NONLINEAR DYNAMIC MOTIVATION-ORIENTED TELECOLLABORATIVE MODEL OF LANGUAGE LEARNING VIA FORMULAIC SEQUENCES TO FOSTER LEARNER AUTONOMY

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Abstract

Exploring the ways to develop a comprehensive learner-friendly telecollaborative model of learning led to the introduction of nonlinear dynamic motivation-oriented model. To foster self-regulated learner autonomy, the model aims at recruiting the potential behind formulaic sequences for L2 comprehension-production in response to immediate processing demands as well as nonlinearity and dynamicity of motivational factors at individual level. Drawing on different theories and findings (e.g. complex dynamic systems, input processing model, motivational task processing model, etc.), the model presents a dynamic conceptualization of language learning to develop language skills in CALL context. To test the model and the validity of the suggested strategies, a mixed methods approach via questionnaire, interview and learner-self report was conducted in a term-long study among 47 EFL learners. The measures of performance taken before and after the intervention indicated improvement and confirmed the effectiveness of NDM-oriented telecollaborative model's strategies at three levels of sociolinguistic, ethnolinguistic, and psycholinguistic. The interview data reflected participants' positive attitude towards their perceived improvement over the duration of the intervention. The effectiveness of the model at recruiting formulaic sequences with respect to nonlinearity and dynamicity of motivational factors at individual level is the main implication of the study for CALL pedagogy.

Keywords: CALL; nonlinear dynamic motivation (NDM); learner autonomy (LA); formulaic sequence (FS)

1. Introduction

The present study was conducted to fill the gap of an applicable pedagogical framework (O'Dowd & Ware, 2009; Pegrum, 2009) by maximizing the institutional nature of telecollaborative L2 teaching-learning with respect to nonlinearity and dynamicity of motivational factors. To this end, nonlinear dynamic motivation (NDM)-oriented-prefabs were arranged for CALL context. The goal was to integrate the idea of ready-made frameworks with nonlinear dynamic motivation (Dörnyei & Ryan, 2015) within a process-

oriented paradigm (Basharina, 2007) instead of a product-oriented paradigm to foster learner autonomy. To provide processing benefits as a shortcut to L2 comprehension and production via formulaic sequences (FSs) and catering for nonlinear dynamic motivational factors of telecollaborative L2 learner, the model approached learner and learning from three dimensions: sociolinguistic (Candlin, 2000; Carter & Sealey, 2000; Kramsch, 2000), ethnolinguistic (Lewis, Chanier & Youngs, 2011; O'Dowd & Ware, 2009), and psycholinguistic (Chen & Plonsky, 2017; Long, 2007; Ziegler, 2016). To this end, frequently observed NDM-oriented formulaic sequences (FSs) in CALL were identified based on Myles & Cordier's (2016) hierarchical identification method and categorized into two sets of data (i.e. linguistic clusters and processing units with respect to NDM).

Instead of a static telecollaborative learning-teaching model, the goal of the study was to provide L2 learners/teachers with an applicable model that can be dynamically self-regulated in terms of the use of FSs. This was done in keeping with L2 learner groups' emergent motivational factors during telecollaboration at psycholinguistic, sociolinguistic, and ethnolinguistic levels. The rationale behind including FSs in the model was to enable telecollaborative learner to master the sociolinguistic function of the language (Ellis, 2005), to develop native-like idiomaticity (Wray, 2012), to raise awareness of the conventions (Yu, 2011), to facilitate language production by bypassing controlled processing of short-term memory (Wood, 2015), and to reduce learning burden (Durrant, 2008). The model creates proportionality between the telecollaborative L2 learner's motivational preferences and native speaker's preferences for certain FSs by encouraging self-regulatory measures for adopting FSs in line with dynamic motivational factors. While FSs encompass several aspects of language (e.g. semantic, syntactic), motivational factors encompass several aspects of L2 learner (e.g. affective factors), which shows their interrelated role in L2 learning. The proposed model consists of five elements (see Fig.1) integrated towards learner autonomy.
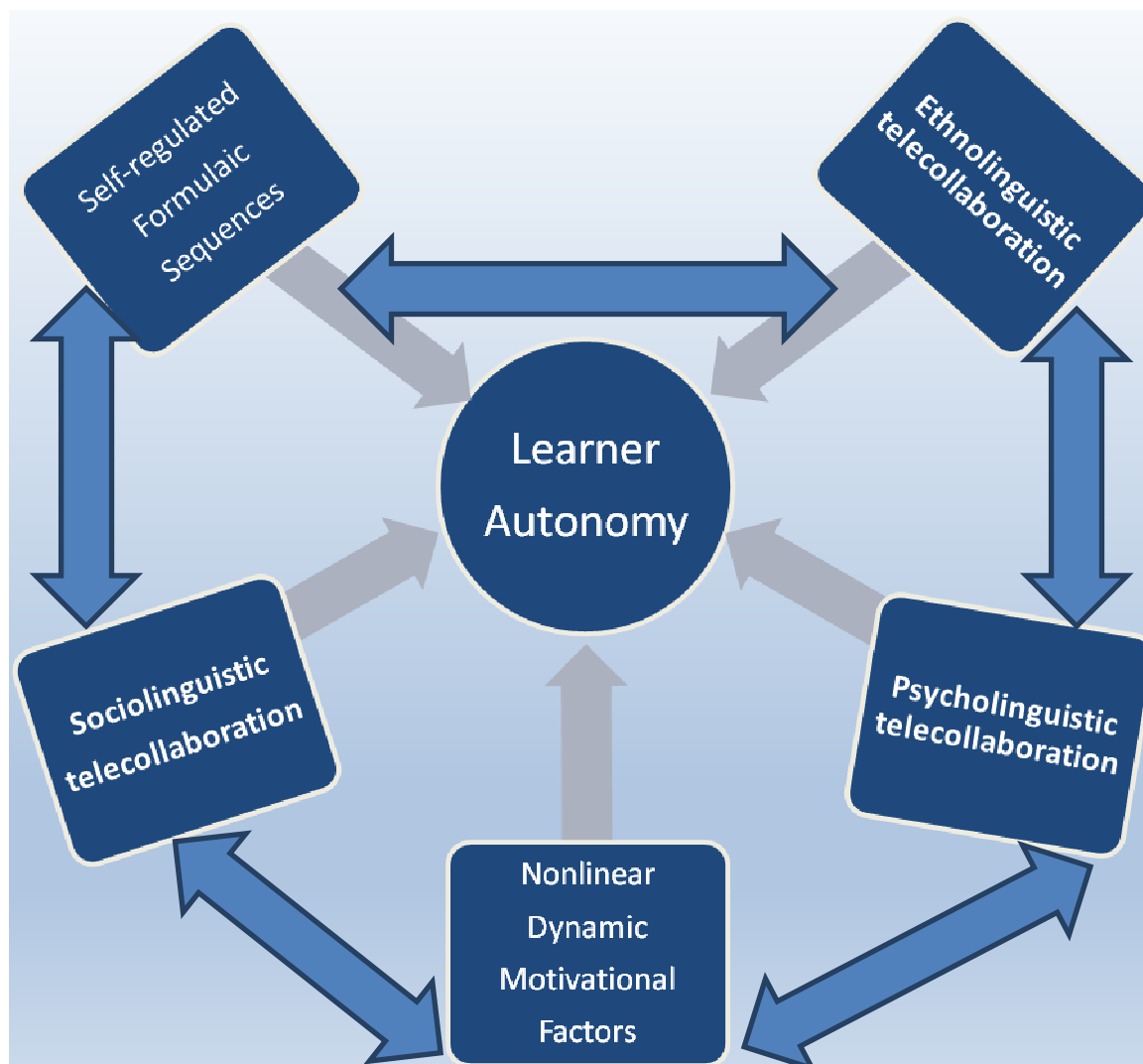
Figure 1. NDM-oriented model of formulaic sequences to foster learner autonomy

2. Sociolinguistic Dimension of Telecollaboration (SDT)

Examining the potential behind telecollaborative L2 teaching-learning with a focus on social perspective has led to studies reporting the significance of sociolinguistic factors in telecollaboration (Ware & Kramsch, 2005). Accordingly, SDT was highlighted in the proposed model to ensure the development of social skills via group work, team-building, building new connections, and sensitizing the telecollaborative learner group to each other's context (Dooly & Sadler, 2013; Fuchs, 2016). SDT emphasizes on commenting on each other's social values without violating interactional norms and expectations (House, 2010) by introducing conversational styles, contextualization cues, and listenership behavior. To address the sociolinguistic sources of online-telecollaboration-misunderstandings the present model proposes some NDM-oriented-socio-interactional prefabs (see Appendix A).

Accordingly, to foster learner autonomy in L2 learning-teaching (Chiu & Liu, 2013) the following SDT strategies are suggested to be proportionally integrated with FSs in keeping with nonlinear dynamic motivational factors identified at individual level to bypass analytical processing and foster self-regulation in telecollaboration.

Table 1. SDT strategies for the telecollaborative teacher

Encourage the use of communicative strategies to manage learning problems (Nakatani & Goh 2007) to develop critical understanding of telecollaborative tools
Include social and cultural factors to make learning an important and meaningful task for learners (Gay, 2010) and to create a social identity via social engagement via telecollaborative tools
Encourage learners to develop social presence by creating online community of learning to develop L2 learners' pragmatic competence via telecollaborative tools
Encourage the use of portfolios and learner diaries to facilitate learner reflection on online interaction via telecollaborative tools
Encourage discourse completion tasks with respect to social parameters (Golato, 2003) and nonlinear dynamic motivational factors to facilitate experiential learning and interaction
Develop learners' understanding of pedagogical affordances and constraints of social communication tools by synchronous tools and sociolinguistic tasks by commenting about each other's local social values
Provide scaffolded guidance via online tutorials concerning telecollaborative goals to move learners towards collaborative activities

3. Ethnolinguistic Dimension of Telecollaboration (EDT)

To expand the range of telecollaborative studies from the Western world scale (Murray, 2000) to international scale studies, the present study integrated EDT into the NDM-oriented model with a focus on intercultural aspect of telecollaboration in keeping with previous studies (Belz & Müller-Hartmann, 2003; Liaw, 2006; O'Dowd & Ritter, 2006; Ware & Kramsch, 2005; Ware, 2005). To avoid culture-related tensions and misunderstandings and to facilitate making communicative choices some self-regulated formulaic sequences were arranged in keeping with NDM and EDT to be applied in asynchronous interactions on L2 learners' dynamic topics of interest. EDT draws on the activity theory (Lantolf, 2000) to explore intercultural dimension of telecollaboration at two contextual layers of offline and online (Lam, 2000). To address the ethnolinguistic sources of online-telecollaboration-misunderstandings the present model proposed some NDM-oriented-ethno-interactional prefabs (see Appendix B). The following EDT strategies need to be dynamically and nonlinearly modified in keeping with identified motivational factors in telecollaborative learner group at individual level along with identified situation-bound formulaic sequences prior to the application.

Table 2. EDT strategies for the telecollaborative teacher

Encourage natural target language reproduction rather than echoing, imitating or slavish mimicry (Kim, 2011) to sensitize L2 learners to cultural differences before engaging them in online exchanges
Encourage ethnolinguistic tasks by commenting about each other's local cultural values
Develop intercultural competence among L2 learners in order to create an interculturally rich relationship
Avoid disrespecting social and cultural values which can causes students feel disfranchised
Inform L2 learners concerning the culturally different discourse genres to avoid online communication breakdown
Encourage participation in online intercultural asynchronous discussion forums to discuss cultural products and practices of the L2
Encourage trying new culture-oriented telecollaborative tasks via openness to cultural variety without imposing any value.
Inform students about cultural clashes and cultural taboos via informing learners about differences in interactional norms and expectations (House, 2010)
Include learner's cultural preferences in organizing culture-oriented telecollaborative tasks by introducing culturally-contingent patterns of telecollaborative interaction
Design culture-oriented tasks in line with nonlinear dynamic motivational factors along with linguistically rich telecollaborative interactions to introduce common causes of intercultural problems in advance

4. Psycholinguistic dimension of telecollaboration (PDT)

Following the social shift of the mid-1990s, Second Language Acquisition studies experienced the development of a variety of approaches including the psycholinguistic approach (Ortega, 2011) to enhance L2 learning-teaching via CALL. To address the psychological sources of online-telecollaboration-misunderstandings the present model proposed NDM-oriented-psycho-interactional prefabs (see Appendix C). The following PDT strategies are suggested to be dynamically and nonlinearly modified in keeping with identified motivational factors in telecollaborative learner group at individual level along with identified situation-bound formulaic sequences prior to the application.

Table 3. PDT strategies for the telecollaborative teacher

Consider nonlinear dynamic motivational factors at individual level before engaging L2 learners in online exchanges
Encourage hopeful thinking among the learners to change the present attitudes to shape positive thinking (Oxford, 2017) to see learning as an enjoyable process.
Encourage learners' control over learning management to ensure a learner-friendly instruction (Mercer, 2015) by developing agency
Encourage goal-directedness towards authentic complexity of learning (Oxford, 2017) by providing learners' with opportunities to manage their emotions, thought processes, and actions (Joe, Hiver & Al-Hoorie, 2017)
Develop agency by reinforcing belief in one's competence (Mercer, 2015) and begin with an elicitation rather than reformulation
Encourage learners to use textual blogs to voice their views with confidence (Golonka, Bowles, Frank, Richardson & Freynik, 2012)
Encourage blog-mediated tasks among L2 learners to liberate and empower L2 learners in online settings to foster learner autonomy
Integrate the pedagogical value of telecollaborative teaching with nonlinear dynamic nature of psychological characteristics of learners

5. Self-regulated formulaic sequences

To facilitate drawing on FSs in response to immediate processing demands (Wray, 2012) and nonlinear dynamic processing capacity of L2 learners Myles & Cordier's (2016) hierarchical identification method of processing units (PUs) was used. It suggests phonological coherence, semantic/functional unity, sequences learnt holistically, intralearner frequency, and interlearner frequency as the criteria to identify PUs. NDM-oriented FSs identified in CALL are displayed at two parts: processing units (i.e. NDM-oriented multiword semantic/functional units in CALL) and linguistic clusters (i.e. NDM-oriented multimorphemic clusters in CALL). The criteria for identifying formulaicity in processing units were identified based on the following criteria: grammatical irregularity, lack of semantic transparency, specific pragmatic function, idiosyncratic use, specific phonological characteristics, inappropriate use, unusual sophistication, performative function. However, not all criteria need to observed in a sequence to be considered as a formulaic sequence (Wood, 2015). The effort-saving processing quality (Wray, 2012), phrase level frequency (Tremblay, Derwing, Libben, &Westbury, 2011), facilitating effect of congruence in code switches in online processing (Titone, Columbus, Whitford, Mercier & Libben, 2015) and ubiquity of multiword units are among the qualities which justify their inclusion in a NDM-oriented telecollaborative model of L2 teaching-learning.

Table 4. Multiword semantic/functional units in CALL

No.	Multiword semantic/ functional units in CALL	Definition	Criterion
1	Back button	A button at the top of a Web browser used to go back to the previous Web page.	Idiosyncratic use
2	yoyo mode	When computer alternates several times between being up and being down	Idiosyncratic use
3	Eye candy	Extra graphics/images included on a Web page to make it look better (e.g. This Web site has too much eye candy going on, doesn't it?)	Lack of semantic transparency
4	Classroom	The classroom software is a superset of the office set which is used in computer classrooms	Lack of semantic transparency
5	PING or ping	Internet program used to determine whether a specific IP address is accessible or online.	Idiosyncratic use
6	Rant-and-rave	Passionate talk about something. To rant implies negative feelings about something, while to rave implies admiration for somebody/something.	Lack of semantic transparency
7	spammin'	Aimless speaking on a mishmash of topics (e.g. was he spammin' you about his ancestors?	Lack of semantic transparency
8	Hot spot	Places with wireless Internet connections.	Specific pragmatic function

| 9 | Mommy-save | Indiscriminate clicking of 'Save' without choosing a folder to store the document (e.g. Did you mommy-save them in the Word folder? | Idiosyncratic use |

Multimorphemic clusters are frequently co-occurring units of conventional expression which are semantically/syntactically irregular (Myles & Cordier, 2016). Multiword semantic/functional units being stored whole in interlocutors' lexicon or being highly automatized provide a processing advantage for interlocutor(s). The dynamicity and nonlinearity of using FSs by different speakers (Wray, 2012) enable L2 learner group to conduct collaborative tasks while saving effort in processing and achieving interactional functions during telecollaboration.

Table 5. Multimorphemic clusters in CALL

No	Multimorphemic clusters in CALL	Definition	Criterion
1	biobreak	To say that you need to take a bathroom break.	Inappropriate use
2	webinar	A presentation delivered online	Lack of semantic transparency
3	Google	To run a search to find out about somebody/something	Specific pragmatic function
4	defrag	To optimize hard drive, which implies some much needed R&R, (e.g. I need to have a quiet drink and defrag)	Lack of semantic transparency
5	meatspace	The real world opposed to cyberspace	Lack of semantic transparency
6	opt-out	To request to be removed from online program (e.g. why don't you opt out if you don't want to receive further emails?)	Specific pragmatic function
7	PDFing	To turn a document into an Adobe PDF	Specific pragmatic function
8	shelfware	Worthless software that remains in the shrink-wrapped box on the shelf	Lack of semantic transparency

Saving effort in processing and achieving interactional functions are among the main functions of FSs which along with observing nonlinear dynamic motivational preferences of L2 telecollaborative learner in a single multilayered model would foster learner autonomy by facilitating self-regulation. The proposed model instead of emphasizing on a single aspect of telecollaboration such as intercultural communicative competence (O'Dowd & Ware, 2009) has integrated psycholinguistic, sociolinguistic, and ethnolinguistic dimensions into a comprehensive NDM-oriented telecollaborative model.

6. Model testing

To test the effectiveness of the model and its translatability into actual telecollaborative setting, a mixed methods approach was conducted among 33 female and 14 male English learners (with the average age of 22.3 years old and SD=1.4) during a language learning term (thirty 90-minute sessions). Incorporating computer assisted instruction into the design, the participants were randomly assigned into experimental group (18 female and 9 male) and control group (15 female and 5 male). To investigate the relationship between NDM-oriented telecollaborative model and developing language proficiency several strands of data collection were employed (see Fig.2) in response to the research questions.
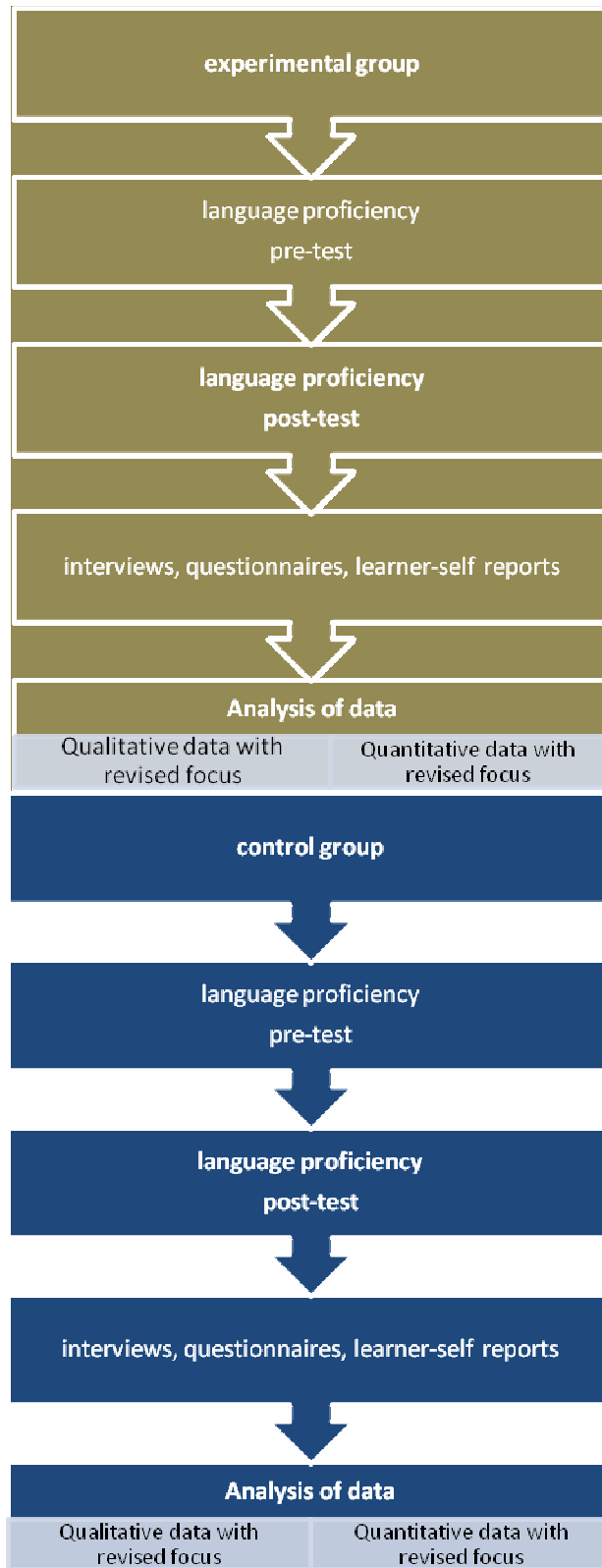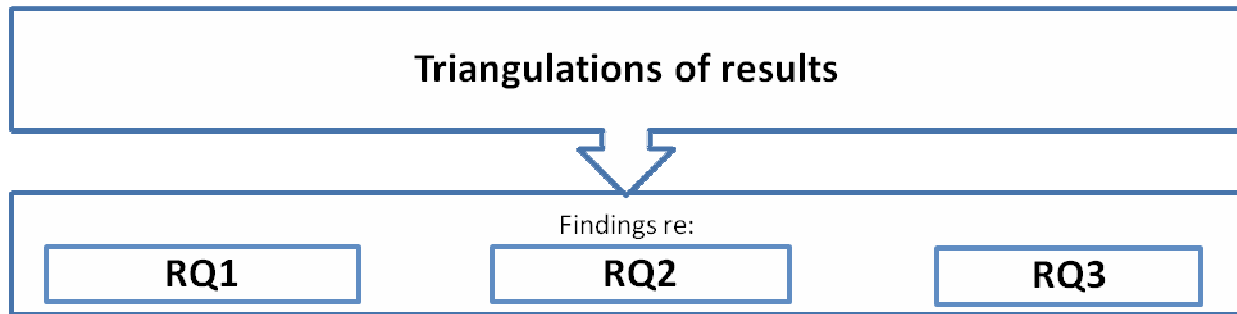
Figure 2. Visual representation of testing NDM-oriented telecollaborative model

A paired samples t-test was conducted to compare the language proficiency scores of the experimental and control groups from pretest to posttest (see Table 1).

Table 6. Paired samples statistics

		Paired Samples Statistics			
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Experimental pre	68.1481	27	3.47191	.66817
	Experimental post	84.7778	27	8.37273	1.61133
Pair 2	Control pre	68.7000	20	3.14726	.70375
	Control post	68.6000	20	3.80305	.85039

There was no significant difference in scores of the experimental (M=68.82, SD=3.55) and the control (M=68.10, SD=3.47) groups on the pre-test; t=0.718, p=0.818. This shows the equivalent language proficiency of the participants before the experiment. However, the experimental group (M=84.77, SD=8.37) displayed significant performance over the control group (M=68.60, SD=3.80) on the post-test; t=-29.69, p=.000. Based on the obtained results it can be argued that students who received treatment based on the model developed more prominently in language proficiency than those who received ordinary schedule of the classroom.

Table 7. Paired samples test

		Paired Samples Test							
		Paired Differences							
					95% Confidence Interval of the Difference				Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	
Pair 1	Experimental pretest - posttest	-16.62963	8.81933	1.69728	-20.11844	-13.14082	-9.798	26	.000
Pair 2	Control pretest - posttest	.10000	4.90864	1.09761	-2.19731	2.39731	.091	19	.928

To elicit the required data NDM-oriented telecollaborative model's questionnaire was prepared. It is a 12-item survey developed by the author to examine three major categories of values, attitudes and beliefs of the L2 learners towards the model as part of the CALL syllabus. The alphas are presented in keeping with (Wigfield & Guthrie, 1997) alphas in Table 8. The subscales (Values, Attitude, and Beliefs) had reasonable reliabilities ranging from .70 to .88.

Table 8. Reliabilities for the questionnaire's Subscales

Subscale	Number of Items	Reliability
Values	4	76
Attitudes	4	88
Beliefs	4	70

The descriptive statistics show that most of the participants had positive opinions (M=1.84) on the efficiency of the model in the CALL context. To elicit the required data for the third research question, the participants voluntarily chose one of the instruments (i.e. NDM-oriented telecollaborative interviews or learner-self reports) depending on their diverse course timetables. The interview was a 9-item survey developed to examine the efficiency of the model's strategies at three levels of sociolinguistic, ethnolinguistic, and psycholinguistic as reflected in participants' responses. To determine the internal consistency reliabilities of the subscales in the present study the 9 subscales were subjected to a reliability test (see the results in Table 9).

Table 9. Reliabilities for the interview Subscales

Subscale	Number of Items	Reliability
sociolinguistic	3	75
ethnolinguistic	3	70
psycholinguistic	3	86

The results of the interviews and learner-self reports revealed that the majority of the respondents had a positive opinion on the efficiency of the administered treatment based on NDM-oriented telecollaborative model under CALL.

Table 9. Subjects' self-reports on the effectiveness of NDM-oriented model

Level	Skill			
	Speaking (%)	Listening (%)	Reading (%)	Writing (%)
Strongly agree	33	31	28	27
Agree	36.5	41	37	36.5
Slightly agree	22	21	20	21.5
Slightly disagree	4.5	6	7	9
Disagree	3.5	0.5	7	5
Strongly disagree	0.5	0.5	1	1

The total M=1.08 of the elicited responses serves as evidence of the success of the suggested strategies to improve language proficiency in CALL context. Such a big number of positive opinions on the efficiency of the suggested strategies not only reflects the perceived convenience (i.e. perceived usefulness and perceived ease of use) on the part of the learner, but also calls for more rigorous attention on the side of the scholars to delve more into the applicability of this model as part of the general L2 instruction.

The findings confirm a greater tendency on the part of female participants of the study towards NDM-oriented telecollaborative model compared to male participants, which is consistent with the findings reported by previous studies for the significance of the relationship between gender and motivation (Ivey, 1999; McQuillan, 1997). To capture different dimensions of the proposed model, methodological triangulation of the data was conducted with respect to the research questions. The triangulation of the elicited data from qualitative and quantitative methods supported the validity of the suggested strategies. This finding can serve as evidence of the conceptualization of the model and the rationale to apply it in CALL contexts.

7. Final thoughts

To guide learners towards their ZPD via tellecolaboration without denaturing language (Atkinson, 2002) the proposed model recruited and integrated related findings in three dimensions of sociolinguistic-, ethnolinguistic-, and psycholinguistic-oriented studies. Drawing on the latest related theories and developments in L2 learning-teaching, the model has highlighted non-linear dynamic motivation as a new perspective for future CALL programs for language skill development. Implementing the proposed model under CALL context confirmed the validity of the suggested strategies to develop language proficiency. To ensure the purposefulness of the activity, catering for non-linear dynamic motivation at

individual instead of group level is considered as the assessment criterion for the effectiveness of the model. The observed benefits of applying the model during the model testing support its application in future CALL programs. The main pedagogical implication of the study is the effectiveness of integrating the model along with nonlinear dynamic motivation to facilitate learning in the ever-evolving CALL contexts to improve language skills. Pedagogically, the proposed model with a focus on nonlinear dynamic motivation facilitates learning in keeping with the prevalent trend of CALL, as described by Clifford & Granoien (2008), where learning is considered as informational construct. Accordingly, the study has important implications for English language teachers who avoid CALL affordances for a variety of reasons such as the lack of an applicable model with a focus on language skills. The use of the model under CALL context not only expands learners' in-class and out-of-class exposure to authentic language which ensures sustainable learning, but also caters for diverse range of motivational factors among the learners which creates a learner-friendly context.

Acknowledgment

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Appendices

Appendix A. NDM-oriented-socio-interactional prefabs

The following prefabs are easier for the telecollaborative L2 learner in terms of processing because of the interactional functions which are highlighted from a sociolinguistic perspective to reinforce association of the meaning, form and content.

Function	Clusters (2 word sequences-6 word sequences)
Thanking	Thank Tom for me; thanks for lunch; thanks a million; thanks for calling, etc.
Apologizing	I apologize; I do apologize; apologize to him; I truly apologize, etc.
Offering	I got an offer; make an offer; I like your offer; I accept your offer; etc.
Requesting	I have a request; consider my request; I don't do requests; I came at his request; I can't ignore his request; etc.
Commanding	I was in command; take command; who's in command of; he's back in command; we are under his command; etc.
Bargaining	I am satisfied with the bargain; hunt for bargains when you shop, it's a bargain; I got a bargain; we made a bargain; it's a real bargain etc.
Inviting	Am I invited; who invited you; were you invited, we are all invited, etc.
Competing	I can't compete; you can't compete with; I compete in ski races, etc.
Teaming	Team up with him; what a team; there's my team; he's on the team, etc.
Socio-commenting . . .	

Appendix B. NDM-oriented-ethno-interactional prefabs

Function	Clusters (2 word sequences-6 word sequences)
Greeting	They greeted me; I greeted everyone; he greeted us warmly, etc.
Baptizing	I was baptized Mary; he was baptized a catholic, etc.
Partying	Let's party; I hate parties; it's your party; we were partying, etc.
Socializing	They don't lie to socialize; he's fed up with socializing, get out and socialize more; it leaves me little time to socialize, etc.
Thanksgiving	Happy thanksgiving; have a nice thanksgiving, etc.
Praying	Let's pray; pray for me; did you pray; I'll pray hard, etc.
Dancing	Let's dance; keep dancing; dance with me; let's go dancing, etc.
Singing	Let's sing; sing along; keep singing; sing us a song, etc.
Clothing	Wear warm clothes; change your clothes; get your clothes on, etc.
Ethno-commenting. . . .	

Appendix C. NDM-oriented-psycho-interactional prefabs

Function	Clusters (2 word sequences-6 word sequences)
Sympathizing	I sympathize with you; I do sympathize with you, etc.
Envying	I envy her; you'll be envied; I really don't envy you, etc.
Humiliating	How humiliating; I'm so humiliated; that's humiliating, etc.
Motivating	I am motivated; are you motivated; I wasn't very motivated, etc.
Worrying	I do worry; I never worry; should we worry; that worries me, etc.
Thinking	Think that it; you should think; because I think; well I think, I think so, etc.
Enjoying	I enjoy chatting; just enjoy it; let's enjoy it; enjoy your meal, etc.
Disgusting	You disgust me; Tom is disgusted; it was disgusting, etc.
Crying	Don't cry; I won't cry; did she cry; we all cried, etc.
Laughing	Don't laugh; stop laughing; I hear laughing, etc.
Imagining	I can imagine that; you are imagining it; I can't imagine that, etc.
Psycho-commenting	