

The more things change, the more they stay the same, or do they? Revisiting classroom interaction approaches and their effects on quantity and characteristics of language production

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Abstract

This study investigated the quantity and characteristics of student language production, discourse functions, and morphosyntactic features in three different discourse settings – face-to-face (F2F), lab-setting chatroom interactions (Lab), and any place/any device chatroom interactions (APAD). Discourse was examined through the replication and extension of Richard Kern's (1995) study. Similarities in findings between the two studies included a continuation of incomplete, and short sentence lengths among F2F students, an absence of F2F greetings, and a higher rate of assertions, verb tenses, and simple sentences in the Lab setting. Differences included a higher rate of F2F turns in the current study, an absence of greetings in the lab setting, and a greater number of commands among F2F participants. Findings underscored what Kern previously asserted: that F2F and chatroom settings tend to encourage and support slightly different goals associated with language discourse. Kern stated that more sophisticated conversation occurred in the chatroom setting. Current findings concurred but furthered that more conversational interaction took place within the F2F discourse setting due to a greater number of commands, turns, and incomplete sentences. Similarly, F2F students experienced greater input due to the increase of words heard, questions asked, and commands made.

KEYWORDS: DISCOURSE; CHAT; MOBILE; FACE-TO-FACE

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Introduction

Richard Kern's (1995) seminal article on chatroom use in the language classroom has long inspired language educators to incorporate the use of chatroom activities into their courses. When published 20 years ago, *Daedalus InterChange* was making its way into English as Second Language (ESL) and Second Language (L2) courses. This new tool offered promising discourse interaction for students engaged in language learning. Since educators lacked understanding of *InterChange's* potential, Kern examined the effects of this new communicative system on students' language production. He found that on average, students produced more language, more sentences, and more sophisticated discourse functions when writing their communication than when speaking their communication in the classroom.

At the time of Kern's study, only a limited, localized chatroom environment was available in a computer lab setting, and to an even lesser extent were individuals engaged in mobile technologies. Since 1995, things have changed; students are not the technological neophytes of the past. Rather, these technologically savvy 'digital natives' are exceptionally used to using any number of chosen devices to communicate in their first language (Prensky, 2001) as are many of their teachers who use technology regularly to teach and to communicate. Considering the technological advances that have emerged since 1995, and a new generation of students and teachers in place, can we see differences in students' ability to communicate in an L2 compared to students' experiences with such strategies two decades ago? Do Kern's (1995) results remain consistent with today's digital technologies and digital natives? A revisit of Kern's (1995) work will help us to understand how today's students and teachers communicate in face-to-face, lab, and any place/any device environments.

Background

Chatrooms have long been utilized in the L2 classroom to empower students to communicate in a synchronistic fashion with classmates, presumably enhancing their comfort and interaction with the target language. Research on computer-mediated-communication (CMC) has been wide and varied over the last 25 years, and each study has consistently emphasized strong support for the use of chat activities in L2 courses (Golonka, Bowles, Frank, Richardson, & Freynik, 2014). Falling in line with Vygotskyian sociocultural theory, such activities emphasized the importance of interaction within group settings to expand one's capacity to develop language expertise (Vygotsky, 1978). Numerous studies have consistently demonstrated that chatrooms support richer, more sophisticated and interactive conversation; often outshining in-class, face-to-face discussions (e.g., Chun, 1994; Kern, 1995; Sauro, 2011; Sproull & Kiesler, 1991; Warschauer, 1996).

In the earliest stages of this technology, numerous researchers compared face-to-face and chatroom discussions and consistently found higher participation rates among students when interacting on the computer as compared to interacting in the classroom (Bump, 1990; Chun, 1994; Kelm, 1992; Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996). Bump (1990) began this trend of CMC studies when he examined the use of *Daedalus InterChange* in an English literature course. He found that students were more engaged in conversation when using this tool and more readily participated than they normally would in a face-to-face setting. For these students, anonymity, time to think, and the lack of interruption were key supporters of their ability to converse. Sproull and Kiesler (1991) highlighted the equalizing nature of chatrooms, the lack of intimidation in conversation, the anonymity of race, gender, and familiarity of individuals. These were, in fact, the early attractions of chatrooms – anonymity and ease of use; one utilized pseudonyms and simply typed messages into a bland, white box on the computer screen (McKenna & Bargh, 2000; Warschauer, 1997), leaving the author of each individual message a complete mystery to fellow classmates (Joinson, 2001). Students could communicate with less interruption (Kelm, 1992), and would ask more questions and engage more with classmates than in the classroom setting (Chun, 1994).

The Kern study

In his oft-cited research, which is the primary focus of this replication study, Kern (1995) demonstrated how chatrooms empowered students to increase their language production, interact in a more sophisticated fashion, and to do so with less anxiety as compared to in-class discussions. To conduct his study, Kern examined 40 students in two sections of a second semester French basic languages course that met 50 minutes a day, five days a week. In both sections, he studied students' interactions in a CMC conversation and a face-to-face conversation, ranging in time from 45–47 minutes in length, and also included a survey to better understand students' and teachers' impressions of CMC versus face-to-face conversation. To analyze the conversations, he utilized transcripts produced in *InterChange*, as well as transcripts produced from the videotapes made during the face-to-face conversations. Both types of transcriptions were analyzed for language production, discourse functions, and morphosyntactic features and were compared utilizing means and percentages. Two teaching assistants with one year's experience facilitated the online conversations while teachers facilitated the in-class conversations. Because of the challenge of analyzing spoken discourse, Kern (1995) examined the conversations utilizing T-Units, 'terminable units' that included an independent clause and its accompanying modifiers (Hunt, 1970).

In his results, Kern demonstrated that second language use increased in the *InterChange* environment, but so did students' participation in the discussion; students doubled the number of turns taken in conversation, wrote longer phrases, and provided four times the number of sentences as compared to normal, face-to-face conversation. The chatroom environment led to greater language production than did face-to-face conversation with 48% of turn production two sentences or longer in the chatroom compared to 33% of turn production two sentences or longer in the face-to-face environment. Discourse research within Kern (1995) further revealed how chatrooms vs. face-to-face interactions impacted students' greetings, off-task discussions, and the number of questions asked. In particular, students often greeted each other within the *InterChange* environment but never did so in face-to-face conversation. Students stayed on task within the face-to-face discussions, but sometimes strayed from topic within *InterChange*. Questions were more freely asked within *InterChange*, while little interaction was attempted in the face-to-face environment.

Sophistication of language also emerged more so in the chatroom arena than in the face-to-face environment. Kern (1995) found students to be more sophisticated in their expression, making greater use of a variety of verb tenses and moods (conditional and imperative) and of subordinating conjunctions when in the *InterChange* environment; students spoke most of the time in the chatroom while teachers spoke most of the time in face-to-face activities. To the contrary, language was less sophisticated when chatting face-to-face, while teacher participation was much greater. In terms of chatroom size, Kern (1995) led his conversations with 14 or so students present in the conversation. However, he identified the fast pace and rapid accumulation of messages on the screen as serious drawbacks to the chat discussions.

Research since Kern

Since Richard Kern published his article in 1995, numerous researchers have further explored separate elements regarding the influence of CMC on students' language production. For example, some researchers analyzed conversation using points of measurement other than Kern's T-Units including 'turns' (Smith 2003), long sentences of six words or more (Werry, 1996), or sentences of eight words or more (Al-Sa'di & Hamdan, 2005). The use of such different points of measurement did not result in different outcomes as compared to Kern's study. Further, Kern (1995) discovered that students would stray from the topic when the teacher was not providing input. Similar results have appeared in subsequent studies; Darhower (2002) found that students would stray from the topic when the teacher was not active in the chatroom discussion, while Park (2007) found that when the floor was delegated in chatroom

conversations, this would promote focus and conversation, and empower greater interaction among participants. Indeed, researchers have found that students prefer the presence of the teacher when conversing online (e.g., Darhower, 2002; Hara, Bonk, & Angeli, 2000; Pérez, 2003; Russo & Benson, 2005; Stepp-Greany, 2002), while others have expressed caution since a teacher may become too involved in the conversation, stifle students' expression (Nickel, 2002), and prevent students from spontaneity in discussion (Heckman & Annabi, 2005). Even still, minimizing the teacher's presence to enhance spontaneity has led to an increase in off-topic discussions (Light, Nesbitt, Light, & White, 2000). To counter this, some researchers have asserted that the utilization of questions that keep the conversation flowing and focused on the topics in question improved students' interaction and focused attention (Ortiz-Rodriguez, Telg, Irani, Rogers, & Rhoads, 2005). Paulus (2009), on the other hand, suggested balance in conversations with the use of open-ended questions in addition to focused questions to enhance conversation and interest.

At the time of Kern's (1995) study, students had no choice in terms of what computer they used. More recent studies have revealed that when students found themselves without a choice in the use of a particular device, some reported that this hampered their ability to communicate and even construct knowledge (de Bruyn, 2004; Pena-Shaff, Altman, & Stephenson, 2005). Others found that students' typing skills and the absence of nonverbal communication also hampered their ability to converse in the CMC environment (Salaberry, 1997; 2001). Further, when too many individuals participated in a chatroom conversation, this too led to confusing and oftentimes incoherent interaction (Smith, 2006). Markman (2010) has since suggested a size of 10 students or fewer in any chatroom activity so that participants can focus greater attention on composing their thoughts; too many students in a chatroom increased competition for the floor, while language depth and sophistication suffered.

Today, laptops, iPads, smartphones, tablets, and wireless devices are readily available and empower students to work and communicate in ways not available twenty years ago. Given the ease of access for today's students to a myriad of technologically-mediated communication tools (such as social networks) and devices, their familiarity with typing and interacting with others online, researchers have begun to examine the role these tools and devices can play in language teaching and learning. Already, researchers have found that students value their tools and devices, particularly when it better suits their learning. Students will even bypass technologies they deem less useful than their own personal devices so as to devise 'their own personalized approach' to learning (Conole, Laat, Dillon, & Darby, 2008: 520; Sanders, 2006). Given the emphasis placed on students' mobile devices, Viswanathan (2012) questioned

how teachers might incorporate mobile learning into the classroom and what impact this might have on students. She found that encouraging students to use devices of their own choosing at a distance enhanced their willingness to engage further in the learning process. Conole (2008), having studied the usefulness of technology in language learning and how students were using technology as a part of their learning experience, also found that students valued self-selected tools and devices more so than those they did not choose. In addition, Bibby (2011) discovered positive aspects of utilizing one's preferred mobile device, and identified motivational influences on engagement in learning that were associated with device choice.

Though there seems to be great value in allowing students to use their own devices, presumably anywhere they choose (Sanders, 2006), such devices may or may not be being used effectively. Levy (2009) argued: 'When technologies that students already use for social purposes are introduced for learning, language educators will need to be sensitive to existing priorities of use and potential disconnects between individual expectations and educational goals for L2 learning' (p. 778). Kennedy and Levy (2008) further noted that when students utilized a mobile device for learning Italian, the selected device varied considerably from student to student. Conole (2008) also warned us that even though students enjoy the freedom of choosing what device they employ, there is still a feeling of value in approaching learning in a traditional fashion with face-to-face interaction being cited as beneficial and crucial for developing community. As a result, students within Conole's study preferred that tools and devices be used sometimes but not extensively.

Chatrooms provide us with opportunities to communicate utilizing our minds and fingers rather than our minds and voices. Though not spoken, the communication is synchronous, and can be made emphatic like oral communication through the use of quotation marks, capitalization, and exclamation marks, among other things (Smith, 2003). Chatrooms allow one to pause and think, to reflect before responding, to craft a response. It has advantages over F2F since students can focus on form and produce more sophisticated output with more confidence (Smith, 2004; Blake, 2008). Thus, as found in Kern (1995), the possibility that chatrooms support more sophisticated expression in language compared to face-to-face discussion may be due to the ability of students to pause and think before 'speaking' (Golonka *et al.*, 2014). However, in more recent years, a moderation of the effects of chatrooms as compared to face-to-face conversation has emerged. Focusing on more recent digital technologies that include conversation via Skype, Yanguas (2010) found that the performance of students in CMC or F2F conversations has become more distinctly related than distant. Lin, Huang, and Liou (2013), however, conducted a meta-analysis of CMC studies and found that there is still great value for CMC in influencing

students' language acquisition and suggest that learners may further benefit from such activities if engaged in small groups or pairs on a more frequent basis. And too, with 20 years of technological growth and experience, students have become very accustomed to utilizing communicative technology on a regular basis and are not so prone to the 'honeymoon' effects of the past when using new technologies or learning strategies. Thus, what has long been the gold standard of utilizing the chatroom within a lab setting, now can be examined through the use of mobile devices that are readily available to students and teachers alike. Though some research suggests that learners have mixed feelings about utilizing their own devices in an educational setting (i.e., Conole, 2008; Kennedy & Levy, 2008), there has not been an examination of how effective use of student-selected devices can be in the chatroom environment for influencing L2 conversation. Therefore, in the study that follows, we replicate the work of Kern (1995) while expanding upon his efforts through the use of an any place/any device format beyond in-class, face-to-face conversations and the lab-based chatroom interactions. We examine the students' discussions within these three environments and also examine students' reactions to each of these three communication strategies. The research questions we examine are as follows and are similar in structure to that of Kern (1995):

1. What differences exist between normal face-to-face conversation in a classroom (F2F), chat discussions via networked computers in a lab setting (Lab), and chat discussions that occur any place and on any device (APAD) in terms of students' participation in conversation activities?
2. What are students' opinions of these different strategies for communicating in the second language?
3. What are the similarities and differences of our results in relation to those found by Kern (1995)?

In this study, we address concerns raised by Kern within his article. First, we increase the sample size in our study, allowing for statistical analyses to uncover possible differences in student discourse behaviors in face-to-face (F2F), computer lab (Lab), and any place/any device (APAD) communication environments. Second, to ensure the same amount of discussion time is afforded in each communication environment, each group meets during its regularly scheduled class time, regardless of group; we use the entire scheduled class session (50 minutes) for all discussions, starting and ending each class session precisely on time. Third, we statistically test for instructor differences that could influence student language production behaviors, providing a greater window into the experiences of teachers and students alike. Finally, we utilize a cross-over design that examines six different topics in the three

different environments. For the first three topics students converse sequentially within each of the three environments, using F2F for the first topic, following with the Lab environment for the second, and completing topic three within the APAD environment. During the final three topics students are randomly assigned to the three communication environments, with every student assigned to each environment once (see Figure 1).

As this is a replication study, we focus our efforts on the work of Porte (2013) and create an approximate replication study with the independent variable of discussion format (F2F vs. Lab vs. APAD) presented to test impacts on dependent variables associated with discourse in language learning environments. Following Chun (2012) we design this as a contextual replication study where we intend to assess differences in numerous variables associated with L2 learning across different contexts (F2F, Lab, APAD).

Though a replication study, it differs as follows: We have the original contexts of: (1) oral face-to-face discussion; and (2) computer lab written discussion with all students in the same room at the same time chatting on computers, but add a third context of any place, any device (APAD) written discussion; that is, place shifting/device shifting (but not time shifting) where students determine the place and device on which to access the scheduled chat sessions and provide written discourse.

Method

Subjects

Forty-seven students across four sections of French participated in the study during the fall 2013 semester. The fourth semester, three-day-per-week course was selected as analogous to the second semester, five-day-per-week course used by Kern since it entailed more conversational activities than the University's second semester course. All students were nonnative speakers of French, fluent in English, and participated in this study as a part of their regular class activities. Because most language courses and corresponding textbooks contain an online or computer-based component, these students were assumed to be more comfortable with using technology than Kern's original subjects.

The class sections were led by two instructors. The first, Chanda, a native speaker of French who had been teaching basic and junior level courses for six years. The second, Janko, also a native speaker of French who was teaching his first French basic language courses.

Procedure

Each of this study's six intervention sessions took place during the students' respective class periods that met 50 minutes a day, three days a week. The F2F and Lab intervention sessions took place in the Language Learning Center

while the APAD sessions occurred at the student's location of choice, though during class time. Once all six sessions were complete, students were asked to participate in a perception survey.

Instructional context

Face-to-face and electronically mediated chat sessions were integrated into the course beginning the third week of class so that they replaced six existing conversation-based class sessions. Participation in the six 'conversations' was graded, and sessions were scheduled in advance of exams to function as a review for the chapters being studied.

Conversation topics centered on cultural reading passages that corresponded to each chapter in the students' textbook *Imaginez: Le Français sans Frontières* (Mitschke, 2012). Students read these passages before each conversation session; passages were followed in the textbook by discussion questions to prompt the students to think about the topic.

The six conversations made up the entirety of the regularly scheduled 50-minute period's activities. For F2F sessions, students met in a seminar room and sat around a large, rectangular table. For the Lab chatroom sessions, students met in the same seminar room and used laptop computers to converse within the *BlackBoard Collaborate* environment; as for the APAD sessions, the students chose their location and the device they wished to use (laptop, cell phone, desktop computer, tablet) to converse in the *Blackboard Collaborate* environment during class time. The chat feature within *Blackboard Collaborate* was selected as the optimal platform because of student familiarity with the software, the privacy and security of the sessions, the program's accessibility on multiple devices (phones, tablets, laptops, desktop computers), the exclusion of non-enrolled students from each online conversation, and the software's ability to record and save chat session transcripts, no matter which device was used.

Instructors oversaw all conversation sessions; they worked with students in the seminar room during all F2F sessions, and participated in this same language center for both the Lab and APAD chat sessions to ensure they could access technical assistance if required. Regardless of session type, the instructor's role was to facilitate conversation and to ask questions to further conversation among students when necessary. As suggested by Ortiz-Rodriguez *et al.* (2005), this approach was taken to improve students' interaction and maintain focused attention.

As with Kern (1995), students could not be anonymous in the F2F sessions but utilized aliases in the chat sessions (Lab and APAD). Additionally and following Markman's (2010) recommendations on optimal chat group sizes, during all chat sessions, the students were grouped in smaller chatrooms with a maximum of six participants to lessen issues associated with pace and

scrolling screens that are inherent when typing a response or following conversations in chatrooms.

Lastly, prior to the electronically-mediated chat sessions, students were provided instruction and practice on the use of the *BlackBoard Collaborate* software. This ensured that all students had the technical skills needed to participate in the online chat sessions. Additionally, prior to the APAD sessions, a drop-in Collaborate ‘course’ was provided, and students were required to sign into the course so as to troubleshoot any device-related issues prior to the actual conversation sessions.

Design and data collection

To alleviate potentially confounding issues associated with the instructors, topics, or order of the conversation types, this study used a cross-over research design that scheduled class sections for two sessions of each conversation type (F2F, Lab, or APAD). During the first three sessions, all four class sections discussed the same topics using the same modes of discussion; the final three sessions were scheduled for each of the four class sections individually in randomized order, for a total of six discussion sessions during the 16-week semester. Details of the crossover design can be seen in Figure 1.

Class Sections and Instructors	Week 3 Topic 1: Marriage and Family Traditions	Week 6 Topic 2: Science and Research	Week 8 Topic 3: Extreme Sports and Petit Nicolas	Week 11 Topic 4: African Entrepreneurs and Jobs	Week 15 Topic 5: Riches of the Pacific Ocean and Poetry of Congo	Week 16 Topic 6: Review of All Topics
1 – Janko	F2F	Lab	APAD	F2F	Lab	APAD
2 – Chanda	F2F	Lab	APAD	Lab	APAD	F2F
3 – Janko	F2F	Lab	APAD	APAD	F2F	Lab
4 – Chanda	F2F	Lab	APAD	Lab	F2F	APAD

Figure 1: The crossover design including topics, conversation types (F2F, Lab, APAD), class sections and instructors, and weeks of the semester (3-16).

In keeping with Kern (1995), this study collected several forms of data and analyzed very specific behaviors found within. All F2F sessions were videotaped (with audio) from two different angles to keep all student faces in view; these sessions were then transcribed. For all electronically mediated discussion sessions, the text transcriptions were available from *BlackBoard Collaborate*, regardless of the device used, and subsequently saved as text files to the computer. All video and chat transcript data from each conversation session were reviewed and analyses focused on 37 student behaviors related to student language production (e.g. words used, turns taken, complete sentences used), discourse functions (e.g. greetings, questions, commands), and morphosyntactic features (e.g. verb tenses, verb moods, conjunctions); all instances of each behavior were tallied.

In addition to data from video and chat sessions, students completed a 20-item Likert-scale survey (1 = strongly agree to 5 = strongly disagree) with additional open-ended questions at the conclusion of the course. The questions closely mirrored those asked by Kern (1995) with rewording to match the provision of three versus two discourse options, the deletion of a few irrelevant questions, and removal of all specific references to *InterChange*. For example, instead of asking students to agree or disagree with the statement, ‘*InterChange* improved my ability to read French’, students instead were asked to separately agree or disagree with the question ‘The discussions improved my ability to read in French’ as related to the F2F, the Lab, and the APAD sessions. The two deleted questions included an item asking if discussions within *InterChange* were too short, which was not applicable to our study because all sessions were of the same exact length. Similarly, a question concerning student receipt of *InterChange* session transcripts was also not relevant to our study as students did not receive transcripts for any sessions.

Methodological limitations

The study encountered several limitations. During the study the University encountered an inclement weather day, causing each class section to miss the final discussion session that was scheduled to occur during week 16; because of the randomized order of sessions, different class sections missed different conversation types. There were also instructor differences to bear in mind. While both were native speakers, one instructor had a great deal more teaching experience that may well have influenced her interaction with students. Additionally, students engaged in F2F conversations were never ‘anonymous’; this lack of anonymity may have influenced the amount of communication expressed by students within the classroom. Additionally, students were videotaped during the F2F sessions and may have been inhibited by the cameras. And too, when transcribing the videotaped sessions, some students were more difficult to hear than others, and sometimes knowing which student was speaking was equally difficult. Finally, the restrictions inherent in certain devices may have influenced the APAD sessions; for example, small keyboards on phones may have been more difficult to use, and the use of off-campus internet made it impossible for the instructors to assist if students encountered connectivity issues.

Analyses and results

Kern (1995) utilized statistics focused on means and percentages as he conducted his analyses of *InterChange* sessions in comparison to face-to-face interactions and the impact on student language production, discourse functions, and morphosyntactic features. Because of the increased number of participants,

structured research design, and incorporation of the any place/any device scenario found in our study, we were able to use multiple one-way ANOVAS to search for significant differences in 37 student behaviors across the three variations of communication (F2F, Lab, and APAD). The structured design allowed us to aggregate student data based on class sections, and the use of averages instead of the total number of behavior occurrences accounted for instances of student absenteeism or unequal numbers of students across class sections. The 12 statistically significant findings from these analyses can be found in Table 1, with post hoc results presented in the following sections. For the matter of space, insignificant differences are not included.

Table 1: Statistically significant ANOVA results indicating differences in student language production, discourse functions, and morphosyntactic features

Variables	SS	df	MS	F	P
Language Production					
Message Turns					
Between Groups	421.48	2	210.74	3.43	0.056 [^]
Within Groups	1043.96	17	61.41		
Incomplete Sentences					
Between Groups	711.75	2	355.86	11.25	0.001**
Within Groups	537.85	17	31.64		
2 Complete Sentences					
Between Groups	10.49	2	5.25	7.05	0.006**
Within Groups	12.65	17	.744		
Words					
Between Groups	15536.77	2	7768.38	3.50	0.053 [^]
Within Groups	37765.73	17	2221.51		
Discourse Functions					
Greetings					
Between Groups	1.87	2	.93	4.65	0.024*
Within Groups	3.41	17	.20		
Assertions					
Between Groups	699.39	2	349.70	18.61	0.000**
Within Groups	319.51	17	18.80		
Commands					
Between Groups	.27	2	.14	6.95	0.006**
Within Groups	.33	17	.02		
Morphosyntactic Features					
Present Tense					
Between Groups	432.35	2	216.17	5.39	0.015*
Within Groups	682.06	17	40.12		

Indicative					
Between Groups	377.84	2	188.92	3.92	0.040*
Within Groups	820.35	17	48.26		
Imperative					
Between Groups	.27	2	.14	6.95	0.006**
Within Groups	.33	17	.02		
Simple Sentence					
Between Groups	120.46	2	60.23	16.02	0.000**
Within Groups	63.93	17	3.76		
Comparative					
Between Groups	1.73	2	.86	3.76	0.045*
Within Groups	3.91	17	.23		

* $p < 0.05$; ** $p < 0.01$; ^ $p > 0.05$ (trend).

Language production

In an examination of students' language production, we analyzed for differences across the three communication settings in terms of student message turns (a student's attempt to converse no matter the length of the message—complete, one sentence, multiple sentences, and so on); length of message turns in terms of incomplete sentences; and turns with 1, 2, 3, 4, or more complete sentences. We used the same procedure to examine the total number of sentences provided by students and to whom these sentences were addressed – to other students, to all students, or to the teacher – and the number of words spoken by students. As witnessed in the Kern (1995) study, language production differences were found across the three communication environments. Specifically, student use of incomplete sentences compared to two complete sentences differed significantly at the $p < 0.01$ level. Tukey's HSD post hoc analyses further indicated students used significantly more incomplete sentences when dialoging F2F ($M = 19.03$, $SD = 8.52$) than when using the Lab ($M = 5.38$, $SD = 3.00$) or APAD ($M = 8.42$, $SD = 3.11$) options. Similarly, students used two complete sentences significantly less when dialoging F2F ($M = 0.84$, $SD = 0.54$) than when using the Lab dialog option ($M = 2.53$, $SD = 0.91$). There were no other significant differences found with students' language production.

Although not found to be statistically significant at $p < 0.05$, the number of message turns taken by students and the number of words used by students were both trending toward statistical significance. An examination of the means indicated that students were trending toward taking significantly more message turns F2F ($M = 29.29$, $SD = 11.55$) than in Lab ($M = 19.30$, $SD = 4.83$) or APAD ($M = 20.15$, $SD = 4.54$) options. In contrast,

students were trending toward using more words in Lab ($M = 196.18$, $SD = 46.63$) than the F2F ($M = 129.63$, $SD = 52.94$) option. In summary, results of the language production analyses suggest students were providing more incomplete sentences, making less use of two complete sentences, and were trending toward taking more turns but using fewer words when dialoging in the F2F option.

Discourse functions

Continuing our replication of Kern's (1995) study, we examined the discourse functions provided by students across the three communication options in terms of greetings; assertions; questions; commands; self-corrections; use of *n'est-ce pas*; and floor delegation. Results of the one-way ANOVA tests revealed statistically significant differences in three discourse functions, with student use of assertions and commands differing at the $p < 0.01$ level, while student use of greetings differed at the $p < 0.05$ level. Post hoc analyses indicated students greeted each other significantly less in the F2F ($M = 0.03$, $SD = 0.08$) option than in the APAD ($M = 0.78$, $SD = 0.53$) setting, and made fewer assertions when dialoging F2F ($M = 9.67$, $SD = 3.43$) than when using the Lab ($M = 21.97$, $SD = 3.74$) or APAD ($M = 22.18$, $SD = 5.74$) dialog options. However, students used significantly more commands when dialoging F2F ($M = 0.29$, $SD = 0.21$) than when using the Lab ($M = 0.04$, $SD = 0.06$) or APAD ($M = 0.05$, $SD = 0.09$) options. No other significant differences were found among students' discourse functions.

Morphosyntactic features

The grammatical (i.e. morphosyntactic) structures utilized by students and teachers further revealed the sophisticated nature of conversation. Again, following the pattern of Kern (1995) we examined numerous morphosyntactic features across the three manners of conversation including student use of verb tenses (present, past, imperfect, future simple, future immediate); verb moods (indicative, conditional, subjunctive, imperative); conjunctions (subordinating, coordinating); *si* clauses; negation; simple sentences; interjections; relative pronouns; comparative structures; superlative structures; and English words.

As found in the Kern study, similar grammatical patterns were present across the discussion modes for most morphosyntactic features. However, also in keeping with the findings of Kern, differences were found in our study relative to the use of verb tense, verb mood, simple sentences, and comparative structures. Post hoc analyses of our findings indicated that when students used the F2F discourse option they used significantly fewer present-tense

verbs ($M = 13.54$, $SD = 6.56$) than when discoursing in the Lab setting ($M = 24.65$, $SD = 6.22$). Similarly, students used the indicative mood significantly less in the F2F setting ($M = 15.27$, $SD = 6.54$) than in Lab conversations ($M = 25.53$, $SD = 6.18$). In contrast and contrary to Kern's findings, students in our study used the imperative mood significantly more when dialoging F2F ($M = 0.29$, $SD = 0.21$) than when using the Lab ($M = 0.04$, $SD = 0.06$) or APAD ($M = 0.05$, $SD = 0.09$) dialogue options.

Based on the post hoc results, a three-way contrast was found relative to differences in the use of simple sentences. Students used significantly more simple sentences when using the Lab dialog option ($M = 10.44$, $SD = 1.77$) than when dialoging either F2F ($M = 4.57$, $SD = 1.81$) or with the APAD option ($M = 7.37$, $SD = 2.26$). Similarly, students used significantly more simple sentences when using the APAD option than when dialoging F2F. Kern reported a similar finding, with higher numbers of simple sentences found in the chat-based sessions than in oral classroom discussion.

Lastly, Kern's study suggested mixed results for the use of comparative structures across discussion modes. Results of our study were more conclusive and indicated students used significantly fewer comparative structures when dialoging F2F ($M = 0.07$, $SD = 0.09$) than when dialoging in the Lab option ($M = 0.76$, $SD = 0.76$). No other significant differences emerged in relation to morphosyntactic features.

Student perceptions of the discussion formats

In addition to examining discourse differences based on the two forms of interaction, Kern (1995) also assessed student perceptions relative to the two forms of discussion via a survey. To ascertain differences in our study concerning students' perceptions of the three forms of discussion (F2F, Lab, and APAD), we administered a 20-item Likert-scale survey (1 = strongly agree to 5 = strongly disagree) with additional open-ended questions at the end of the semester. A total of 18 surveys were returned (38% response rate), with three surveys demonstrating one or more missing answers. One-way within subjects ANOVAs were performed on each Likert-scale survey question to ascertain opinion differences of students across the three forms of discussions. In instances of missing data, survey respondents were dropped from the analysis of the related question, reducing the n size for those specific survey items. Of the 20 survey questions analyzed, eight items demonstrated statistically significant perceptual differences across the three discussion formats, with five differences found at the $p < 0.05$ level, and three identified at the $p < 0.01$ level (see Table 2).

Table 2: Statistically significant ANOVA results indicating differences in student perceptions across the three discussion formats

Questions	SS	df	MS	F	p
Q4: This written form of conversation allowed me to feel confident about participating.					
Between Groups	3.92	2	1.96	4.92	0.013*
Within Groups	35.37	16	2.21		
Q8: Good computer skills were essential to active participation in the discussions					
Between Groups	11.37	2	5.69	9.07	0.000**
Within Groups	57.48	17	3.38		
Q9: Not having to worry about pronunciation was a strong incentive to contribute to the discussion					
Between Groups	22.04	2	11.02	20.72	0.000**
Within Groups	34.67	15	2.31		
Q12: Some students dominated discussions.					
Between Groups	1.44	2	0.72	4.17	0.024*
Within Groups	53.50	17	3.15		
Q16: The amount of participation from the instructor was appropriate.					
Between Groups	1.33	2	0.67	3.4	0.045*
Within Groups	29.33	17	1.73		
Q18: The discussions improved my ability to write in French.					
Between Groups	5.81	2	2.91	4.33	0.021*
Within Groups	67.48	17	3.97		
Q19: The discussions improved my ability to read in French.					
Between Groups	2.37	2	1.19	3.68	0.036*
Within Groups	59.87	17	3.52		
Q20: The discussions improved my ability to speak in French.					
Between Groups	12.00	2	6.00	10.20	0.000**
Within Groups	79.33	17	4.67		

* $p < 0.05$. ** $p < 0.01$.

Post hoc analyses revealed that for some survey items students agreed with the statement for all discussion forms, but the degree of agreement statistically differed. For example, when asked if the written format of

conversation allowed them to feel confident about participating (Q4), students agreed with the statement overall ($M = 2.18$, $SD = 1.02$), but agreed more strongly with the statement for the Lab ($M = 2.00$, $SD = 0.75$) and APAD ($M = 2.00$, $SD = 0.75$) discussion formats than for the F2F option ($M = 2.59$, $SD = 1.51$). As an additional example, when asked if some students dominated discussions (Q12), students agreed overall with the statement ($M = 2.38$, $SD = 1.07$), but more for the F2F option ($M = 2.17$, $SD = 1.21$) than the Lab ($M = 2.44$, $SD = 1.20$) or the APAD ($M = 2.56$, $SD = 1.08$) discussion formats. Similarly, when assessing whether the amount of participation from the instructor was appropriate (Q16), all students agreed with the statement ($M = 1.78$, $SD = 0.84$), but students more strongly agreed for the F2F option ($M = 1.56$, $SD = 0.50$) than the Lab ($M = 1.89$, $SD = 0.81$) or the APAD ($M = 1.89$, $SD = 0.81$) discussion options. Lastly, when asked if the discussions improved their ability to read in French (Q19), all students agreed that their ability to read in French improved ($M = 2.42$, $SD = 1.17$), but agreed more strongly with the statement for the Lab ($M = 2.28$, $SD = 1.27$) and APAD ($M = 2.28$, $SD = 1.27$) discussion options than for the F2F option ($M = 2.72$, $SD = 1.62$).

Statistically significant results related to other survey items revealed that students were not always in agreement across all three discussion formats. Rather, for some questions students agreed with the statement for two discussion options, but disagreed for a third. This was demonstrated when students were asked if good computer skills were essential to active participation in discussions (Q8). Students were neutral or slightly agreed with the statement for the Lab ($M = 2.83$, $SD = 1.56$) and APAD ($M = 2.89$, $SD = 1.40$) discussion options, but were in disagreement with the statement for the F2F option ($M = 3.83$, $SD = 1.68$). Similarly, when students were asked whether not having to worry about pronunciation was a strong incentive to contribute to the discussion (Q9), students agreed for the Lab ($M = 2.19$, $SD = 0.83$) and APAD ($M = 2.19$, $SD = 0.83$) discussion options, but were in slight disagreement with the statement for the F2F option ($M = 3.63$, $SD = 1.71$). Following that same response pattern, when students were asked if the discussions improved their ability to write in French (Q18), students agreed for the Lab ($M = 2.61$, $SD = 1.66$) and APAD ($M = 2.56$, $SD = 1.56$) discussion options, but were neutral or in slight disagreement with the statement for the F2F option ($M = 3.28$, $SD = 2.09$). Finally, when students were asked if the discussions improved their ability to speak in French (Q20), students agreed with the statement for the F2F option ($M = 2.11$, $SD = 1.87$), but were neutral or in slight disagreement with the statement for the Lab ($M = 3.11$, $SD = 1.99$) and the APAD ($M = 3.11$, $SD = 1.99$) discussion options.

Tests for instructor differences

In the original Kern (1995) study, the author noted differences in instructor behaviors that may have contributed to less student language production in one of the class sections, thereby potentially confounding the results of the study. This current study utilized a structured research design to lessen the potential for this to reoccur. Additionally, statistical tests were used to check for differences between the two instructors that could have potentially confounded results. Per Hill and Lewicki's (2007), use of ANOVA testing in place of *t*-tests is appropriate if checking for differences in the means of two groups, particularly if use of the test maintains continuity in the statistical procedures utilized in the remainder of the study. This was the case for this particular study, so multiple ANOVAs were used to test for differences between the two instructors on the total number of occurrences for several instructor behaviors. After testing for instructor differences in nine language production and discourse function behaviors, results indicated statistically significant differences at $p < 0.05$ in two areas, and $p < 0.01$ in a third area (see Table 3). The analyses of means demonstrated that Chanda ($M = 1.78$, $SD = 1.46$) made significantly more commands than Janko ($M = 0.40$, $SD = 0.22$), while Janko made more self-corrections ($M = 0.57$, $SD = 0.50$) than Chanda ($M = 0.17$, $SD = 0.23$) and utilized significantly more English words ($M = 6.52$, $SD = 8.25$) than Chanda ($M = 0.06$, $SD = 0.11$).

Table 3: ANOVA results for differences in instructor language production and discourse functions

Variables	SS	df	MS	F	p
Language Production					
Message Turns					
Between Groups	46.37	1	46.37	0.397	0.536
Within Groups	2099.68	18	116.65		
Words					
Between Groups	77577.75	1	77577.75	1.51	0.235
Within Groups	925870.37	18	51437.24		
Discourse Functions					
Greetings					
Between Groups	0.008	1	0.008	0.109	0.745
Within Groups	1.25	18	0.069		
Assertions					
Between Groups	205.81	1	205.81	2.385	0.140
Within Groups	1553.23	18	86.29		
Questions					
Between Groups	33.45	1	33.45	0.318	0.580
Within Groups	1893.16	18	105.18		

Commands					
Between Groups	9.46	1	9.46	8.66	0.009**
Within Groups	19.66	18	1.09		
Self-Corrects					
Between Groups	0.81	1	0.81	5.36	0.033*
Within Groups	2.74	18	0.15		
Floor Delegation					
Between Groups	3.05	1	3.05	1.20	0.288
Within Groups	45.81	18	2.55		
English Words					
Between Groups	208.70	1	208.70	6.13	0.023*
Within Groups	612.86	18	34.05		

* $p < 0.05$. ** $p < 0.01$.

Student and teacher participation distribution

Due to the small size of the instructor population (2) it was not feasible to perform statistical analyses to indicate whether interactions occurred between instructors' language production and the three discussion options. However, as with Kern, our study did find that students in the F2F option generated fewer words and more incomplete sentences, while those using the chat-mediated options generated more words and complete sentences. This was observed in spite of the finding that a significantly higher number of message turns were taken in the F2F option than in the Lab setting. To further explore the language production of instructors and the dynamic that was occurring within each discourse setting, the number and percentage of message turns taken and words generated by instructors and students were examined (see Table 4).

Table 4: Distributions of student and instructor language production

Variables	Chanda			Janko		
	F2F ($n = 34$)	Lab ($n = 49$)	APAD ($n = 36$)	F2F ($n = 39$)	Lab ($n = 33$)	APAD ($n = 24$)
Student Message Turns	942 (56%)	1026 (80%)	806 (78%)	934 (55%)	532 (76%)	407 (73%)
Instructor Message Turns	739 (44%)	252 (20%)	230 (22%)	755 (45%)	171 (24%)	154 (27%)
Total Message Turns	1681	1278	1036	1689	703	560
Student Words	4435 (23%)	9373 (84%)	7075 (80%)	3985 (19%)	6580 (77%)	3333 (65%)
Instructor Words	11526 (72%)	1849 (16%)	1815 (20%)	17169 (81%)	1887 (23%)	1796 (35%)
Total Words	15961	11322	8890	21154	8467	5129

The data in Table 4 suggested that our results were consistent with Kern (1995), indicating that instructors appeared to use more words and take more message turns during the F2F discussions than when conversing with students in the Lab or APAD settings. Despite the additional message turns and words used by instructors in the F2F setting, students were able to take more message turns in the F2F setting as well. As reported previously, students took significantly more turns when face-to-face than when in the online chat environments (Lab or APAD). This difference can be seen above, as students took between 76% and 80% of the total turns in the Lab sessions (avg = 16.12 to 20.9), between 73% and 78% of the turns in the APAD sessions (avg = 16.9 to 22.38), and between 55% and 56% of the turns in the F2F sessions (avg = 23.9 to 27.7).

Despite the increase in student F2F message turns, previously reported statistical results indicated fewer words were generated by students in the F2F setting. As Table 4 indicates, more words were produced in total during the F2F sessions; however, 72% to 81% of the total words used in F2F sessions were generated by the instructors, as compared to Lab and APAD sessions where instructors generated only 16% to 35% of the total words. Similarly, instructors in the electronically mediated chat environments only took 20% to 27% of the message turns; whereas in the face-to-face activities, instructors took 44% to 45% of the total message turns.

Discussion and conclusions

Kern's (1995) article was cutting edge at the time of its publication, being the first of its kind to reveal what was possible in the chatroom environment versus the classroom environment with regards to L2 discourse. What he found was that on average, students produced more language, more sentences, and more sophisticated discourse functions when writing their communication than when speaking their communication in the classroom.

This current replication study aimed to revisit Kern's (1995) findings, adding to it a fresh, twenty-first-century any place/any device component, as well as statistical analyses to determine where significant differences were present. The results revealed a continuation of Kern's language production findings, demonstrating that when engaged in F2F conversation, students' produced significantly more incomplete sentence structures and significantly fewer two-sentence length structures than when conversing in the two distinct chatroom settings, and produced significantly fewer two-sentence length structures than in the Lab chatroom setting. As a distinction, the APAD chat setting appeared to follow a middle ground between the significantly different Lab and F2F settings in relation to two-sentence length structures, with no significant APAD differences noted. Students also trended toward using more

words while conversing in the Lab chatroom setting than in the F2F environment but not in the APAD setting. This finding both supported and refuted the early work of Bump (1990) and Chun (1994) who asserted that students are more engaged with each other when conversing online. It also indicated that other factors in addition to the mere act of conversing online may influence the volume of word use in chat settings.

However, varying from Kern's results, this study found that students took more message turns in F2F conversations compared to conversations held in both chatroom environments. Initially, this finding appeared counterintuitive because students took more turns yet used fewer words in F2F conversations than in the Lab setting. However, when the increase in message turns was considered in conjunction with sentence structure findings, it led to the hypothesis that students were engaged in more casual and responsive conversational dialogue with the instructors in the F2F settings, and more structured student-to-student conversations in the Lab chatting environment. This theory was supported by the instructor data which demonstrated that instructor participation was higher in the F2F discussion environments, and that the increase in instructor participation coincided with increases in questions and commands directed toward the students. With an increase in questioning on the part of instructors, short answers such as *oui* or *non*, or incomplete answers were more quickly forthcoming from the students. Thus, when all the language production findings were considered in combination, it led to the inference that, although additional questioning and commands from the instructor spurred students to take more turns in the F2F environment, the higher instructor involvement may have prompted shorter and less structured student language production than in both chatting settings. This finding supported previous work by Nickel (2002) and Heckman and Annabi (2005), who reported that too much instructor involvement can stifle student contributions and interaction.

Discourse findings within Kern (1995) revealed how chatroom versus F2F interactions impacted students' greetings, off-task discussions, and the number of questions asked. In particular, students within Kern's study often greeted each other within the *InterChange* environment but never did so in F2F conversation. Students in Kern's chatroom discussions also demonstrated more off-task discussion behaviors, and asked considerably more questions in the *InterChange* environment than when conversing F2F. Discourse findings of the current study both complimented and differed from Kern (1995). First, as in Kern's results, the current authors were not surprised to find that greetings occurred significantly less often in the F2F environment compared to the APAD setting. Students typically arrived five to seven minutes early to class in the F2F setting; thus any greetings that occurred may have taken place

prior to the start of class, which was prior to the start of the videotaping. The same was true of the Lab sessions, as students could greet each other in person prior to the start of the recorded Lab chatroom sessions. Thus, greetings that occurred prior to the official start of F2F or Lab sessions were not recorded or counted. In contrast, in the APAD chat setting students could not see or greet each other in person prior to the start of class. Rather, as they logged in at the beginning of the recorded class session, they would often 'check in,' utilizing *Bonjour* or *Salut* to greet their classmates at a distance. Although they were unable to see their classmates, the use of greetings confirmed their presence in the chatroom arena, whereas their presence was visibly noticeable in the F2F and Lab discourse settings.

Similar to another of Kern's discourse findings, students in the current study made significantly more assertions in both chatroom settings than in the F2F environment. The significant increase in student assertions when utilizing chatroom environments supported an overall pattern of greater student-to-student dialogue in the chatroom setting. As Kern indicated, the normal pattern of classroom discourse involves an instructor question and a student response, followed by another instructor prompt directed to a different student. However, data from the current study demonstrated that all chatroom setting dialogues involved more student-to-student interaction and less instructor involvement, which, as suggested by Paulus (2009), may have prompted students to be more assertive with each other during the chatroom sessions. Additionally, as Golonka *et al.* (2014) found, having time to prepare phrases on the computer may have given Lab and APAD students more of an opportunity to reflect and assert themselves within the conversation as compared to being asked to respond to a question posed by an instructor within the F2F environment.

Different from the discourse findings of Kern (1995), students in the current study's F2F group used more command structures (imperative mood) compared to those in both chatroom settings. This may again highlight the interplay between instructors and students, given that students more often commanded the instructor to repeat, or to explain things in the F2F setting than in the computer settings. This may also reflect the difficult nature of understanding the spoken French language as compared to understanding the written language and the need to request clarification from the instructor. This is a positive outcome given that it allowed F2F students more variety in their interaction efforts compared to such efforts in the computer settings. It also potentially demonstrated one of the benefits of chatting discourse, which was the ability of students to visually review previous messages in APAD and Lab chats, which may have been a visual form of seeking clarification that lessened the need for student commands.

In terms of grammatical or morphosyntactic structures, similarities and differences were found between the two studies. As with Kern, the use of a variety of verb tenses overall was higher among the Lab participants than the F2F participants. However, differences were not witnessed between the APAD setting and either the F2F or the Lab settings relative to verb tense. In other words, verb tense usage in the APAD setting fell between F2F and Lab setting usage. And too, the use of simple sentences in the Lab setting was highest, even more so than the APAD setting, while both chatroom settings were significantly higher than the F2F with regards simple sentence usage. Simple sentence structures contain a subject and a verb, and may be more easily provided when chatting online, while being less prevalent in F2F discussions where students more often used incomplete sentences to respond to questions posed by the instructor. Thus, both chatroom settings may have provided students more of an opportunity to reflect (Golonka *et al.*, 2014) and express complete sentences than the F2F arena. Similarly, the fact that students made more comparative analyses in the Lab compared to F2F was not surprising. Such structures are complex and can perhaps be more easily written than spoken when students are given the ability to see the structure itself, as is afforded in the chatroom setting. However, the lack of significant differences between the APAD and F2F setting did not fully support this explanation. As with two-sentence length structures and verb tenses, the APAD results fell between the significantly different Lab and F2F settings, which indicated that additional unknown factors came into play for students chatting on a chosen device at a distance as opposed to sitting together in the lab and using the provided computers.

Though not investigated as closely in Kern, the current study did examine several instructor behaviors to determine if there were differences between the two instructors, especially given that one was a 'seasoned veteran' of the classroom while the other was a beginning instructor. Overall it was not surprising that Chanda made more commands in the classroom compared to Janko. Chanda's experiences as an instructor gave her more confidence and a willingness to prod students further than in the case of Janko. Janko, on the other hand, made more self-corrections, reflecting a tendency to be hyper-vigilant in his language capacity, and perhaps reflecting some nervousness in the classroom setting, though this is simply hypothetical. The fact that he also spoke more English than Chanda highlights his desire to have students understand, to keep the conversation flowing, and to avoid silence in the classroom. Observations of his F2F conversations confirmed a pattern of asking a question, some silence, and then a question in English to try and get further understanding across to students. Aside from these basic differences that may be expected between new and more seasoned instructors, there were

no additional variances in instructor behaviors that may have impacted the results of the current study.

In summary, findings of the current study closely mirrored those of Kern (1995) in that F2F and both chatroom environments successfully supported second-language discourse. Students in all settings were able to converse with each other and with the instructor. Of the 37 discourse variables tested only 12 demonstrated significant differences, indicating the three environments within the current study were more alike than different in the quantity and characteristics of language production that occurred. The presence of significant differences regarding certain aspects of language production, discourse functions, and morphosyntactic structures within the three settings did not suggest that any one environment was better than the others for conversation. Rather, the findings underscored what Kern asserted many years ago, which was that F2F and chatroom settings tend to encourage and support slightly different goals associated with language discourse, but also suggested differences within the two chatroom settings. For example, though the results demonstrated that more sophisticated conversation took place in both chatroom settings, and that APAD and Lab results closely mirrored each other when considering discourse functions, results related to morphosyntactic features demonstrated a slight bit of divergence, as the APAD setting outcomes fell between the Lab and F2F findings. Future research is needed that further explores similarities and differences in discourse functions and morphosyntactic features as they relate to these distinct chat settings.

The differences between the F2F and chat settings found in this study were not considered to be a negative reflection of F2F. In language learning, there is a give and take of style and strategy that comes into play. The fact that students gave more commands, took more turns, and provided more incomplete sentences in the F2F condition suggested a greater realm of interaction within the F2F discourse setting. Similarly, it could be argued that students were exposed to much more language in the F2F arena by virtue of the increase of words heard, questions asked, and commands made.

While the findings of Kern and the current study support the use of all three discourse settings, it remains less clear which settings were preferred by students. Survey data indicated a student preference for F2F discourse when the goal was to improve speaking skills, but students also reported that the lack of pronunciation needed in chatroom settings served as an incentive to participate in discourse sessions. Future research is needed that explores the associations between student preferences for these three environments and actual student discourse performance. Similarly, additional studies should specifically examine student perceptions and motivations as they relate to the use of mobile technologies in second-language dialogue.

To conclude, the findings of the current study are merely an additional step in understanding the roles technology can play in supporting students' second-language development. Although we have gained additional insight concerning the use of chatrooms to facilitate language discourse, 'Continued evaluation of the nature of these new links and their effects on learners is essential if as a profession we are to make well-informed decisions' (Kern, 1995: 470).

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