ISSN 2616-5775 Vol. 5, Issue 6: 74-82, DOI: 10.25236/AJCIS.2022.050611

The Application of Computer-Assisted Corrective Feedback in Chinese Learning Environment

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Abstract: *Corrective feedback plays in critical role in second language learning and facilitates the learners' uptake of a linguistic structure. The study seeks to explore the teachers' perception towards corrective feedback for foreign students and attempts to find the feasibility of carrying out computer-assisted corrective feedback in China's tertiary institutes. A sample of 38 Chinese language instructors and that of 39 foreign students were randomly selected respectively. For the teachers a questionnaire and a post hoc interview had been conducted and the finding thereby shows that the 36.8% of interviewees can accept computer-assisted corrective feedback. For the students, a three-month teaching practice targeting Chinese wh-question learning has been conducted between the control group (n=19) and the experiment group (n=20). A pre-test, two post-tests on grammaticality judgments had been conducted, and the results demonstrate that there is significant change between two groups. The implication of the present study is ease the tension between the shortage of language instructors and the increase of foreign students in China.*

Keywords: *computer-assisted corrective feedback, teachers' perception, Chinese wh-questions acquisition*

1. Introduction

Corrective feedback (CF) refers to the pedagogical practice that a teacher or a learner's peer provides direct or indirect feedback to learners on performance that contains linguistic error. CF has appealed to increasing interests from scholars over the past two decades. Previous research on CF has mainly focused on: the dichotomy of CF types; whether CF facilitates or impedes second language acquisition; whether explicit CF is more effective than implicit CF; whether CF is effective when it is form-focused or meaning-focused; teachers' and learners' attitudes and perceptions towards CF. Interests in CF from scholars have explicitly or implicitly contributed to the comprehensive understanding of the mechanisms of this teaching practice in facilitating language learning.

A wide range of observatory and empirical evidence have illustrated the positive effect in classroom CF practice. Both interaction-cognition and socio-cultural approaches have recognized that CF is beneficial for the internalization of second language acquisition. As interest in CF has greatly expanded, corrective feedback, a former pedagogical technique, has become a hot issue with fundamentally theoretical significance which awaits further exploration from the perspective of second language acquisition.

Since most of the research that derives from interaction hypothesis has taken place in the classroom context, there is increasing recognition of the importance of the computer technology in providing opportunities for language learner interaction. Overwhelming amount of research on the effects of CF, however, have been taking English as a second language. Scarce research has used Chinese as a target language, which obviously failed to meet the demands of Chinese as SLA research. The paper attempts to explore the effective of computer-assisted corrective feedback, a specific approach of CF, in Chinese learning for foreign students in China and the study has taken Chinese wh-questions as a target structure.

2. Literature Review

2.1 CF in Second Language Learning

For any language learning or instruction, classroom interaction plays a vital role in the pedagogical

ISSN 2616-5775 Vol. 5, Issue 6: 74-82, DOI: 10.25236/AJCIS.2022.050611

and acquisition process. The interactive activity finds its theoretical basis from interaction hypothesis, which develops Krashen's influential input hypothesis [1]. Interaction hypothesis and its predecessor, highlight the crucial role that comprehensible input plays in SLA. Negotiation and negative evidence in classroom have directed contributed to the formation of interlanguage. It is widely recognized that language instructors in their teaching practice should strive their utmost to create opportunities for students to interact in the classroom.

The roles that corrective feedback (CF) plays in second language acquisition (SLA) process have always been a controversial topic. Some experts have claimed that no effective evidence can prove the positive effect of CF in SLA, and what is worse, the practice of error correction is liable to takes learners' time and energy away from the routine learning track. Based on the assertion, they continue to prove that CF does not show learners correct language usage, may lead to negative affective/psychological feeling that being interfered with and is likely to shift learners' focus on language form rather than on meaning and usage [2].

Sound as it is, the opposing voice seems to run against with the real expectation of the ambitious language learners and more with the conventional teaching practice of conscientious language instructors. Research on students' preferences has demonstrated that language learners expect their instructors to make some correction, or give some comment on their performance, especially their errors.

A wide range of empirical research on the effect of corrective feedback has highlighted that feedback does lead to improvement in all aspects of language capabilities. Hyland & Hyland have proved that writing ability could be improved through CF [3]. Ellis holds the position that CF is beneficial to L2 grammatical features acquisition[4]. He also demonstrated that students made statistically significant reductions in their total number of errors over a semester in five major grammar categories with a particular reduction in verb and lexical errors.

2.2 The typology of Corrective Feedback

Several scholars have proposed basic types of corrective feedback in SLA classroom context: recast, explicit correction, elicitation, metalinguistic feedback, clarification request, repetition; paralinguistic signal [4], [5], [6]. Based on the typology above, recast is often taken as a typical approach of explicit CF and metalinguistic feedback, implicit.

Previous researches mainly accumulatively focus on recasts and metalinguistic feedback, since these two approaches are the most frequently used strategy in classroom context. Recast refers to reformulation of all or part of a learner's erroneous utterance without changing its original meaning. For instance, if a learners says *Yesterday he buys three books, then the instructors is supposed to respond: Yes, yesterday he bought three books. Metalinguistic feedback, on the other hand, refers to information on the nature of error of the student's erroneous utterance. If the same error occurred, for example, * Yesterday he buys three book. …, the instructor will explain the reasons for the ungrammaticality: "In English grammar, past tense is used when a past event is expressed and present tense is used when an event is undergoing. There are several factors which restrict the full function of recasts and metalinguistic feedback, such as language proficiency levels, teaching environment, language structures and learners' individual difference. Considering the realistic manipulation of corrective feedback on a computer-assisted platform, the present study will only explore recasts and metalinguistic feedback.

Another influential classification is made in terms of who initiates the feedback. It consists of teachers CF, self-CF, peers CF, and computer-assisted CF. It is interesting to scrutinize the computer assisted CF, as it offers the promise of unlimited individual practice and can provide automatic correction on learner output with the assistance of technology.

2.3 Computer-assisted corrective feedback

With the widespread use of computer-based technologies in language instruction at present, a further taxonomy can be made between computer-based CF and conventional CF. As a matter of fact, despite the fact the former approach contains all the merits of the conventional error-correction feedback, it possesses some unique features which evidently outperforms the traditional feedback approach. In the first place, it is relatively embarrassing for some learners to be corrected when involved in class activities, since cultural difference and personal cognition to the practice may be diversified. Computer-based CF, however, helps learners overcome their timid psychology and bear the courage to interact with the machine, thus, in the long run, students' confidence can be picked up. In the second place,

ISSN 2616-5775 Vol. 5, Issue 6: 74-82, DOI: 10.25236/AJCIS.2022.050611

classroom CF practice is often a temporary response towards learners' errors from instructors. Once finished, the correct explanation may not necessarily have been acquired and the same error may be recurrent in the following communication. Computer-based CF provides higher frequency of correction, till language form-meaning complex can be proficiently internalized by the learner. And perhaps, the most worthwhile is the fact that computer-based CF could integrate means of correction and allow learners immerse in an autonomous learning process.

Contemporary research on computer-based corrective feedback mainly focus on written language acquisition. Sullivan & Pratt demonstrate that E-feedback can lead to better writing products [7], Tuzi concentrates on larger chunks of writing and work on macro-revisions [8]. Examining different areas of research and instruction in which the concept of electronic feedback has been addressed, Ware and Warschauer outline three strands of research on e-feedback for second language writing [9]. First, they delineate the potential usefulness and cost-effectiveness of software-generated feedback to replace or enhance direct human feedback. Second, they sketch out comparative studies evaluating the effect of computer-mediated human feedback on ESL writing when compared with more traditional face-to-face feedback. Finally, influenced by socio-cultural and socio-cognitive perspectives, they look into differentiation within electronic modes, ranging from a specific focus on academic modes of second language writing to a notion of feedback that incorporates other communicative modalities, such as online chat, email collaboration, and multimedia authoring.

2.4 Nature of teachers' perceptions

Teacher perceptions refers to the thoughts or mental images teachers have about their students and their teaching practice. It often derives from their background knowledge and life experiences. It consists of either tacitly held assumptions, perceptions about teaching and learning or personal constructs of teachers that can help understand their decisions and teaching practices. The belief system consists of the information, attitudes, values, theories, and assumptions about teaching, learning, learners, and other aspects of teaching. Some of these beliefs are quite general while some are very specific. It is generally held that teachers' beliefs influence their judgment and perception, the classroom activities they use, and it can contribute to the improvement of teaching practices and teacher education programs. The belief system is argued to serve as a base for the activities and practices teachers use in the classroom. It guides teachers in the course of the practices they have in the classroom. Teachers' beliefs can to a large extent determine the way they approach their teaching. In brief, research findings show that teachers have complex thinking and interpretation of teaching and the context upon which they reflect, decide, and act was a wide and rich mental context. Since teachers' perception functions a guideline of a teacher's profession, it is imperative to know what sort of tactics they will adopt in correcting students' language errors. Suppose a teacher holds a doubtful attitude to the computer-assisted corrective feedback, the study like the present one will lack pedagogical significance.

3. Research questions

One of embarrassing consequence of classroom face-to-face corrective instruction is that instructors often fail to consider the learners' emotional response towards the correction and thus the effect of CF is under strong criticism. Brown has pointed out that one of the principles of classroom error correction feedback is to fully consider the emotional characteristics of learners [10].

Lyster & Saito hold the same attitude with Brown, they have elicited factors like learners' anxiety, learning attitude, learning capabilities, learners' age have exerted a powerful and proportional impact on the efficacy of corrective feedback [11].

Chinese teachers should fully consider the individual differences of learners when implementing error correction feedback in the classroom, especially paying attention to the emotional factors of learners. First, encourage the learner's communication by creating a relaxed and pleasant classroom atmosphere. Willingness, positive affirmation of students' correct language expression, etc., reduce learners' foreign language anxiety. Second, for students with high levels of anxiety, try to use implicit and euphemistic error correction feedback strategies to reduce the use of explicit correction methods, such as "It's wrong, this is not right" or "no, this is wrong". Because the way of clear corrections will make students feel nervous and frustrated, hurting their self-esteem, thus reducing their willingness to communicate and reducing the chances of adjusting language output [12], [13], [14] .

The study seeks to answer the following two questions:

ISSN 2616-5775 Vol. 5, Issue 6: 74-82, DOI: 10.25236/AJCIS.2022.050611

(1) Does computer-assisted corrective feedback on Chinese wh-questions lead to an increase in learners' performance on grammaticality tests?

(2) Is there a difference between language instructors and language learners' perception to the various types of corrective feedback?

4. Methods

The present section describes our integrated computer-assisted corrective feedback system that offers grammar practice in Chinese learning. The targeted linguistic form--Chinese wh-questions were embedded in an experiment to measure learning outcomes by applying pre- and post-tests. Apart from a quasi-experimental design including a pre-test, treatment and two post-tests are used in the study, a questionnaire is also used in order to examine the language teachers' perception to the choice of corrective feedback.

4.1 A new model of computer-assisted corrective feedback in SLL

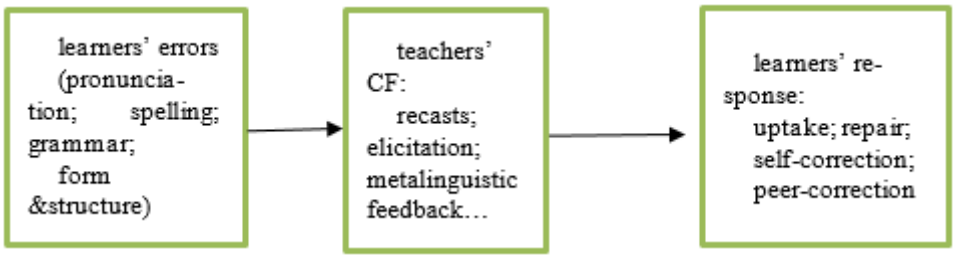

Figure 1: Traditional classroom corrective feedback flow

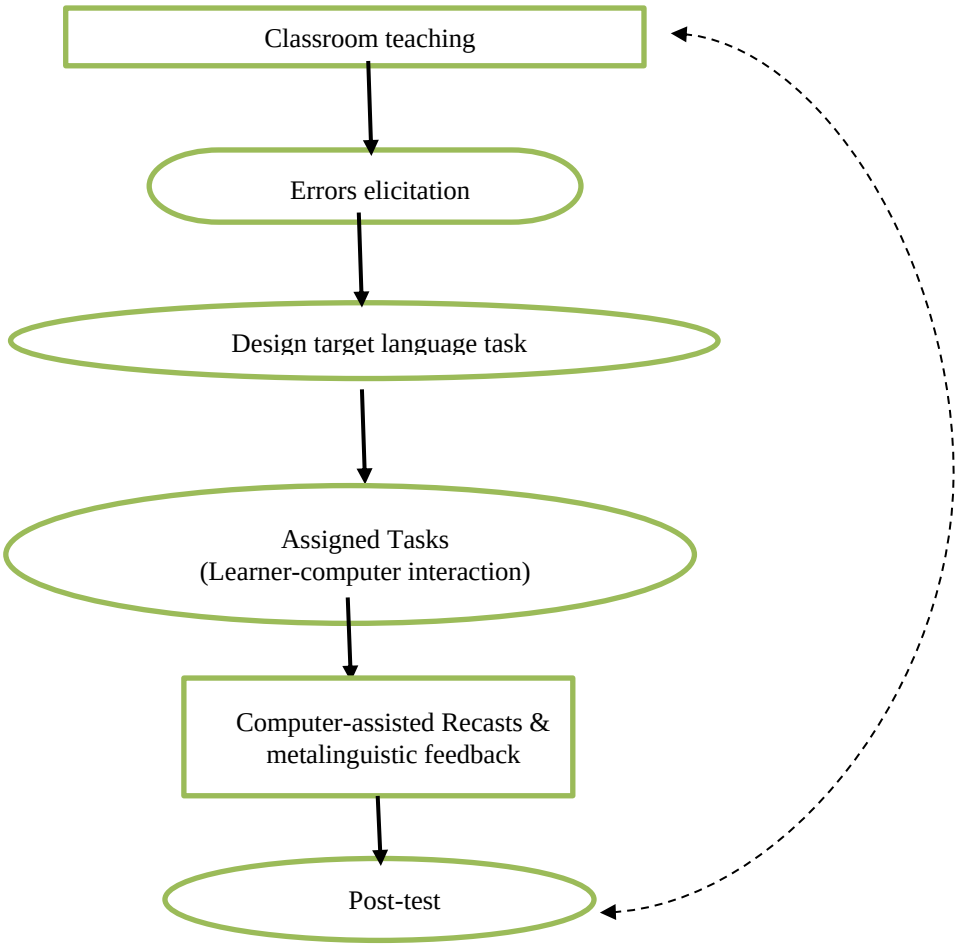

Figure 2: Revised computer-assisted corrective feedback model

ISSN 2616-5775 Vol. 5, Issue 6: 74-82, DOI: 10.25236/AJCIS.2022.050611

Figure 1 depicts the conventional flow of classroom corrective feedback. In the process of routine teaching practice, the instructors intentionally summarize the learners' errors in regards to their phonological, orthographical, syntactic, and pragmatics acquisition, and based on which, they are supposed to adopt several techniques of corrective feedback, such as recasts, metalinguistic feedback. Like a bridge, corrective feedback links the learners' erroneous performance with learners' uptake. From this flow diagram, it seems that prompt feedback, which is explicit in nature, is the most effective. However, this conclusion seemingly lacks adequate empirical support. One of the counterevidence is from teaching practice, which triggers learners' anxiety and hinders the further progress of learners, especially the starters.

Unlike Figure 1, corrective feedback in Figure 2 is not a purposeful aim in teaching practice, and error elicitation in classroom teaching is a spontaneous process, in which language instructors record the frequently occurred errors. Language teachers will design units with a specific linguistic form. With the assistance of software designers and programmers, these units will be integrated in a computer platform, and language learners will have access to the electronic platform, which provides the learners with correction and explains the reasons for a certain error. If possible, the platform can integrate more functions, such as voice recognition, or writing correction. Having finished the interaction with computer, learners are supposed to attend a post-test, whose results ensures the effective outcomes of a period of learning.

4.2 Participants

The questionnaire is aimed for 38 language instructors in charge of teaching Chinese to the overseas students attending an exchange program in China. Twenty-eight of teachers are female and ten are male. The age of the instructors range from 35 to 50 and the length of their teaching time is from 8 to 20 years. 30 of them has achieved College English Test 4 certificate (which is equivalent to intermediate level of English proficiency) and 8 of them has been visiting scholar in the USA for one year. They are mainly responsible for the courses such as Basic Chinese Reading, Chinese Listening, Chinese Speaking and Chinese culture. In this questionnaire, Chinese language instructors are interviewed in terms of their choice on the various forms of feedback and of their decision on the tactics of feedback.

The participants are 39 foreign students enrolled in a financial university in Anhui province, China. These students have been learning Chinese in a formal teaching environment for one and a half year, their communicating language is English with a self-rated intermediate proficiency level. The institute has classified these participants' Chinese level as elementary. Fifteen of the participants were male and sixteen were females. They came from a variety of first language backgrounds, including Japanese (6), Korean (9), Russian (12), Thai (5), Ukrainian (7). Before they came to China, the length of time spent leaning Chinese ranged from 3 to 5 years. In this program, the average length of time spent leaning Chinese through formal instruction is 10 around hours. The average age of participants was 24 years, and they are skillful at using computer operation. 39 (100%) has previous online learning experience.

Two classes took part in the study in October, 2018 and the teaching experiment lasts for three months. For each administration, students were randomly assigned to two groups, Group 1 (n=19) received routine classroom teaching and Group 2 (n=20) received computer-assisted teaching and feedback. The first group, therefore, is viewed as a control group and did not participate in the online activity.

The researchers in the study served as the teachers monitoring the classroom activities and as course electronic resources designers at the same time.

4.3 Target Structure

The linguistic structure chosen as the target for feedback was Chinese wh-questions. The choice is based on several reasons. The first is that interrogation is a universal linguistic phenomenon which finds its manifestations in all languages, therefore, this form-meaning pair in languages lays a possible foundation for comparison and acquisition of Chinese wh-question. The second reason is that when a foreign student is learning a new language and having touch upon a new culture, it goes without saying that he or she will encounter tremendous amount of unfamiliar things which trigger the processing and production of wh-questions. The third reason is that unlike with wh-questions in English, wh-questions displays some difference in form and its meaning. One of the most conspicuous feature is that Chinese wh-question is a wh-in-situ language, that is, interrogative words need no movement in the linguistic process. Therefore, it merits both empirical and pedagogical significance to take Chinese wh-question

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as the target structure in the study.

4.4 Instructional process

The instructional material is the Chinese textbook (paper version) for the control group and its E-learning platform (it includes teaching videos, PowerPoint and interaction and corrective feedback module) for the experiment group. The unit chosen is with the focus on Chinese wh-question, but the instructors do not tell the teaching focus directly and the Chinese wh-questions are embedded in the reading material and teaching process, so that the Hawthorne Effect could be reduced to a minimum.

The experiment group will start their learning in a lab. After finished the video and the related courseware PPTs, members in the group will take part in the interaction with the computer. The course platform will present the learner with 20 videos of 30 seconds each, in each video a mini-case is created and at the end of the video the computer will voice 2 or 3 questions related to the situation in the video. Facing the multiple choice on the screen, students are required to click one correct answer. If the choice is not correct, the platform will present the correct form (recast) and give a specific analysis (metalinguistic feedback). The instructors will stand aside with the learners, and write down the numbers of errors in the process.

As for the control group, their learning is in the traditional classroom. The instructors will read and analyze the materials in the textbook and the students are required to answer the same questions as presented in the computer platform (questions are raised by the instructor). Based on errors in the learning process, instructors randomly choose the specific way of correction, like recast, metalinguistic feedback, paralinguistic feedback. There are also two instructors responsible for the recording the numbers of errors in the group.

The length of time for both groups lasts for seven lecture-sessions consecutively, and each lecture is for 45 minutes.

Table 1 shows the number of instances of wh-questions expressions elicited during the tasks, along with the number of errors in the use of that form. For instance, the experiment group used 60 times wh-questions, and of those, 36 were wrong. All 36 errors received feedback. The control group had 58 times wh-questions, and 40 times were not correct, of which 37 times were corrected. The average rate of feedback assisted from computers (100%) is higher than that of from language instructors (92%).

Table 1: Errors statistics between the experiment & control groups

	the experiment group	the control group
Total instances of wh-questions	60	58
Number of incorrect uses of wh-questions	36	40
number of corrective feedback to errors	36	37

4.5 Testing Instruments and Procedures

In addition to the treatment, a pre-test and two delayed post-tests are used to the two groups of students. The pre-test was held three days before the treatment. Post-test A was held immediately after the treatment and post-test B took place one week after the treatment. The present study used two wh-question grammaticality judgment tests. The testing items in both tests were the same, the only difference between two tests lies in the amount of time the participants were allowed to make the judgments. Post-test A should be finished within 30 minutes and there is 20 seconds interval between each testing item and Post-test B without any time limits (100% participants have finished the testing within 40 minutes).

The Chinese wh-questions grammaticality judgement tests consisted of a total of 25 items, 5 were ungrammatical expressions and 20 were grammatical expressions involving a full range of wh-questions, like who(shui used as subject), whom(shui used as object), what(shen me), when(shen me shi hou), where(na li). Participants are required to make a judgment about the well-formedness of each statement. One point was awarded for each correct judgment.

The pre-test is an interview which is designed to examine participants could read and understand the related Chinese interrogative characters and instructors gave a global score (25-point full score) based on the accuracy of participants' responses. Both post-test A has been accomplished on the com-

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puter and post-test B has been finished in a paper form.

4.6 Analysis

Descriptive statistics were calculated for Chinese wh-questions for grammaticality judgment tests (A&B). Independent-samples T test was used to determine if there was significant differences within each group and Paired-samples T test was performed to determine if there were significant differences between two groups.

4.7 Results

Descriptive statistics for performance on the pre-test shows that the experiment group and the control group have had the proficiency of understanding the questionnaire and communicating with instructors and there was no significant difference between two groups. Results of independent-samples T test shows that: in both two post-tests, after one-month of study, through conventional classroom learning and computer-assisted learning, there was some increase on the results of post-test A and post-test B in terms of grammaticality judgment scores (test A: t=3.040, df=12, p=.013<.05; test B: t=3.972, df=7, p=.026<.05). Meanwhile, paired-sample T test showed that the result of grammaticality judgment scores did not differ significantly within each group (group 1: t=1.01; df=6; p=0.51>.05; t=1.23; df=4; p=0.60>.05), however, when the results of post-test B was compared with that of pre-test, there was significant change in the experiment group (t= -1.02; df=9; p=0.030<.05), but no change in the control group (t= 1.01; df=5; p=0.550>.05).

Table 2: Statistics of pre-test, post-test A and post-test B

	Pre-test		Post-test A		Post-test B	
	M	SD	M	SD	M	SD
Group 1(n=19)	15.23	1.52	15.61	1.01	15.35	1.63
Group 2(n=20)	15.37	1.27	17.18	1.34	17.82	1.12

The questionnaire is designed in terms of types of corrective feedback, including teachers' CF, self-CF, peer CF, and computer-assisted CF (CACF). Results of questionnaire refers to Table 5, the Chi-square test ($\chi 2$=22.00, df=3, sig.=0.001) shows that there is significant change among four types corrective feedback. 50% of instructors in the study take it's the teachers' responsibility to correct the learners' errors, and 36.8% of them thinks that corrective feedback from computer is feasible, if the courseware is designed by experts and technology is adequately sophisticated. However, compared with majority of acceptance of teachers' CF and CACF, only five of them take self-correction and correction from peers is acceptable. In a follow-up semi-interview with these teachers, five of them strongly agreed that it was the tradition in China's education for teachers to correct learners' errors, only through this way can learners be uptake what they have learned and can correctly use the targeted linguistic form. Seven of them perceived that self-correction and peer-correction was not acceptable simply because of learners' unfamiliarity with the targeted language often aroused incorrect feedback or inexact usage, which worsens the learning process. They have, therefore, highly reserved for these two approaches. To probe into further the reasons for the teachers' perception is not attempted here, but the data here shed lights on the possibility for the use of computer assistance in corrective feedback.

Table 3: Statistics of different types of CF

	teachers' CF	self-CF	peer CF	CACF
Teachers (n=38)	19	2	3	14

5. Discussion

The first research question focused on the effect of the computer-assisted corrective feedback approach on language acquisition of Chinese wh-questions. Previous researchers have found that when the CF was more explicit and prominent, students were more likely to correct their errors in grammar and vocabulary; when a targeted L2 form is presented, corrective feedback can be especially useful in help learners notice mismatches between their own language production and target-like forms. Overall, the results of the experiment share a common compliance with above-mentioned findings and, furthermore, show that the CACF appeared to be an effective pedagogical tool in mediating the participants' acquisition of Chinese wh-questions. When the corrective feedback became more explicit, the participants were more likely to recognize the issue and correct the error in question. The finding proves that

ISSN 2616-5775 Vol. 5, Issue 6: 74-82, DOI: 10.25236/AJCIS.2022.050611

learners' uptake of Chinese structure with a definite meaning can be facilitated in a CACF environment.

The second research question asked about the Chinese teachers' perception toward the various approaches of corrective feedback. The research, based on a quantitatively survey, has concluded that teachers' perception on the issue does not show significant difference, that is, language instructors are quite open on the choice of specific approach of CF. Thus, it is possible to implement various approaches of corrective feedback in Chinese classroom for foreign students. It goes without saying that a great tension between a shortage of teaching staff to foreign students and an increase of Chinese as SL learners as the world's interest in Chinese culture has ascended in the new century [15]. One of the solutions to the tension lies in the teaching alternatives. With the wide establishment of E-language labs in China's colleges and universities, it is realistic to teach foreign students Chinese according to their levels of proficiency. For instance, language instructors are supposed to be responsible for the teaching foreign starters; classroom teaching plus CACF teaching could be rendered to intermediate and higher levels of learners. Through this way, the dilemma between teaching hands' shortage and mounting learners could be well resolved and the model proposed in the paper is significant in the pedagogical field.

An important contribution of the study to the research on CF is that CF does not have to be static and mono-channel, but rather interactive in real-time. This dynamic view of CF aligns well to the notion of individualization of CF. Within the field of SLA, scholars have recognized the importance of computer-assisted CF to students' writing performance. In the study, we have shown that it is possible to tailor CF not only to individual student, but also to students with different language backgrounds. The rapid development of state-of-art technologies from computer fields such as educational psychology, cognitive linguistics and language processing have benefited the autonomy of language learning.

6. Conclusion

In this study, we have explored the effectiveness of an integrated model of computer-assisted corrective feedback for foreign students learning Chinese. From the perspective of sociocultural theory of interaction, the model successfully combines the merits of conventional classroom instruction with the relatively open-ended format with a form-focused interaction. The quantitative analysis has shown that the computer-assisted approach to CF, supplemented by the instructor, when needed, is effective in helping learners to self-identify and self-correct a number of grammatical forms in regard to the Chinese wh-questions. It is also suggested that a computer-mediated learning system is a value and potential addition to traditional language-learning pedagogy, by providing an opportunity to practice L2 learning in a controlled environment. The model we have proposed is particularly suitable for conducting experiments on the effect of feedback responses to different language structures of different groups of learners.

This study is not without limitations. Room for further improvement is to explore the language processing of the Chinese wh-questions when they are involved in the interaction with their peers or with the computer system. When abundant responses have been collected and successive research have been completed, a more form-focused and individualized E-course system can be established and this system will undoubtedly improve learners' language performance abilities.

Acknowledgment

The research is supported by Humanities and Social Sciences Project Fund (SK2019A0480), Anhui Province.

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