of tasks in DA. Oskoz (2005) investigated how learners scaffold each other in L2 Spanish chat sessions using Aljaafreh and Lantolf's (1994)

pioneering regulatory scale. One of the drawbacks of her study is lack of systematic investigation of specific morphosyntactic structure (Darhower, 2007). It also failed to generate the typologies of mediation and reciprocity moves for DA in SCMC context. Darhower (2007) investigated the development processes of two university Spanish learners as they produced a series of past narrations. He claimed that the findings revealed that learners' need in mediation provided information on their developmental potentials as well as their independent functioning. The focus of Darhower's study was limited only to oral narrations of the stories, no account of written narrations was presented. Unlike the previous DA studies in L2 (Ableeva, 2010 ; Darhower, 2007 ; Oskoz,2005 ; Poehner, 2005; Summers, 2008), mediation which is one of the basic principles of Feurestian's mediated learning experience (MLE)(Feurestian et al., 1988) and a cornerstone of DA, was carried out only in spoken form(except for Shrestha & Coffin ,2012) . In the present study, mediator's access to different Web 2.0 affordances of highlighting and web links made the emergent mediation and reciprocity typologies a mixture of written and spoken prompts, organized from the most implicit to the most explicit assistance offered flexibly based on the learners' reciprocity to mediation in SCMC.

Method

To explore the nature of mediation in SCMC and its impact on DA a heuristic case study approach was used. Following most DA studies (Ableeva, 2010; Poehner, 2005; Summers, 2008), the microgenetic method was implemented as the general analytical framework to investigate the level of self-regulation in learners' cognitive development. Vygotsky (1978) defines genetic analysis as "analysis that returns to the source and reconstructs all the points in the development of a given structure' (p.65). Lantolf (2000) indicates that microgenetic method offers an innovative alternative to the study of mind to capture the moment-to-moment changes in children behavior that characterizes development for Vygotsky. Belz and Kinginger (2003, p.594) discuss the microgenetic method as the observation of skill acquisition during a learning event enabling researchers to examine specific instances of the development. In the context of this study the mediator kept track of moment-to moment changes of the learners' performance on target structures in which the learners' high reciprocity and fewer number of mediation moves represented microgenetic development of target structures. This means that learners requiring fewer and less explicit mediation moves while being more responsive to mediation in subsequent DA and TR sessions exhibit microgenetic development. Moreover, the microgenetic method which is rooted in collaborative interaction is compatible with interactive Web 2.0 technology and process-based SCMC that offer tracking systems to digitally record learners' microgenetic development of the use of target structures.

Participants

Due to the nature of the study which required access to the broadband internet and difficulty in finding subjects with the high speed Internet access, the researcher used snowball or chain referral sampling, which is a nonrandomized purposive sampling to recruit participants not easily accessible by the researcher. Biernacki and Waldorf (1981) state that snowball sampling "yields a study sample through referrals made among people who share or know of others who possess some characteristics that are of research interest."(p.141).

At the outset, the subjects were adequately and thoroughly informed about the research and its requirements in the recruitment email, and they were also assured that their privacy and confidentiality would be protected. Six participants consented to voluntary participation in the study. They were required to fill out web literacy and participants' language profile questionnaires posted to their emails. It was expected that the data elicited through questionnaire and participants' profiles would provide insights into learners' L2 learning and web literacy history that would allow better organization of the experimental stage of the study. Later, the volunteered participants were invited to download the web-based diagnostic test of DIALANG which is free and available at <http://www.lancs.ac.uk/researchenterprise/DIALANG/> about. As an adaptive diagnostic web-based assessment tool, DIALANG provides test-takers with scores related to the Common European Framework of Reference for Languages (CEFR). It provides feedback and advice on how to move towards the next CEFR level. In DIALANG, the Common European Framework of Reference – CEFR (Council of Europe, 2001) – Test results are reported on the six levels of the CEFR scale, which ranges from A1 (the lowest level) to C2 (the highest level). They were required to take the structure section of the test and email the results to the researcher. The results included a CEFR level and diagnostic feedback which highlighted the underlying problems in participants' English grammatical structure among which the use of modal and preposition structures were the most problematic and subsequently chosen as the target of mediation in DA and TR sessions. On the basis of DIALANG proficiency levels and nested approach two university students reported as basic users (A2) were selected. Patton (2002) refers to nested approach as a sampling method that "the logic and power of which as a purposeful sampling lie in selecting information-rich cases for study in depth" (p.230).

Despite their participation in the study, the data of those falling within and independent (B1, B2) and proficient users (C1, C2) were not considered as they were not information rich cases in this study because only A2 participants had a number of errors in modals and prepositions chosen as the target of DA and TR sessions.

The subjects were Iranian PhD candidates in educational psychology studying in Non-English speaking universities whose native language was Persian and struggled with their command of English proficiency particularly writing skill and hoped that the study would provide an opportunity to improve the use of grammar in their writing. Therefore, the potential benefits kept them motivated to participate in the study. The participants had one-to-one individual DA and TR sessions (DA1, DA2, TR1, TR2) twice a week on written and oral narratives in GW and Skype for a period of two months to uncover the participants' ZPD differences in the use of target structures and develop their current capabilities. Regarding the ethical considerations, to ensure the confidentiality of the participants pseudonyms were chosen for them through the whole research. Every effort was made to protect the identities of the participants by storing all audio and video recordings of their online interactions with the mediator in password-protected internal and external hard drives only accessible by the mediator and the subjects.

Materials and Tasks

Different materials were used for data collection at each stage of the study (see table 1).

Table 1
Materials and tasks

Research stages	Materials	Tasks
Pre-test as a diagnostic NDA	Lion story: A picture story comprised of a series of pictures about the relations between a lion and a mouse	All selected materials were shared via Skype's screen sharing and narrated orally and in written form in Skype and Google wave by the learners.
DA	Pear Story: A silent YouTube film showing a man harvesting pears, which are stolen by a boy on a bike.	
TR1	Dog rescue: a picture story depicting a heroine rescue of a dog drowning in a river by a passer-by who risked his life to save the dog.	
TR2	Mr. Bean video clip: A funny clip by the popular British comedy about the open day in a school.	

For the traditional assessment and diagnostic phase of the study used to collect baseline information and resonated pre-test in experimental design, a set of pictures which formed a story were shared via Skype's screen sharing application with the participants to be narrated orally and in written forms in Skype and Google wave (GW) respectively. For DA sessions, a silent YouTube video clip named the pear story comprised of five scenes was used. To evaluate the learners' level of internalization and ability to extend DA mediation to new and more challenging contexts transcendence (TR) was employed. Furestian et al., (2002) define transcendence as "the widening of interaction beyond its immediate goals to other goals that are more remote in time and space" (p. 76). In transcendence new situations are introduced to enable learners expand their cognitive capabilities beyond the here and now demands of a given task. This study intended to investigate near and delayed TRs in terms of timing of their presentation after DA sessions which were carried out within one and two week intervals. For TR1, dog rescue picture story was shown to the learners which was presumably more challenging than DA tasks because of its dramatic rescue scenes which involved emotional reactions on part of the learners. The second task in TR2 was rather of a different nature. It comprised a short clip from Mr. Bean a popular British comedy in which he engaged in a series of wrong doings in the open day in a school. The clip selected also seemed to be more challenging than DA materials because it covered different themes and included more characters. Robinson (2005) states that task difficulty is related to learners' perceptions of how difficult a task is. It reflects the demand of the task including both cognitive factors (e.g. working memory) and affective variables such as anxiety and confidence (see Robinson, 2001). As participants indicated in the course of the study, both TR1 and TR2 involved multiple dramatic scenes which were difficult to recall and caused anxiety in narration. As the clip was silent and no lexical items and verb forms were available to control the learners' familiarity level as an index of

the task's difficulty level, the other researcher's second opinion added credibility to the selection of TR2 clip.

Data collection procedure

To track and archive the participants' written narratives and follow the mediation process online, the researcher selected Google Wave (It is now terminated and replaced with different services such as Titanpad and Primarypad) which allowed students to enjoy a wide array of collaborative tools such as highlighting and shared web links in real time. Skype, a free online phone service, was used to provide oral mediation and prompts in DA and transcendence sessions offering live interactions via text, audio and video. By integrating Skype's audio application with GW's live platform for written narrative, the researcher could combine oral and written prompts in online mediation which has been unprecedented in both traditional classroom-bound and other SCMC DA studies.

The learners' performance was evaluated in the following assessment sessions: First, they took part in a non-dynamic assessment session served as baseline information in which the participants were prompted to present their oral and written narratives of a series of picture stories and short video clips. It was used as the baseline and repeated for all participants after DA to find out about the underlying problems and the level of progression towards self-regulated behavior of the target structures. In DA1 and DA2, the learners and the mediator worked dialogically to promote their cognitive functioning of the target structures. It should be pointed out that the dialogic mediation in this study was based on the principles of interactionist DA i.e. the mediation emerged out of the cooperative dialoguing between the mediator and the learners. The mediation was individualized and it was provided as the learners were engaged in narrating the stories (cake format), i.e. the erroneous sentences were mediated as the narration unfolded over GW and Skype (see results and discussion). Thus, the assistance was tailored to the learners' ZPD levels of the target structures. DA2 was followed by a near transcendence session which was carried out within a week interval to capture the learners' ability to extend the outcome of the mediation within a short time period. It was followed by a delayed TR2 conducted within two weeks interval to make sure of the long term effect of internalization process of the mediation and expand the learners' cognitive capacity. This entire process was digitally recorded in GW and Skype's archives and also by Skype's mp3 call recorder and Camstudio 2.0 software for later thematic and microgenetic analysis. Moreover, the students' reciprocity behavior, i.e. the actions of the students that triggered mediation along with mediation moves were identified, transcribed, analyzed and catalogued.

Data Analysis

According to Darhower (2002), data reduction is necessary to maintain consistent and systematic data analysis. Reduction is achieved by selection of relevant episodes. Swain (2001) described Language Related Episode (LRE) as “any part of a dialogue where students talk about the language they are producing, question their language use, or other- or self-correct their language production” (p. 287). In the present study, the instances of interactions between the learners and the mediator in which the learners were struggling with some target structures during DA sessions and transfer tasks

in the form of LREs are considered the unit of analysis. The researcher looked for some signs of microgenetic development in the use of the target forms to determine the learners' potentials and their capacity to self-regulate their performance.

In this study, thematic analysis was used for manually encoding the transcripts of the interactions between the mediator and the learners in NDA, DA and TR sessions. Boyatzis (1998) points out that thematic analysis is a method in qualitative research used for uncovering patterns and themes in a particular phenomenon. The researcher in this study adopted the inductive data-driven approach to find out about emerging key themes through scrutinizing the mediation's raw data between the mediator and learners. This approach requires the researcher to explore the data in order to construct theories 'grounded' in the data themselves (Charmaz, 2006).

To begin with code development, audio and video files of NDA, DA and TR sessions were transcribed and organized for each participant in the study. After coding the data, reports were generated for the following themes:

1. Mediation moves
2. The use of target structures in mediation
3. The learners' reciprocity to mediation

As mediation moves employed by the mediator and learners' reciprocity to mediation could not be anticipated, grounded theory was used to code the emerging categories of mediation and reciprocity moves. Grounded theory methods consist of "systematic, yet flexible guidelines for developing theories from research grounded in data rather than deducing testable hypotheses from existing theories" (Charmaz, 2006, p. 4).

Descriptive statistics was used to analyze the quantitative data including the mediation moves carried out in DA sessions and TR tasks along with learners' reciprocity to mediation to shed light on their development in a traditional manner targeting their zone of actual development (ZAD). It should be reminded that the learners' ZPD for the target structures was explored in language related episodes(LREs) in which the learners' moment-to moment changes in performance is presented and considered as microgenetic development.

As the researcher went through multiple forms of evidence (oral and written narrations of different picture stories and video clips presented in multiple LREs) rather than a single incident, the interpretations based on results tended to be valid enough to find out about the potential level of learners' development for the target structures after mediation in SCMC. Summers (2008) believe that as DA studies target individuals' developmental path by extracting the pattern of mediation and learners' reciprocity rather than generalizing across populations, the reliability of codes is not applied and is rather replaced by trustworthiness.

To increase the trustworthiness of the study, the researcher worked with a peer-debriefer who was familiar with the nature of qualitative design and analysis. He reviewed the whole process of methodology, design, questions, data collection and analysis in the process of entire study.

As for the clarifications of the researcher's bias, I made every effort to present a fair and balanced account of data and tried not to see the data only through my theoretical lens, but rather multiple perspectives of data collection and analysis (peer-debiefier and audit trail) were employed. By maintaining an audit trail of methodological and analytic decisions through recording all data collection procedures and digitally stored them into hard disks, the researcher enabled others to evaluate the significance of the research.

Results and Discussion

Mediation Taxonomy

To explore the nature of mediation and reciprocity typologies as the criteria to evaluate the learners' microgenetic development of the target structures in SCMC-based DA, this section details the mediation moves and learners' reciprocity which emerged out of thematic analysis of data to address the research question. In the first part, the mediation typology is discussed followed by the inventory of learners' reciprocity.

Poehner (2005) believes that developing typologies is essential for uncovering microgenetic development over time in DA studies. Through mediation and reciprocity typologies one would track the precise level of mediation that a learner required and how this might change with time. The following mediation typology represented different mediation moves employed by the mediator in DA in SCMC context. The mediation typology presented at Table 2 was in fact the sum of all moves employed by the mediator in different DA and TR sessions which emerged out of data and arranged from the most implicit to the most explicit mediation categories. The mediation moves were employed in an individualized manner based on the learners' level of ZPD for the target structures and their reciprocity to mediation.

Table 2
Mediation Typology

	Themes	Description		Categories
M1	Awareness-raising	Learners are prompted to use Web 2.0 affordances to become aware of their errors	M1.1.	Virtual collaborative frame, using visual saliency of SCMC to detect errors
M2	Problem identification	Learners are prompted to identify the erroneous sections in the paragraph and within sentences by using Web 2.0 affordances	M2.1.	Auto smart edit, taking advantage of Google wave's edit application to offer choices by automatically underlying grammar and spelling errors

			M2.2.	Yellow highlighting of the sentence containing error/errors
			M2.3.	Zero in on the exact location of error using red highlighting
M3	Overcoming the problem	Cyber-mediation, providing the target structures and sharing the inserted relevant web links	M3.1.	Incorporating the link content and solving the problem
			M3.2.	Highlighting the examples and illustrations in the web page
M4	Choice offering	Choice offering to find out about the learners' level of understanding of the target structures		Offering choices of the variations of target structures orally or in written form
M5	Justification of response	Learners were asked to talk about the reasoning behind the choice of target structures		Asking for the learners' justification of their responses over Skype
M6	Focusing on the target structures	The learners were explicitly mediated orally to fully explore the target structures	M6.1	Providing the correct form orally
			M6.2.	Oral explanation and exemplification of the target structure

The emergent mediation typology was divided into four general categories namely awareness raising, problem identification, overcoming the problem and finally focusing on the structure.

Unlike the previous DA studies (Poehner, 2005; Ableeva, 2010; Summers, 2008) and SCMC-based DA (Darhower, 2007; Oskoz, 2005) in which the respected mediation typologies comprised of only oral mediation moves to extend their participants' ZPD, the emergent mediation typology in this present study was a mixture of written and spoken mediation moves organized from the most implicit to the most explicit assistance offered flexibly during mediation in SCMC. Except for the final phase of mediation, the mediation moves provided were in written form exploiting the

wide array of Web 2.0 tools such as highlighting and web links to enrich the mediation in online DA.

Virtual collaborative frame (VCF)

Inspired by Aljaferih and Lantolf (1994), the mediation started with the most implicit form of mediation which has been termed as collaborative frame, i.e. the mediator's mere presence on the context of the study without any direct intervention in the learner' error correction. They argued that the collaborative frame prompted learners in their study to correct their errors to some extent. In the awareness raising category of Table 2, Aljaafreh and Lantolf' collaborative frame was reformulated to fit the needs of online DA as *virtual collaborative frame (VCF)*. The following example illustrates the use of VCF:

In TR1, Dara managed to use collaborative frame to make some corrections to the following erroneous structure which indicates microgenetic development in exploiting collaborative frame:

1. *D: He tries to swimming towards the land.**

D: He tries to swim towards the land.

VCF was revealing in highlighting not only the progression toward self- regulation but in displaying regressive moves used by the participants. The following excerpt illustrates how Dara made wrong correction within VCF in TR1:

2. *D: she wants to help it.*

*D: No .she wants to helping it.**

M: Why helping?

D: because of to (preposition)

M: No, to is not a preposition here , we had it before in infinitive, (to help)

D: Ok, you are right.

Smart auto edit

The problem- identification category included another affordance of Web 2.0 in the form of auto smart editing which allowed automatic correction of the learners' erroneous spelling and grammar structures. As it is provided automatically as Web 2.0 affordance, this form of online assistance is considered as the most implicit mediation move after VCF. Sepideh used auto smart edit to make some corrections in DA1 as in the followings:

3. *S: There is trees and a man in this garden.**

S: There are trees and a man in this garden

It is important to remember that in the initial mediation phase, technology seems to assume greater role than human mediator and made it possible for the learners to assume responsibility for their performance without the mediator's direct intervention.

Highlighting in color

The problem identification section of the mediation was also marked by the use of highlighting in different colors to identify the erroneous sections within the sentences. Highlighting made it possible for the learners to be engaged in both written and spoken modes with the mediator and added richness to visual saliency of SCMC. Presumably, SCMC had been influential in focusing their attention on minor errors that were often overlooked in other contexts. Through the problem identification category, learners' reciprocity to yellow and red highlighting revealed important information about their ZPD levels. It is implied that the learners were more responsive to mediation in the case of yellow highlighting because they managed to correct the erroneous structures, so with fewer mediation moves and less explicit type of assistance, they were developmentally more ready than those needed additional more explicit red highlighting for a target structure.

Those learners who only required yellow highlighting to overcome their problems were functioning more progressively on the target structures than those required red highlighting which is considered as more explicit type of assistance.

The following language related episode indicates the importance of the use of yellow and red highlighting as a mediation move: Dara had a problem with the use of prepositions in DA1 in which he failed to correct the error through yellow highlighting and required more explicit assistance to zero in on the exact location of error through red highlighting. This clearly highlights the importance of red highlighting make the learner aware of the type of error committed.

4. D: *The boy watch the farmer.* *

M: *The boy watch the farmer.* *

D: *the boy watches at the farmer.* *

M: *the boy watches at the farmer.*

D: *the boy watches the farmer.*

Cyber-mediation via web links

The third main category of mediation moves was concerned with overcoming the problem by exploiting another feature of Web 2.0, namely web links. This particular mediation which I called *Cyber-mediation* seemed to be promising in making DA possible for distant education. Poehner (2010, personal correspondence) indicates that this approach to mediation of posting URLs to relevant web sites where learners could get more information is very innovative and seems to have a good deal of potential to help us do DA in contexts where one-to-one face-to-face interactions are not possible. This cyber-mediation as an “autonomous constructivist activity” (Kessler, 2009) enabled students to establish a sense of responsibility for the ongoing mediation,

extend their ZPD.

Sepideh in TR2 struggled with the modal verbs structure. After being mediated by a posted web link on English basic modals, she not only overcame the problem but explained the reasoning behind her error correction. This indicates the significant impact of this particular cyber-mediation on some target structures which resulted in progression toward ZPD and self-regulation,

*S: He said it might be have better condition.**

M: He said it might be have better condition.

*S: He said it may be have better condition.**

*M: He said it may be have better condition.**

*S: He said it may be had better condition.**

M: Follow the link: http://www.eslgold.com/grammar/basic_modals.html

*S: May have? (**choon have shekl sadeh fel ast**)(because have is the simple
for of verb)*

M: OK

Because of the difficulty level and wide coverage of target structures presented in some of the posted web links, some of the learners experienced difficulty with the cyber-mediation. Therefore, additional human mediation was required to further explore the content of the web links. This time the mediator employed the targeted highlighting of the relevant illustrations and examples exploiting Aapture add-on in Firefox browser which allowed highlighting of web links content only to be shared with the learners in the collaborative context of SCMC via Skyp's screen sharing. (see screenshot 1). To maintain an acceptable degree of implicitness, care was taken to highlight only the relevant sections, not direct examples.

Sepideh in DA1 had problems with the use of compound nouns, she was overwhelmed by the complexity of illustrations offered in the link. After spending some time browsing through the content, she found it unhelpful. The mediator provided her with a more explicit mediation in the form of targeted highlighting of relevant illustrations and examples (see screenshot 1).

Screenshot 1

Somebody said a GREEN HOUSE (a house which is painted green) or a GREENHOUSE (a building made of glass for growing plants inside).

British/American differences

Different varieties of English, and even different writers, may use the open, hyphenated or closed form for the same compound noun. It is partly a matter of style. There are no definite rules. For example we can find:

- container ship
- container-ship
- containership

If you are not sure which form to use, please check in a good dictionary.

Plural forms of compound nouns

In general we make the plural of a compound noun by adding -s to the "base word" (the most "significant" word). Look at these examples:

singular	plural
a school teacher	three <u>school teachers</u>
one assistant headmaster	five <u>assistant headmasters</u>
the sergeant major	some sergeants major
a mother-in-law	two <u>mothers-in-law</u>
an assistant secretary of state	three <u>assistant secretaries of state</u>
my toothbrush	our <u>toothbrushes</u>
a woman-doctor	four <u>women-doctors</u>
a doctor of philosophy	two <u>doctors of philosophy</u>
a passerby, a passer-by	two <u>passersby</u> , two <u>passers-by</u>

Note that there is some variation with words like spoonful or truckful. The old style was to say spoonfuls or truckfuls for the plural. This is now normal for spoonfuls and truckfuls. Both the old style

Oral explanation of target structures

In the final phase of mediation, Skype's audio chatting application was mainly used as a means of providing oral explanations for the problematic target structures which were resistant to previously offered written mediation. It should be reminded that the nature of the problem the learners faced determined the degree of explicitness of mediation provided. For example in some problems related to the use of prepositions most of mediation moves were explicitly oriented and required oral mediation via Skype because the learners could not use the mediation provided in written form (highlighting and cyber-mediation) and required the answer right away to keep the narration going.

In TR1, Sepideh was mediated for the use of modals and because of his low ZPD level of this structure, he could not incorporate the implicit mediation moves and was finally given the correct answer by the mediator.

6. S: *May weather is cold and man gets a cold.**

M: *May weather is cold and man gets a cold.**

S: *The weather may cold and man gets a cold.**

M: *The weather **may cold** and man gets a cold.**

S: *What's the problem?**

M: *Follow the link: http://www.eslgold.com/grammar/basic_modals.html*

S: *The weather may is cold and man gets a cold.**

M: May be, after may we have simple form of verb, and the simple form of "am , is, are" is "be"

S: Yes, may be cold

A final note on the importance of each general category of mediation moves is in order here. It is important to remember that the frequency of mediation moves is not as informative as their quality in DA mediation. For example, it would be quite revealing to find out whether the mediation moves employed by the mediator just raised learners' awareness to the source of errors or helped them solve the problem. This qualitative difference highlighted in LREs indicates different orientations of learners' progression toward self-regulation of the target structures. This moment-to-moment microgenetic analysis of the exchanges between the mediator and the learners form the basis of "micro validity" (Poehner, 2011) argument i.e., the appropriateness of particular mediating moves during the interaction as evidence to support interpretation of DA mediation. Thus, the mediation moves employed by the mediator along with learners' reciprocity to mediation play a crucial role in evidence-based validity argument in DA studies.

Learners' reciprocity taxonomy

Similar to mediation typology, the reciprocity inventory (table 3) emerged out of thematic data analysis. This typology is divided into four main categories organized hierarchically from learners' lack of reciprocity to virtual collaborative frame and highlighting mediation to their taking on responsibility for performance by explaining and exemplifying the target structures. Although it has been inspired by and bears some general resemblance to that of Poehner (2005), its categories are mostly related to learners' reciprocity to written mediation rather than spoken mediation. Thus, the categories emerged out of general themes are inclusive to SCMC context via Web 2.0.

Table 3
Reciprocity inventory

	Themes	Description	Categories
R1	Lack of reciprocity to mediation	Failure to identify the location of error in VCF and highlighting	R1.1.no response to mediation
R2	Partial reciprocity to mediation	Problems in error identification and incomplete incorporation of mediation	R2.1. correcting some errors, missing the others R.2.2. Changing correct structures into incorrect ones

			R2.3. overgeneralization of previous mediation
			R2.4. Backsliding and Regression
			R2.5. Respond incorrectly
R3	Overcoming the problem	Using the mediator as a resource and incorporating his mediation to solve the problem	R3.1. Asking for more help
			R3.2. Problem solved
R4	Assuming full responsibility	Trying to internalize the mediated structure by offering explanation and exemplification	Learners' justified their responses

The reciprocity inventory was divided into two general themes as indicators of low and high reciprocity to mediation. Contrary to the mediation typology, this inventory started with the learners' low reciprocity in the form of lack of response or partial reciprocity to mediation. The learners who exhibited this type of behavior were considered low in their ZPDs for the target structures. On the other side, the main themes of overcoming the problems and assuming full responsibility of mediation (see Table 3) represented high reciprocity levels and progression towards self-regulation. The lack of reciprocity to mediation occurred at different stages ranging from VCF as the most implicit mediation move to oral explanation of the target structure that represented the most explicit type of assistance provided by the mediator. The following LREs illustrated the data on the basis of which the reciprocity inventory emerged:

Lack of responsiveness to mediation

In TR2, Dara failed to pay attention to highlighting mediation was not aware of his error on the use of infinitives, consequently was nonresponsive to the mediator's yellow highlighting.

7. D: *He wants a police officer gives him a pencil and a net.**

M: *He wants a police officer gives him a pencil and a net.**

D: *No problem, I think*

M: *Gives or to give?*

D: *To give*

M: *Why?*

D: *Because of 'want'*

M: OK!

It is argued that the term "lack of reciprocity to mediation" could signal the learners' abilities in different ZPD levels at various mediation stages. For example lack of response to VCF is qualitatively different to lack of response to the mediator's more explicit help. The same argument applies to other reciprocity moves. Therefore, it is important to remember that while interpreting the reciprocating moves by the learners, the mediators' mediation behavior should be taken into consideration. Thus, it is assumed that in DA mediation every move on part of both sides counts and should be considered as components of microgenetic development.

Partial responsiveness to mediation

The following LRE illustrates reciprocity move by Sepideh in which she made a correct structure incorrect after being mediated by yellow highlighting. This move uncovered her lack of control for that particular structure that called for further mediation.

8. *S: He was driving when he saw a car same as his car. **

*M: He was driving when he saw a car same as his car. **

S: He was driving when he saw the car same as his car.

M: A car was OK, because we do not know that car.

*M: He was driving when he saw a car same as his car. **

S: The same as?

M: yes

This LRE represents Dara's DA1 overgeneralization of the previous mediation of the third person "s" in the present tense which has been one of the high frequency errors made by both participants in the study. In this LRE, Dara attempted to apply the same rule to the modal "can". After being mediated through yellow highlighting, he is only partially responsive to mediation and the sentence is still erroneous.

9. *D: The farmer cants understood. **

*M: The farmer cants understood. **

*D: The farmer can't understood. **

Assuming full responsibility

Offering explanations by the learners represented the highest reciprocity level in which they not only took full responsibility for their performance but they willingly explained the reasoning behind their choices to display their full control of the structures being mediated.

In TR1, Sepideh showed her control of tense making by justifying her correction of the problem:

10. *S: But the woman get very sad because she missed the dog.**

M: But the woman get very sad because she missed the dog.

S: But the woman got very sad because she missed the dog. (choon jomlah badi gozashtas)(because next sentence is in the past)

As illustrated, the above LREs detailed the learners' specific needs and the ZPD levels for the target structures. It should be pointed out that these typologies are not intended to generalize the component moves to new contexts and learners; rather, they reflect the individual mediation in SCMC-based DA via Web 2.0. The point to keep in mind in learners' reciprocity is the important role of the mediator's expertise in using different mediation moves to keep up with the reciprocating patterns of the learners in their ZPDs to move them beyond their current capabilities. According to Poehner (2011) reciprocity to mediation could be considered as crucial evidence for evaluating interpretations of learner development in validity argument.

Assessment in the ZPD

To evaluate the development in the learner's interlanguage, Aljaafreh and Lantolf (1994) developed a 5-level regulatory scale based on two principles of the frequency and the type of assistance needed by the learners in mediation. This scale represents different development stages; starting with other-regulation which is characterized by learners' reliance on the tutor's help to notice and correct an error—(levels 1-3), followed by partial regulation in which learners are able to correct an error with minimal or no explicit feedback (level 4) and finally to self-regulation which culminates in self-generated and automatic feedback—(level 5). Aljaafreh and Lantolf argue that a learner who is able to produce a particular structure as a consequence of more implicit forms of regulation is developmentally more advanced than one who needs more explicit and direct feedback for the same structure. Following Aljaafreh and Lantolf's study, the criterion to represent microgenetic development in the present study was determined by the 'quality' and 'frequency' of help provided through mediation as the learners moved through ZPD in five transition levels toward the self-regulation of the mediation. The mediation moves employed by the mediator through the sessions are presented in Table 4 ordered from the most implicit type of mediation.

Table 4
Mediation Moves across the Sessions

Participants	Dara				Sepideh			
	D A1	DA2	TR 1	TR 2	DA1	DA2	TR1	TR2
Virtual collaborative frame	1	1	1	1	1	1	1	1

Auto smart edit	1	1	1	1	1	1	1	1
Yellow highlighting	19	11	6	7	14	9	6	4
Red highlighting	9	5	3	4	9	5	2	4
Providing web links	9	3	1	3	10	6	4	4
Incorporating the link content	6	3	1	0	6	3	2	1
Highlighting the link examples	3	0	0	3	4	3	2	3
Choice offering	2	2	0	2	2	1	0	2
Oral explanation and justification of the response	2	1	0	0	2	1	0	0
Providing the correct form orally	3	2	1	2	3	2	2	2
Total mediation moves	55	29	14	23	52	32	20	22

As can be seen in the above data, both subjects' mediation moves increased in TR2 which represented backsliding and regression. This corroborates Feuerstein et al. (1979) argument that while some learners may perform efficiently in a specific task, they may not be able to transfer/transcend their learning to new contexts. They suggested that while a group of learners may perform similarly in acquisition tasks with little or no help required, differences among them may emerge when learning is re-contextualized. Vygotsky regards development as an evolutionary as well as revolutionary process which is not linear and involves both progression and regression. He argued that even if development might contain some regression, it still contributes to general movement forward (cited in Ableeva, 2010). The regression here does not constitute failure to development. The learners had in fact developed, but that the TR2 task was sufficiently challenging that they once again required more explicit mediation.

Contrary to mediation moves used by the mediator, reciprocity categories started with the lowest level of the learners' reciprocity to mediation which was characterized by the lack of response to yellow highlighting and culminated in consolidation and offering explanations as the highest reciprocity level to mediation that reflected the learners' control over the target structure.

As is illustrated in Table 4 the total number of reciprocating moves decreased, which indicates the general progress towards self-regulation of the learners' ZPD. Because we expect higher reciprocity in subsequent sessions, the decline seems to be paradoxical. As a matter of fact, when learners move forward in their ZPDs, they need fewer mediation moves that naturally call for less reciprocity on the part of the learners. It is essential that the learners' reciprocity levels be interpreted in relation to the form of mediation that prompted them. We would want to distinguish between learners who, for example, overcame a problem as a result of the yellow highlighting from those who only were able to overcome a problem when a choice was offered. Developmentally, these two learners would be in different places.

Table 5
Reciprocity Moves across the Sessions

Participants	Dara				Spideh			
	D A1	DA2	TR 1	TR 2	DA1	DA2	TR1	TR2
Lack of response to yellow highlighting	9	1	2	3	7	2	2	3
Correcting some errors missing the others	8	3	3	4	6	2	2	5
Changing correct structures into incorrect ones	4	2	1	2	4	2	0	1
Overgeneralization of previous mediation	2	0	1	2	0	0	0	2
Backsliding and regression	0	1	1	2	0	1	1	2
Asking for more help	7	3	3	4	5	3	3	2
Problem solved	9	7	4	2	6	4	2	2
Consolidations by offering explanations	3	5	2	1	2	2	2	1
Total reciprocity moves	42	22	17	20	30	16	12	17

A comparison between DA1 and DA2 indicates the fact that despite a relative decline in the number of low reciprocity moves (lack of response to yellow highlighting, correcting some errors missing the others), the learners maintained their high reciprocity levels (asking for more help, problem solved) that clearly indicates their progression towards self-regulation of the target structures in DA2, TR1 and TR2.

As each session passed, the mediation became increasingly implicit in nature and the learners' reciprocity level decreased (the number of incorrect responses declined) which is indicative of their microgenetic development. The data presented in Table 5 points out the fact that progress does not run smoothly across TR sessions. Dara's and Sepideh's performance did not maintain the progress observed in TR1 and signs of progress in delayed TR2 were not evident. This highlighted their need for more explicit assistance at this stage. In the meantime, the level of their reciprocity dropped to lower levels (lack of response to yellow highlighting, correcting some errors missing the others). This regression indicates that they probably had difficulty in transferring some parts of the previously developed abilities in a more challenging context within longer time intervals. It also highlights the importance of delayed transfer to reveal even more information regarding the learners' developmental trajectory which is marked by continuous backsliding and regression. It

should be acknowledged that the lower amount of needed mediation might also be because of learning that may have happened between transcendence tasks

Although the quantitative representation of the mediation moves used in each session is presented and is considered as a factor indicating learners' microgenetic development (see tables 4 & 5), what adds to the credibility and validity of the study's interpretation is the qualitative individualized microgenetic analysis of DA and TR sessions which are presented in the form of LREs presented in the following section:

The following LRE illustrated an exchange between the mediator and Sepideh in DA2 in which she had a problem with the use of modals. In this exchange, she focused on the past tense and changed "may" into "might" but failed to notice a more serious error. After being mediated by red highlighting, she could notice the erroneous section and correct the error. Later, she gave reasoning for her correction in L1 to convince the mediator that she already knew something about modals in English. The data evidenced that Sepideh could take responsibility for her performance with less explicit help in her first encounter with this problem in DA1. She was able to notice and incorporate the assistance which characterizes level 3 of Aljaafreh and Lantolf's (1994) internalization of assistance in ZPD.

11. S: *he said he may finds better condition.*

M: *he said he may finds better condition.*

S: *he said he might finds better condition.*

M: *he said he might finds better condition.*

S: *he said he might find better condition.*

M: *why?*

S: *(fek mikonam bad az inha, can,may,might fel bedon s miad)(I*

think after modals we should not use "s")

M: *OK*

Two weeks later in TR1, the mediator traced an error in Sepideh's writing on the same modal problem. As soon as he highlighted the sentence in yellow, Sepideh corrected the error instantly. As a matter of fact what she needed for self-regulation was just a second chance with much less explicit assistance. The data highlighted the fact that Sepideh actually moved up to level 4 of internalization of assistance in which she noticed and corrected the error with minimal or no obvious feedback assistance.

12. S: *the dog might to be hungry.*

M: *the dog might to be hungry.*

S: *the dog might be hungry.*

However, the structure was not yet fully internalized at this stage since the learner sometimes produced the target form incorrectly as in the following LRE in TR2.

13. *S: they may be continue life happily.*

M: they may be continue life happily.

S: they may continue life happily.

This backsliding in TR2 reiterates Feurestian's and his colleagues (1988) concern over the hopes to gain substantially in a limited number of MLE sessions. It also raised the question that mediation effect on some learners' development might be short-lived and should be taken with a grain of salt. The regression in TR2 could be explained by the existence of longer time intervals that possibly had an adverse effect on the learners' performance or by the difficulty level of the video clip shown in TR2. Although it was a silent movie with almost no conversations, Mr. Bean's clip involved some fast-paced dramatic scenes that might have distracted the learners' attention from the target structures.

Discussion and Conclusion

The above data highlighted the point that DA mediation and reciprocity patterns shed light on the learners' current interlanguage and their development over time. It is argued that if evaluation stops at DA mediation, the mediator would be robbed of the chance of obtaining more information out of their functioning in more challenging TR sessions. The results of the study are in line with Poehner's (2008) assertion that learners' reciprocity is apt to change as the learners become more self-sufficient. Thus, reciprocity plays a crucial role in DA mediation and it represents learners' agency in learning.

This study corroborates Kozulin's (2011) study in which he identifies two goals for DA studies: discovering learner's learning potential or thinking potential. Learning potential refers to the efficiency with which learners use learning devices such as models, prompts, and cues to acquire knowledge, strategies, and skills. Thinking potential or cognitive modifiability, on the other hand, denotes the restructuring and application of knowledge, strategies, and skills to the solution of problems that are removed from acquisition tasks in complexity and modality. To put Kozulin's concepts of learning and thinking into an understanding of DA, exploring learning potential is realized in DA sessions and thinking which is concerned with cognitive modifiability is dealt with in transcendence/transfer tasks. The regression of the learners in TR2 is in line with the results of Kozulin's (2011) study revealing that those exhibiting same learning potential through mediation in DA do not achieve same terminal levels of cognitive modifiability in TR. In DA sessions, a subject may display relatively high learning potential in the form of fewer numbers of mediation moves, less explicit help and fewer reciprocity moves. Yet, the same learner might exhibit low modifiability in transcendence (TR) sessions in the form of more mediation moves, more explicit help and reciprocity moves which represent backsliding. This study highlighted the need to conduct even more delayed TR sessions (far and very far) which might render different unexpected results that in turn provide more insights into the learners' progression towards self-regulation in their ZPD.

The pedagogical implications of DA in SCMC lies in the fact that the learners' microgenetic development profiles could be used for development of emergent syllabus (Boettcher,2007) or individualized instructional plan which are based on the emergent patterns of learners' behavior and unpredictability of the course. The emergent syllabus consequently allows the development of individual learning plans for learners with different levels of reciprocity to mediation. This is where lies the main attractive of using DA for both learners and course designers. By integrating visual saliency of forms, the self-paced setting and more processing time of SCMC into course syllabi, language educators provide learners with a virtually supportive learning environment, in which they contextualize their learning when they interact with other learners independent of time and space and exceed the limits of typical decontextualized classrooms. Moreover, the online interactions as a demonstration of learners' interlanguage can be tracked and retrieved for further analysis of microgenetic development.

Besides being labor-intensive in terms of procedure, DA advocates sometimes fail to establish a clear demarcation between interactionist and interventionist DA in procedural terms. Because of non-standard nature of interactionist DA mediation, the mediator needs to be highly qualified to develop insights and assess learning process. Doing DA in the SCMC requires digital literacy along with linguistic competence to help learners mature in both areas. Although presenting the emergent typologies of mediation and reciprocating moves in this study was a step forward in promoting the validity and credibility of procedures employed in SCMC-based in virtual classroom, much still needs to be done by different researchers in various online contexts particularly in asynchronous computer mediated communication (ACMC) such as blogs and wikis to further explore this issue.

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