Teaching with Cloud Technology: Google Docs for Chinese Language Learning

Ming-Tsan P. Lu[1] and Michael J. LaVaglio[2]

[1] University of Texas at Brownsville
Brownsville, TX, USA
Corresponding author email: MingTsan.Lu {at} utb.edu

[2] Teachers College, Columbia University
New York, NY, USA

ABSTRACT— *Identified as a difficult language for beginning learners to learn, Chinese as a Foreign Language (CFL) is nonetheless taught in over 1,600 K-12 schools and over 2,700 colleges and universities in the United States. Since CFL teachers and learners have been trying to find innovative and effective teaching or learning approaches, current cloud technology appears to be an inevitable trend for CFL learning as it creates an environment that allows learners to be exposed to more amount of input towards the target language than any traditional classroom learning environment. Given the uniqueness of CFL, this paper seeks to introduce the use of Google Docs for Chinese language learning and discuss the effectiveness of implementing such tool as an instructional method or learning approach to CFL learning. The findings from the learning experiment with 24 adult CFL learners suggest that the implementation of Google Docs for Chinese language learning and teaching be effective. Pros and cons of implementing Google Docs are discussed.*

Keywords— Google Docs, Google Drive, cloud technology, Chinese language instruction, CFL learning

---

1. INTRODUCTION

Chinese as a Foreign Language (CFL) has gained its popularity in terms of the increasing number of schools offering CFL classes and the increasing number of learners of CFL in the United States over the past several years (Lu, 2011; Lu, Hallman, & Black, 2013). In addition, due to its difficulty, many educators and scholars have been trying to develop and use innovative teaching and learning approaches to CFL learning (e.g., Lu, Hallman & Black, 2013). One of the approaches is through current cloud technology as it can create an environment that allows learners to be exposed to vast amount of linguistic input towards the target language as well as facilitates collaboration amongst users. In this paper, the authors state the importance of the study and the purpose of the study, then introduce the use of Google Docs for CFL with discussions about its pros and cons, present an empirical study with the effectiveness of implementing Google Docs for CFL learning, and discuss the implications of using Google Docs in CFL learning and teaching.

1.1 Importance of the study

Chinese has become a popular second or foreign language to learn for both K-12 school students and college students in the United States (Furman, Goldberg, & Lusin, 2007). This can be easily seen, for instance, from fast-rising Chinese language classes offered by K-12 schools across the nation as well as the 2nd fastest-growing Chinese language course enrollments in colleges. The Center for Applied Linguistics reported more offerings of Chinese classes in middle and high schools despite an overall decrease in foreign language instruction in American schools (The New York Times, 2010; 2008). Similarly, the Modern Language Association (MLA) found Chinese language course enrollments rose 51% from 2002 to 2006. The MLA found 34,153 students in 2002, and then 51,582 students in 2006, studying Chinese language at the colleges and universities it surveyed, which are 2,795 institutions, about two-thirds of all institutions of higher learning in the United States (Furman, Goldberg, & Lusin, 2007).

However, although CFL is popular, many researchers and scholars have identified that Chinese is one of the most difficult languages for non-heritage speakers to learn (e.g., Lu, Wu, Black, & Fadjo, 2010; Baxter, 2006; Moser, 1991), due to its logographic writing system and its tonal pronunciation. Therefore, more and more researchers have drawn their attention to how learners may better learn Chinese using innovative approaches or current technologies from either theoretical or practical perspectives (e.g., Lu, 2011; Lu & Black, 2011; Lu, Hallman, & Black, 2010a; Lu, Hallman, & Black, 2010b; Lu, Hallman, & Black, 2010c; Lu, Hallman, & Black, 2013).

1.2 Purpose of the study

Along similar lines, we propose the use of one powerful type of cloud technology tools for CFL learning and teaching. Specifically, we propound Google Docs (Google Drive) for CFL learning and teaching. As Google Docs contains many features and functionalities, the paper seeks to investigate its pros and cons and effectiveness in CFL teaching and learning, and discuss practical implications and possible future research directions.

2. IMPLEMENTATION OF GOOGLE DOCS IN CFL LEARNING

Google Docs is an easy-to-use, easy-to-share, easy-to-collaborate, and Web-based free office suite and data storage service provided by Google. Its latest version with minor functional revisions was released on the 18th of October in 2011. Google Docs contains online Document, Presentation, Spreadsheet, Form, Drawing, Table, and Collection that are all real-time and easy-to-use for students' collaboration work. Teachers and students can use these Google Docs for their education-related activities. The new name of Google Docs, namely the Google Drive, was released in October 2012 and it mainly added to the Google Docs the drag-and-drop function.

Document: Teachers can assign writing activities and students can work on their projects together through Document. For CFL learners, words and characters that are unfamiliar to someone can be taught by other classmates when conducting an article immediately. The syntax, semantics, and pragmatics of CFL can be double-checked by learners. For learned Chinese phrases or words that do not come to the learner's mind when writing an article collaboratively, other learners can provide help to show these phrases or words right away.

Presentation: In addition to immediate and collaborative advantages that Document has, when teaching CFL, Presentation can easily make last-minute or up-to-date changes. Chinese sentence examples or advanced CFL articles can be clearly demonstrated through Presentation. Videos, sounds, and images can be integrated into Presentation.

Table: Table is for presenting data and organizing information. In CFL teaching and learning, presenting grammar points, listing Chinese/ English translations, or combining Chinese materials using Table is convenient and helpful.

Collection: Collection makes sorting, categorizing, and searching files straightforward. By clicking and dragging, files can be easily tagged, labeled, and categorized.

Spreadsheet: The many functions Spreadsheet provides make CFL learning interesting and practical. GoogleTranslate, for example, makes immediately translating a series of words or phrases possible and therefore learners could gain better fluency. Functions work as commands, and commands such as GoogleLookUp, GoogleFinance, ArrayFormula, ImportData, GoogleClock, GoogleTounament, Time, and Query...etc. make professional Chinese language, such as Business Chinese, more approachable to learners.

Form: Use of Form is popular for creating and modifying CFL tests. Testing types such as translation, making new or complete sentences, fill-in-the-blank, phonetics, grammar, Chinese reading, or Chinese writing can all be included in the use of Form. In addition, surveys and public polls can be easily created and implemented.

Drawing: For beginning learners of CFL, presenting images or pictures for pictographs, indicatives, and ideographs through Drawing greatly help with memorization and understanding of words' etymology. Even a quick stroke demonstrated in Drawing would increase learners' CFL accuracy.

3. STUDY: THE CFL LEARNING EXPERIMENT

To determine if the implementation of Google Docs for CFL learning is indeed effective, the researchers conducted an empirical study in fall 2011. The CFL learning experiment lasted for one week and was for beginning learners of Chinese who did not have any prior knowledge of Chinese language.

3.1 Participants

Twenty-four adult CFL learners were randomly assigned to one of the three learning groups: the GoogleDocs group (GooD), the Technology in Education/ Classroom Hybrid group (TECH), and the Traditional classroom-based group (TraC). There were eight participants in each group. All participants were screened and showed no prior knowledge of Chinese language before they started in the study. The mean age of the participants in our study was 25.6 (SD = 2.2). Six of the participants were of African American ethnicity while eighteen of the participants were of Caucasian American ethnicity. All participants spoke English as their native, primary language with seven participants indicating that they can speak a second language. In terms of gender construction, the study included fifteen females and nine males.

3.2 Procedures

The screening test ensured that all participants did not know Chinese language. After random assignment, the participants received a total of 60-minute CFL instruction on 50 Chinese characters and 20 two-word phrases over two lessons (30 minutes each) in their own groups, i.e., the GooD group, the TECH group, and the TraC group. The second

lesson took place after three days of the first lesson. Posttests on memorization (i.e., memory tests) and application (i.e., transfer tests) of the CFL learning materials took place after one week of the first lesson. The posttests took approximately 15 minutes. The participants were interviewed using a semi-structured questionnaire after the posttests.

3.3 Designs

Two lessons for 50 Chinese characters and 20 two-word phrases were designed, taught, and uploaded as learning materials. Participants in the GooD group received CFL instruction using all the Google Docs applications in addition to classroom teaching. The GooD participants were encouraged to use Google Docs as materials were presented and placed in Google Docs. The TECH participants received the same CFL instruction using other forms of similar technological applications, such as MS Word (for Document), PowerPoint (for Presentation), and Excel (for Spreadsheet). The TraC participants received the same CFL instruction using the traditional classroom-based method such as paper and pencil, and the blackboard and chalk method. The study adopted the posttest-only experimental design.

4. ANALYSES AND RESULTS

The researchers first performed exploratory data analysis (EDA) and generated a broad picture of our data on CFL learning. The researchers conducted the omnibus One-way Analysis of Variance (ANOVA) to see if there existed any mean difference in their test performance among the three groups. The post-hoc Tukey HSD tests were conducted to determine the possible mean differences in their test performance between any of the two groups.

4.1 Perceived and Actual Usefulness of Google Docs by CFL Learners

Figure 1 shows the frequency of uses for different types of Google Docs among the GooD group participants over a week. Document, Presentation, and Spreadsheet were the most popular applications and functions for these eight GooD group learners of CFL. They were used 72, 76, and 70 times, respectively. Drawing and Collection were also used by these CFL learners, for 25 and 22 times, respectively, though they were not used as frequently. Table and Form were used the least, with only 15 and 12 times, respectively. Figure 1 also shows the GooD group participants' ratings (out of 100) of CFL learning perceived effectiveness after one week. Overall participants believed that Documents, Presentation, Collection, Spreadsheet, and Drawing were most effective on their CFL learning, with ratings of 82.5, 76.6, 76.2, 88.6, and 78.5 respectively. There were obvious discrepancies between how often they used certain applications on Google Docs and how they thought about the effectiveness of those applications for Table, Collection, Form, and Drawing.
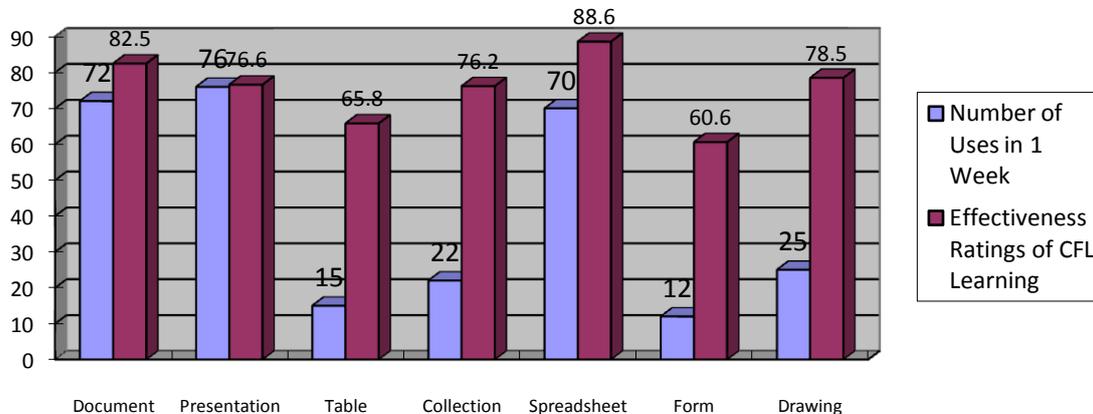

Figure 1: Number of Uses for Different Types of Google Docs in One Week and the Effectiveness Ratings of CFL Learning by the GooD Group Participants

4.2 Learning Results after One Week

Figure 2 and Table 1 show the posttest scores on memory and transfer for the three learning groups. After one week of CFL learning, all participants took the memory test and the transfer test. For the memory test, the GooD group participants yielded a mean of 85.75 (SD = 3.45), the TECH group participants yielded a mean of 80.63 (SD = 4.87), and the TraC group participants yielded a mean of 63.13 (SD = 9.42). From ANOVA, there was significant mean difference in the memory test scores across the groups ($F_{(2, 21)} = 27.17$, $p < .001$). Post-Hoc Tukey HSD tests revealed that the GooD group performed better than the TraC group with a mean difference of 22.63 (SE = 3.22, $p < .001$). The TECH group performed better than the TraC group with a mean difference of 17.5 (SE = 3.22, $p < .001$). There were no significant mean difference in the memory test scores between the GooD group and the TECH group (D = 5.13, SE = 3.22, p = .271).

For the transfer test, the GooD group participants yielded a mean of 69.88 (SD = 4.52), the TECH group participants yielded a mean of 61.75 (SD = 7.07), and the TraC group participants yielded a mean of 37.50 (SD = 7.35). From

ANOVA, there was significant mean difference in the transfer test scores across the groups (F (2, 21) = 54.76, p < .001). Post-Hoc Tukey HSD tests revealed that the GooD group performed better than the TraC group with a mean difference of 32.38 (SE = 3.22, p < .001). The TECH group performed better than the TraC group with a mean difference of 24.25 (SE = 3.22, p < .001). There were marginally significant mean differences in the transfer test scores between the GooD group and the TECH group (D = 8.125, SE = 3.22, p = .05).

The Levene test of homogeneity of variances revealed that for the memory test, the learning groups did not hold equal variances (Levene (2, 21) = 4.07, p = .032). Further examination of the data revealed that the TraC group had a large variance indicating that some participants in the TraC group were good at rote memorization while others in the TraC group did not perform well. For the transfer test, there was no heterogeneity of variance issue.
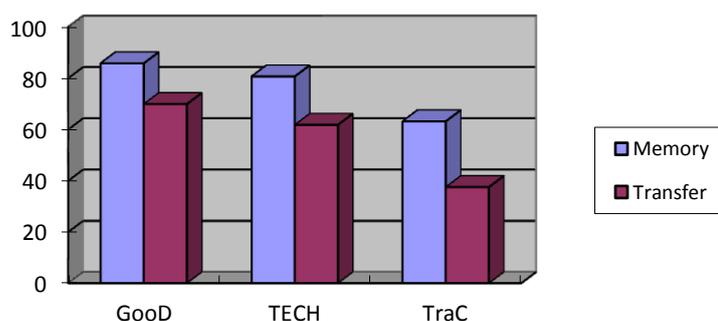

Figure 2: The Memory and Transfer Test Scores for the Three Learning Groups after One Week of CFL Learning

Table 1: The Memory and Transfer Test Scores for the Three Learning Groups after One Week of CFL Learning

Groups	Memory: Mean (SD)	Transfer: Mean (SD)
GooD	85.75 (3.45)	69.88 (4.52)
TECH	80.63 (4.87)	61.75 (7.07)
TraC	63.13 (9.42)	37.50 (7.35)

4.3 Learning Results for Different Types of Han Characters by CFL Learners

Figure 3 and Table 2 show the percent correct on types of Chinese characters for the three learning groups. Lu (2011), Lu, Hallman, and Black (2013) and Lu, Hallman, and Black (2010a) have suggested that for beginning learners of CFL, it is best that three basic types of Chinese characters should be introduced: pictographs, indicatives, and ideographs. Following Lu's (2011) and Lu, Hallman, and Black's (2013) research, the study also examined the learning results of these three types of characters from the participants. Pictographs and indicatives were better memorized and recalled than ideographs across all three learning groups.
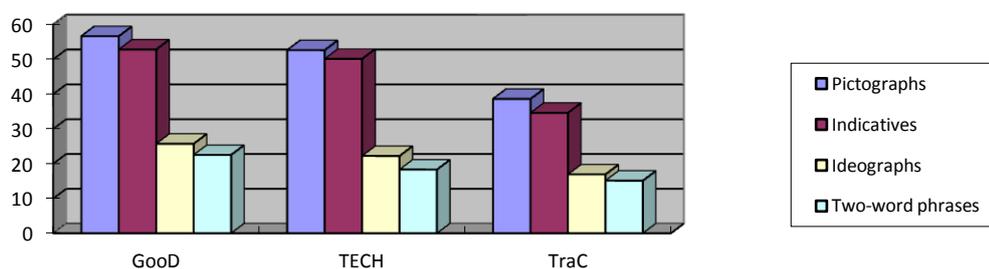

Figure 3: Percent Correct on Types of Chinese Characters for the Three Learning Groups

Table 2: Percent Correct on Types of Chinese Characters Recalled on Posttests

Groups	Pictographs	Indicatives	Ideographs	Two-word Phrases
GooD	56.6%	52.8%	25.7%	22.5%
TECH	52.6%	50.1%	22.2%	18.3%
TraC	38.6%	34.6%	16.9%	15.1%

5. DISCUSSION

5.1 Pros and Cons of Using Google Docs in CFL Learning

The utilization of Google Docs in the endeavor to augment pedagogic enterprises in linguistics, specifically CFL learning, must be analyzed from both a critical and supportive lens. The embracing of cloud technology in educational modalities has many beneficial qualities as well as those which have hitherto been considered not as beneficial to users. Albeit studies have generally shown learners' positive feedback when using technology in their learning, like this empirical study, the researchers ask: What are the benefits and complications of using Google Docs in CFL learning? The researchers further discuss these benefits and complications in hope to help with CFL educators' future implementation considerations.

5.2 Benefits

There are several dialectical advantages when utilizing Google Docs for Chinese language acquisition and learning, largely in the broad and flexible epistemological opportunities it offers for students to individually and collaboratively produce knowledge. By working towards ameliorating the accuracy, consistency, scope of applicability, and overall comprehension of the Chinese language, students utilizing Google Docs replace neurologically ambiguous tendencies with an acute receptiveness to the insights of others and the epistemological strategies of the constructivist and social constructivist schools of thought.

Constructivists contend that knowledge, however disciplinary characterized, is generated from an interaction between ones experiences and their ideas. In practice, constructivist pedagogues endeavor to build upon knowledge that a student already knows, particularly by manipulating objects. Alternatively, social constructivists postulate that many students learn more from another than from the direct manipulation of objects. "Accordingly, through interactions with others, they learn the fundamental questions of reflective inquiry: How did I arrive at this hypothesis? Will it work? What are the logical alternatives? How can I explain my hypothesis to others? As others put such questions and challenges to us, we internalize these questions and develop the habit of asking them ourselves" (Noddings, 2009).

In providing both a shared workspace and personalized learning environment, Google Docs effectively merges the opposing constructivist schools into a complimentary epistemological modality. This is particularly beneficial for teachers interested in differentiating their instruction. For example, due to the constructivist dualism offered by Google Docs, students who are more inclined to academically succeed in group work can do so by sharing a work place where Chinese linguistic complexities and ideas can be easily expressed and shared. Further, the flexibility that Google Docs offers students makes it a good tool for a personal learning environment or e-portfolio. Analogous to a wiki, learners can use Google Docs to record and share what they are learning; however, on Google Docs this can be done in real-time. Therefore, students are able to transcend time and space. With the ability to manipulate time and space, content can be successfully accessed at any geographical location at any moment. Cloud technology, therefore, has the faculty to reach local or globalized audiences operating from anywhere on the planet; subsequently, resulting in the creation of a socially and culturally heterogeneous cohort of learners.

Further, teachers can embrace the program to evaluate student performance, making any necessary edits, corrections, or if needed, progress evaluation by utilizing the revision history function. With the ability to access the program from any location that has Internet access, teachers can further utilize the program when they are home or absent. In our own practice, for example, if missing class due to sickness students will be able to effectively communicate with instructors via Google Docs. Students can add notes, images, links to relevant sites and links to videos to create an online folder or interactive essay.

By learning to manipulate the same technological object from multiple perspectives, and merging the disparities of different knowledge constructions, students work together toward a collective goal that helps them master the conceptual lacunae and work through the intellectual voids associated with learning the Chinese language (Stepansky, 2009). In addition, by bringing their own epistemological conceptualizations to the program, personal knowledge is the means to make sense of the Chinese language and the interrelations of the knowledge of others sharing the Google Doc. Hence, "the concepts and relations in terms of which we perceive and conceive the experiential world are necessarily generated by ourselves; in this sense students are responsible for the educational world they are experiencing" (Noddings, 2009). At its best, then, pedagogic exercises in cloud technology that are predicated on Google Docs engender students and teachers alike to engage in adaptive activities that cultivate from a rich and complex shared linguistic knowledge base; one which is open to both collective and individual manipulation, easy to operate due to its commonalities to Microsoft Word, ODF, or PDF, and stored within one shared technological framework easily accessed by the student or teacher virtually anywhere on any machine that has Internet connectivity. Students hence taught will engage in their linguistic pursuits in an educational environment that by disposition celebrates collaboration, teaming, and a commitment to continuous and differentiated learning and linguistic acquisition.

5.3 Complications

Effective Chinese language learning in the classroom can be difficult, even during the best of technological conditions. The phonological and prosodic dimensions embedded within Chinese reveal the extents to which the functional limitations existent in Google Docs may preclude successful CFL acquisition. Further, it seems that Google Docs retains the assumption that language is static. Put differently, if language were static, it would presume that when a thought or idea was transmitted by a sender the mental picture perceived by the receiver would be analogous to what was envisioned by the sender. Google Docs, by disposition of its tonal and prosodic impotence, does not account for the many manipulations applied to the Chinese language. Take, for example, the five tones in standard Mandarin Chinese as applied to the syllable "ma." Depending on the phonetically pronounced tonality of the syllable, as well as the register in which one releases it, "ma" manifests five distinct terminologies:

妈 / 媽(mā) "mother"—high level;

麻(má) "linen" or "numb"—high rising;

马 / 馬(mǎ) "horse"—low falling-rising;

骂 / 罵(mà) "scold"—high falling;

吗 / 嗎(ma) "question particle"—neutral.

Comparatively, suppose that students are asked to get into groups of two and assigned the task of simulating a social exchange as they would if meeting a new person that they may be interested in taking on a date. At the end of the simulated conversation a student, supposedly, asks their group partner "Why don't I take you to dinner tonight?" Here, intonation, or a variation of one's pitch while speaking to emphasize particular importance to one's message, is critically important to the substance of the sentence. However, accommodations for linguistic intonations and tonal variations are wholly absent from Google Docs. In verbal exchange personal intentions emanate from a background orientation that shapes an ontological sensibility, which that sensibility is thereupon converged with a consistent material framework. In other words, the intonation of specific words within the sentence "Why don't I take you to dinner tonight?" supplants, complicates, or evinces the verbal and practical intentions of the speaker. (Table 3)

Table 3: Intonations between Emphasis and Meaning

Placement of Emphasis	What It Means
Why don't I take **you** to dinner tonight?	I was going to take someone else.
Why don't **I** take you to dinner tonight?	Instead of the guy you were going with.
Why **don't** I take you to dinner tonight?	I am trying to find a reason why I should not take you.
Why don't I take you to dinner tonight?	Do you have a problem with me?
Why don't I **take** you to dinner tonight?	Instead of going on your own.
Why don't I take you to **dinner** tonight?	Instead of lunch tomorrow.

Source: Robbins, S (2009). Organizational Behavior. Upper Saddle River: Prentice Hall. 359

The sounds heard by conversationalists, as construed in the aforementioned examples, are very different: They are verbal expressions of complex linguistic productions, which are themselves embedded in dense and different phonetic and contextual narratives (Stepansky, 2009). These narratives, following the phonological structure of each syllable and intonation, comprise not only the content of the sentence's subject but also the conversationalist's linguistic intentions and personal subjectivity. Sentences using the syllable "ma" or that prosodically emphasize singular words for conceptual necessity carry their own syntactic sequence and subjective context depending on the speaker's epistemological perceptions and intentions. Google Docs has no means to accommodate for each student's unique sensibilities or the necessary conceptualizations for an understanding of them; consequently, this could lead to the misinterpretation of messages during collaboration. One research team at New York University, for example, discovered that students can accurately decode an online messages intent and tone only 50 percent of the time, yet most of them vastly overestimate their ability to send and interpret clear messages (Robbins, 2009).

Further, without accurate characterizations of participants' subjectivity, students' selective perceptions can distort what is actually exchanged from what it is that they want to be heard and how they want to receive it. Although one could presumably implant their specific sensibility in Google Docs by utilizing its "comment" function, this can be determinately time-consuming for students and tends to obviate from the importance of constructing Chinese characters within the interface.

In addition, because individuals have a finite capacity for storing information, as this can be compounded when learning a new language, students are more inclined to select, ignore, pass over, or forget important

information when there is an information overload (Robbins, 2009). Subsequently, this loss in information can result in less effective communication. One need not dwell in robust Chinese vernacular studies to recognize that phonetic sounds and the meaning in which they intend to convey, far more than merely seeing Chinese symbols via Google Docs, only become meaningful when they are infused with the listener's subjectivity, which itself is a product of the listener's thick epistemological narrative as situated in a material sensibility. In this manner, linguistic "listening" in Google Docs is detached from linguistic "seeing:" Just as seeing presupposes something beyond retinal stimulation or visual sense-datum that we then infer to be something other than what we are visually aware of, so analytic listening presupposes something beyond aural stimulation to which meanings are added (Stepansky, 2009). Analytic listening in Chinese is therefore not merely conversationally necessary; it is conversationally enabling. The speaker's epistemological commitment and heuristic values reside in the act of listening; while entertaining Google Docs, which has no functions to explore a syllable's tones or a user's listening integrity, it is improbable that students will naturally derive a discursive organization of tonalities and the words, sentences, and intentions to which those tonalities are wed.

Although Google Docs can be characterized as a sort of faceless, sterile form of communication, it is not without emotion or human complexity (Robbins, 2009). These human emotions and complexities, however, are not applications found within the program; rather, they are created by the people manipulating it. Consequently, educators utilizing the program for purposes of instruction have no means with which to inculcate the importance of the humanistic elements that naturally foment in conversation, such as body language and sociocultural formalities. Therefore, Google Docs carries with it a possibly low cultural capacity. Languages with high cultural contexts, specifically Chinese, warrants not only that the speaker is aware of the deviations in phonology's that structure effective speaking and listening but is also authentically receptive to the needs and social characteristics of the person they are engaging with. For what, after all, is the locus of conversation (Stepansky, 2009)? It is the individual, who enters conversation with a purpose, however it may be characterized, to be illuminated, attenuated, and ultimately addressed by the person or group of people with whom they are talking to (Stepanksy, 2009). Within the linguistic constructions of Chinese, as within any language, words may be ostensible. Meaning conveyed in didactics, however tacitly or transparently expressed, need always to be conceptualized and defined within each sociocultural orientation or context from which they are derived. Asian cultures tend to differ in the importance to which context influences the meaning that individuals take from what is actually said.

However, in Chinese, people rely heavily on nonverbal and insidious situational cues when communicating with others (Robbins, 2009). Put differently, what is not said, in some instances, may be more significant than what is said. Considerations of a person's official status, place in society, and reputation carry significant importance in China. Oral agreements, specifically, imply strong commitments. And who you are—your age, your education, rank in occupation—is valuable and heavily influences your credibility in such social arrangements (Robbins, 2009). Analogously, the amalgam of body language and physical distance adds to, and often complicates, verbal communication. A body position or movement does not by itself have a precise or universal meaning, but when it is linked with spoken language, it gives fuller meaning to a sender's message (Robbins, 2009). Just as a smiling face purveys something different than a snarling one, peoples distances between one and another suggests an intimacy and alters the meaning of what is being verbally exchanged (Robbins, 2009). Undoubtedly, it is important for one in conversation to be alert to these nonverbal aspects of communication. Facial expressions inextricably temper our emotional expressions, but in Google Docs, there is no other face to look at, and so many students will learn the Chinese language without being prepared for how their messages can be distorted, conceptualized, and internalized by others.

The challenges that materialize due to these linguistic complexities and their intersections in humanely affair are not explicitly addressed in Google Docs; there are no functionally appropriate grounds in the program, ether empirically, epistemologically, or heuristically that accommodate for the humanistic sensibilities of conversation in efficiently transferable pedagogic ways. Though Google Docs offers its users with technological flexibility, especially in terms of its ability to transcend time and space, its dialectical process is not an organic sequence capable of examining and contrasting the different cultural constructions that are necessary to master the conceptual and material tools of the Chinese language. In other words, although with Google Docs students may acquire a mechanical understanding of Chinese; it may be unlikely that they will acquire a means with which to think conceptually and critically with it.

6. CONCLUSION

Despite the complications, the implementation of Google Docs for Chinese language learning and teaching seems to be effective in many ways and should therefore be encouraged to learners and educators. Many different instructional materials and designs can be created for Chinese character teaching and learning according to our review on Google Docs and related literature. We see that the use of cloud technology will be the new trend of CFL teaching and learning and thus the use of Google Docs seems to be beneficial and of great significance. Teachers' instructional designs will be different from traditional ones when it comes to using web-based technology for Chinese language classrooms.

GoogleDocs Help and GoogleDocs Tutorial are great resources for teachers and students who are interested in further using GoogleDocs for CFL teaching and learning.

REFERENCES

[1] Baxter, W. (2006). *How Hard is Chinese?* Retrieved on Feb 28th, 2010, from http://www-personal.umich.edu/~wbaxter/howhard.html

[2] Chapelle, C (1997). CALL In the Year 2000: Still in Search of Research Paradigms? *Language Learning & Technology, 1*, 19-43.

[3] DeFrancis, J. (1966) Why Johnny Can't Read Chinese, *Journal of the Chinese Language Teachers Association, 1,* 1-20.

[4] DeFrancis, J. (1984). *The Chinese Language: Fact and Fantasy*, Honolulu: University of Hawaii Press.

[5] DeFrancis, J. (1989). *Visible Speech: The Diverse Oneness of Writing Systems*, Honolulu: University of Hawaii Press.

[6] Egbert, J. & Hanson-Smith, E. (1999). *CALL Environments: Research, Practice, and Critical Issues.* Teachers of English to Speakers of Other Languages, Inc.

[7] Everson, M. (1998). Word recognition among learners of Chinese as a foreign language: investigating the relationship between naming and knowing. *The Modern Language Journal, 82*, 194-204.

[8] Kennedy, G. (1964). *A Minimum Vocabulary in Modern Chinese*, in Selected Works of George Kennedy, Tien-yi Li (ed.), New Haven: Far Eastern Publications.

[9] Furman, N., Goldberg, D. & Lusin, N. (2007). *Enrollments in Languages Other Than English in United States Institutions of Higher Education*, Fall 2006. Web publication. Modern Language Association.

[10] Furstenberg, G (1997). Teaching With Technology: What Is At Stake? *ADFL Bulletin, 28*, 23-25

[11] Hanson-Smith, E. (2000). *Technology-Enhanced Learning Environments.* Teachers of English to Speakers of Other Languages, Inc.

[12] Ha, E. & Rilling, S. (2006). *Learning Language through Technology*. Teachers of English to Speakers of Other Languages, Inc.

[13] Lewis, M. Paul (ed.), 2009. *Ethnologue: Languages of the World,* Sixteenth edition. Dallas, TX.: SIL International.

[14] Lin, C., Huang, C. & Chiang, Y. (2009). Learners' Perspectives on Incorporating Drupal and Web 2.0 Tools in a Blended-learning Chinese Classroom. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2009* (pp. 4223-4228). Chesapeake, VA: AACE.

[15] Lin, Y., Lin, C., Lin, L., Chen, H., Ma, J. & Chang, R. (2009). The Design of a 3D Virtual Game for Chinese as a Second Language (CSL) Practices. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2009* (pp. 1255-1260). Chesapeake, VA: AACE.

[16] Lu, M. (2011). *The Effect of Instructional Embodiment Designs on Chinese Language Learning: The Use of Embodied Animation for Beginning Learners of Chinese Characters.* Ph.D. Dissertation, Columbia University. New York, NY. Retrieved January 1, 2012, from http://academiccommons.columbia.edu/catalog/ac:132065

[17] Lu, M., Wu, C., Martin, E. & Shah, R. (2009). The Effects of Computer-Assisted Language Learning (CALL) in Grammar Classrooms. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2009* (pp. 2217-2236). Chesapeake, VA: AACE.

[18] Lu, M., Hallman, G., & Black, J. (2013). Chinese Character Learning: Using Embodied Animations in Initial Stages. *Journal of Technology and Chinese Language Teaching, 4*(2), 1-24.

[19] Lu, M.T., Hallman, G. & Black, J. (2010a). Effective Designs of the Computer-Assisted Chinese Learning Program for Beginning Learners of Chinese Characters. In J. Sanchez & K. Zhang (Eds.), *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2010* (pp. 218-227). Chesapeake, VA: AACE.

[20] Lu, M.T., Hallman, G. & Black, J. (2010b). The Development of Embodied Animations for Chinese Characters. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2010* (pp. 3763-3768). Chesapeake, VA: AACE.

[21] Lu, M.T., Hallman, G. & Black, J. (2010c). Evidence for the Use of Embodied Animations in Chinese Character Learning. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2010* (pp. 3753-3762). Chesapeake, VA: AACE.

[22] Lu, M., Wu, C., Fadjo, C. & Black, J. (2010). Future Trends in Chinese Character Teaching: Use of Embodiment and Technologies in Classrooms. In C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2010* (pp. 2485-2492). Chesapeake, VA: AACE.

[23] Lu, Z., Crooks, S., Maushak, N., Lan, W. & White, D. (2009). Computer-Based Chinese Character Learning: An Experimental Study. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2009* (pp. 3962-3968). Chesapeake, VA: AACE.

[24] Mair, V. (1986). The Need for an Alphabetically Arranged General Usage Dictionary of Mandarin Chinese: A Review Article of Some Recent Dictionaries and Current Lexicographical Projects, *Sino-Platonic Papers*, No. 1, February, 1986.

[25] McLaughlin, B. (1987). *Theories of second language learning*. London: Arnold.

[26] Moser, D. (1991). Why Chinese is so Hard. In Mair, V.H. (eds.) Schriftfestschrift: Essays on Writing and Language in Honor of John DeFrancis on His Eightieth Birthday. *Sino-Platonic Papers, 27*, 59-70.

[27] Noddings, N. (2010). *Philosophy and Education*. New York: Jossey-Bass.

[28] National Academy of Sciences (2008). *Science, Evolution, and Creationism.* The National Academies Press.

[29] The New York Times (2008). *More School District Look to Hire Teachers of Chinese*. Retrieved Feb. 24th, 2010, from
http://www.nytimes.com/2008/06/01/nyregion/nyregionspecial2/01chinesewe.html?_r=1&fta=y

[30] The New York Times (2010). *Foreign Languages Fade in Class—Except Chinese*. Retrieved Feb. 24th, 2010, from
http://www.nytimes.com/2010/01/21/education/21chinese.html

[31] Robbins, S (2009). *Organizational Behavior.* Upper Saddle River: Prentice Hall.

[32] SIL International. (2009). *Scope of denotation*. Retrieved Oct. 15th, 2009, from http://wwpw.sil.org/iso639-3/scope.asp#M

[33] Stepansky, P. (2009). *Psychoanalysis at the Margins.* New York: Other Press.

[34] Warschauer, M., Shetzer, H. & Meloni, C. (2000). *Internet for English Teaching.* Teachers of English to Speakers of Other Languages, Inc.