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Peng Zhang

*The Hong Kong Polytechnic University*

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# Learning Strategies, Motivation and Learners' Perspectives on Online Multimodal Chinese Learning

Peng Zhang  
The Hong Kong Polytechnic University

## ABSTRACT

This mixed-method empirical study investigated the role of learning strategies and motivation in predicting L2 Chinese learning outcomes in an online multimodal learning environment. Both quantitative and qualitative approaches also examined the learners' perspectives on online multimodal Chinese learning. The participants in this study were fifteen pre-intermediate adult Chinese learners aged 18-26. They were originally from different countries (Spain, Italy, Argentina, Colombia, and Mexico) and lived in Barcelona. They were multilingual, speaking more than two European languages, without exposure to any other Asian languages apart from Chinese. The study's investigation was composed of Strategy Inventory for Language Learning (SILL), motivation questionnaire, learner perception questionnaire, and focus group interview. The whole trial period lasted three months; after the experiment, the statistics were analyzed via the Spearman correlation coefficient. The statistical analysis results showed that strategy use was highly correlated with online multimodal Chinese learning outcomes; this indicated that strategy use played a vital role in online multimodal Chinese learning. Motivation was also found to have a significant effect. The perception questionnaire uncovered that the students were overall satisfied and favoring the online multimodal learning experience design. The detailed insights from the participants were exhibited in the transcribed analysis of focus group interviews.

*Keywords:* Chinese Learning, Online Multimodal Learning, Individual Difference, Motivation, Strategy

Over the last few decades, individual differences in Second Language Acquisition (SLA) have been widely studied; the commonly investigated individual difference factors are age, personality, learning anxiety, motivation, language learning aptitude, and strategy use (Artieda & Muñoz, 2016; Dörnyei, 2001; Granena et al., 2016). In the beginning, most studies explored the features of successful language learners' to foretell the factors that facilitate learning. In later times, more and more research started to examine learners in groups focusing on learners' aptitude and other factors to look into the elements that facilitate and maximize learning (Artieda & Muñoz, 2016). However, most of the existing research mainly explored face-to-face classroom settings; as a new language learning trend, online multimodal learning also needs to be studied. With the development of information and communication technology (ICT), particularly the increased access to the Internet on desktop and mobile devices, online multimodal communication has become prevalent in our lives. Various online platforms are available to conduct online multimodal communication (such as Moodle, Skype, Zoom, & Classin). Additionally, the Covid-19 pandemic struck public health, the anti-epidemic measures such as social distancing forcefully transformed the way of learning. Most schools and universities have to conduct online lessons, seminars, and discussions; consequently, students have been obliged

to transition to online learning. Thus, there is a call for more studies based on online learning and the design of online learning mode.

Sankey, Birch, and Gardiner (2010) explained that multimodal lessons entail using ICT and multimedia to produce vivacious course resources that call upon different sensory modes and various learning styles. Diversified features can be implemented in the multimodal class, such as simulations, interactive diagrams, visuals, audio materials, interactive quizzes, crosswords, and hyperlinked examples (Gilakjani, Ismail, & Ahmadi, 2011). These are essential elements of multimodal learning. Multimodal learning integrates multiple learning modalities and environmental instruments, including the dynamic depiction offered by textual or multimedia content (Daniels, 2001). Since many senses (e.g., visual, auditory, kinaesthetic) can be activated via multimodal learning, learners can extend their learning potential; thus, it might further improve learners' learning outcomes. It is substantial to further investigate multimodal learning in language learning to identify more effective language learning and teaching methods. However, studies on online multimodal language learning are scarce, especially, very few studies have explored online multimodal Chinese learning.

Furthermore, there is another gap in the studies conducted because there is not enough focus on pre-intermediate learners of Chinese as a second/foreign language (L2/FL). Most of the research work pays particular attention primarily to intermediate and advanced learners learning English as a second language (Saito & Samimy, 1996; Hyltenstam & Abrahamsson, 2003). Regarding Chinese language learning, Winke (2013) explored advanced Chinese learners' individual differences in L2 Chinese development; Zhang (2020) investigated Chinese beginner learners' learning motivation, strategy use, and aptitude on L2 Chinese listening skills gained in a face-to-face setting. Transiting from beginner to intermediate or even advanced learners, the stage of pre-intermediate learners is also worth investigating. Specific attention has to be paid to pre-intermediate learners.

This study explored the role of motivation and strategy use to fill in these gaps, which might predict online multimodal Chinese learning outcomes. In order to further examine the learners' perceptions of the online multimodal Chinese learning, perception questionnaires and focus group interviews were carried out. The design of the online multimodal Chinese learning courses was also discussed in this paper.

## BACKGROUND

### 1.1 Individual difference and SLA

Various factors can influence Second Language Acquisition (SLA); one of the essential elements is individual differences. Multitudinous L2 learning outcomes can be explained by individual differences (Skehan, 1991). Over the past few decades, a considerable amount of research has been conducted investigating the role of different components of individual differences in L2 learning. As a leading researcher in this field, Dörnyei (2006) argued that individual differences are typically seen as the crucial topics in L2 learning and teaching. Many of the variations in language learning effects are due, directly or indirectly, to particular features of the learner.

Research has answered questions linked to various factors to understand why learners achieve various levels of success in L2 learning. Dörnyei (2006) stated that the five most relevant individual difference variables that have been examined are personality, aptitude,

motivation, learning style, and learning strategies; he further explained that these variables could be classified into cognitive and non-cognitive components. Subsequently, Sparks' longitudinal study indicated that the mixture of cognitive and non-cognitive factors explained the essential proportion (66%) of improving L2 skills (Sparks et al., 2009). In this study, two non-cognitive individual difference factors, motivation and learning strategies in an online multimodal learning environment, were investigated.

## **1.2 Individual differences in online learning**

Traditionally, studies on individual differences and learning lie in face-to-face classroom settings. Over the past several decades, there is an emerging body of research exploring individual differences in online learning; both cognitive (such as learners' cognitive styles) and non-cognitive (such as previous online learning experience, computer competency, and motivation) components of individual difference were investigated (Bolliger, Supanakorn, & Boggs, 2010; Oh & Lim, 2004; Sozcu, 2014).

When it comes to the role of individual differences in online language learning, specifically L2 learning, a few studies have shed light on online self-regulated language learning (Kim et al., 2015; Lin et al., 2017). Lin et al. (2017) explored the motivation of learners and the use of learning strategies across various online language courses and examined the role of motivation and such strategies in the sense of self-regulated learning. Their findings showed that online learning strategies worked at a modest level in learning L2 and anticipated the effects of online learning for the learners (Lin et al., 2017).

Apart from online self-regulated language learning, online language learning directed by teachers also needs to be further explored, especially in online multimodal settings. There is a notable gap in exploring the role of individual differences in online multimodal language learning directly by teachers. This study was conducted to address this gap; it investigated two non-cognitive individual differences factors: the role of learners' motivation and strategy use in an online multimodal language learning environment.

## **1.3 The role of motivation in SLA**

The motivation for language learning is a widely studied element in SLA (Dörnyei, 2009; Ushioda, 2001). An important classification of language learning motivation was by Deci and Ryan (1985; 1995; 2010), who identified motivation as intrinsic motivation and extrinsic motivation. In L2 learning, many researchers have widely recognized the function of intrinsic motivation (Noels, Clement, & Pelletier, 1999; 2000), whereas extrinsic motivation is not inherently detrimental to learning or conflicting with intrinsic motivation (Gonzales, 2011). Scholars also stressed motivational change, observing the variations of L2 motivation and better distinguishing between the motivation to attract L2 learning and the motivation needed to maintain L2 learning interest (Dörnyei, 2001; Ushioda, 2001). Overall, a substantial number of studies have provided evidence that motivation is a significant indicator of L2 learning outcomes. It has also been shown that learning goals, learning strategies, and learning outcomes are associated with motivation (Tachibana et al., 1996; Noels, 2000).

Apropos of motivation in Chinese as an L2 acquisition, several studies have been carried out. The role of motivation and language attitudes in the adaptation of international students in China to learn Chinese was investigated by Yu (2010). He discovered that integrative motivation

plays a significant positive role and that language anxiety plays a significant negative role in socio-cultural adaptation and literary adaptation. During the L2 Chinese learning process, Ruan et al. (2015) found that inclusive motivation played a more critical role than instrumental motivation. Another recent study also revealed the positive role of motivation in L2 Chinese learning; it was uncovered that motivation played a significant positive role in developing Chinese listening gains for beginner learners (Zhang, 2020). The current study employs the same motivation questionnaire as Zhang (2020) to investigate learners' learning motivation in the following aspects "integrativeness, incentive values, attitudes towards learning the L2, linguistic self-confidence, language use anxiety, task attitudes and willingness to communicate" (Dörnyei, 2002).

#### **1.4 The role of strategies in SLA**

As analogized as an engaging, informed, intentional, and attentive learning toolkit (Hsiao & Oxford, 2002), language learning strategies were claimed as another notable predictor of L2 development. In traditional language learning courses, namely instructed L2 learning, there is ample evidence demonstrating that the consistent utilization of different strategies will help learners with L2 learning (Cohen, 2014; Griffiths, 2003). The positive role of strategies was found in L2 general language proficiency (Seker, 2016) and L2 vocabulary acquisition (Zhang et al., 2016).

Nevertheless, Ehrman and Oxford (1995) found out that many strategies are not practical if they are random. Only structured and organized learning strategies can be conducive to success in L2 acquisition; consequently, they mentioned that adept language learners could organize their language learning strategies and apply particular tasks (Ehrman & Oxford, 1995). More recently, Macaro (2006) affirmed that strategy use is not persistent but changes over time and is dependent on different language proficiency levels and individual learning contexts. Furthermore, he quoted strategies as "cognitively oriented," which are the fundamental input of conscious cognitive processing. The effectiveness of strategies deviates depending on how they are used and what approach is chosen (Macaro, 2006). Regarding strategies and online language learning, learners' self-regulatory skills and self-regulatory learning strategies were broadly discussed (King, Harner & Brown, 2000; Kuo et al., 2014; Mezei, 2008; Tsuda & Nakata, 2013), since online learning allows students to exert more autonomous control of their learning actions compared to face-to-face learning environments (Barnard et al., 2010).

As for strategy use in Chinese as an L2 acquisition, in a case study, Huang (2018) examined the strategies L2 Chinese learners employed to infer unknown Chinese terms' meanings. It was disclosed that the two most effective inference participants indicated that they could use several strategies. It was also observed that the absence of specific strategies was a significant barrier to sufficient inference (Huang, 2018). Most recently, Zhang (2020) explored the role of motivation, strategy, and aptitude of Spanish-Catalan bilingual L2 Chinese beginner learners in predicting the growth of their listening abilities. It was discovered that the use of strategies has a substantial positive effect, but the significant association was only found in the first phases, with a later decline in effect (Zhang, 2020). Inspired by Zhang's (2020) research, this study also applied the same instrument, SILL, to investigate participants' strategy use. SILL's six sub-components scores were added to generate an overall score to reflect the participants' strategy use. The six SILL sections are memory strategies, cognitive strategies, compensation

strategies, metacognitive strategies, affective strategies, and social strategies (Hsiao & Oxford, 2002).

## 1.5 Language learning with multimedia

In SLA, the use of multimedia materials has been generally recognized as a valuable and practical instrument; in order to fit various learners with diverse learning styles, multimedia has been effectively employed in many courses (Birch & Gardiner, 2005).

Typically, learners have a favored learning mode, either visual, aural, textual, or kinaesthetic, whereas some learn in a multimodal way. Multimedia could be employed to create a more comprehensive approach that responds to visual, aural, and kinaesthetic learners and overcomes individual achievement gaps that may arise from different modes of learning (Gilakjani, Ismail, & Ahmadi, 2011).

The beneficial effect of implementing multimedia in learning and teaching has been found; Scaife and Rogers (1996) claimed that the presence of multiple representations could help learners improve their understanding, memory, communication, and inference. Vial and Dubois (2000) further stated that when the content presented is complementary and tailored to each presentation, text and picture integration is effective.

Applying multimedia in learning and teaching adds all types of resources together; effective learning with multimedia needs to be well planned and tailored. Based on former research in multimedia learning, Gilakjani, Ismail, & Ahmadi (2011) identified eight essential principles of multimedia learning:

- a. *Text and visuals are better than mere texts;*
- b. *Multimedia learning is more effective when the learner is concentrated;*
- c. *Extraneous and redundant information should be excluded in the presentation of multimedia content;*
- d. *Multimedia learning is more effective when it is interactive and up to the learner's choice;*
- e. *Multimedia learning is more effective when the learner knowledge structures are triggered before revealing multimedia content;*
- f. *Multimedia instruction that incorporates animation can enhance learning;*
- g. *Multimedia learning is the most effective when the learner is involved with the presentation;*
- h. *Multimedia learning is the most effective when the learner can implement their recently acquired knowledge and obtain feedback.*

## 1.6 Multimodal learning

Multimodal learning refers to learning with multiple sensing modes activated (Daniels, 2001; Gilakjani, Ismail, & Ahmadi, 2011; Moreno and Mayer, 2007). In multimodal learning, these senses always connect, providing a dynamic educational environment that can increase the learners' performance.

Some scholars claim that different learners have their learning styles with the preference of specific learning modes; for instance, visual, auditory, reading and writing, and kinesthetic (VARK) (Fleming and Mills, 1992). Multimodal learning can stimulate learners' learning ability and makes it possible for all learners in a classroom to make the best of their learning potential.

Besides, it was argued by Shah & Freedman (2003) that multimodal lessons could be used to enhance learning since learners were exposed to more than one sensory mode.

Multimodal learning ordinarily employs multimedia, but the two terms are different. Multimodal means that the learner uses more than one sensing mode to learn, whereas multimedia applies to the concept that more than one presentation method is used by the teacher (Gilakjani, Ismail, & Ahmadi, 2011). Similarly, Mayer and Sims (1994) relate the multimedia notion to the instructor's introduction of knowledge via more than one means and the multimodality concept to learner's use of more than one sense.

In terms of multimodal learning in the classroom, Matheson (2002) stated that a range of modes cooperates in a multimodal classroom: gestures, drawings, speech, objects; each mode builds upon the construction of meaning (Kress et al., 2001). Similarly, Moreno and Mayer (2007) consider multimodal learning environments to use different modes to represent content knowledge, for example, verbal and non-verbal. These different presentation modes are used to appeal to students' different sensory modalities. Shah & Freedman (2003) further claimed that since learners were exposed to more than one sensory mode, multimodal courses could be applied to promote their learning.

With the development of technology, multimodal learning and teaching have become more accessible, thanks to Information and Communication Technology (ICT). The implementation and incorporation of ICT have transformed teaching, learning, and assessment dramatically; for instance, it can contribute to more student-centered teaching and learning practices and encourage a more constructivist approach to teaching and learning (Gilakjani, Ismail, & Ahmadi, 2011).

## **1.7 Significance of the study and research questions**

The Significance of doing this study is threefold. First of all, the existing body of research on individual differences and L2 learning mainly explored English as an L2 acquisition (Huang & Eskey, 1999; Hyltenstam & Abrahamsson, 2003). In comparison with learning English as a second or foreign language (ESL / EFL), learning Chinese as a foreign or second language (FL/L2) still needs to be further investigated. A fast-growing number of learners worldwide learn Chinese as a foreign or second language (CFL/CSL) (Wang, 2014). However, Chinese learning is challenging for lots of learners since it is logogram which is very different from other phonogram languages. The growing learning demands, learning difficulty, and less developed research call for CFL/CSL studies.

Besides, individual differences and SLA are already broadly explored, while most of them are based in either traditional face-to-face language classrooms or online self-directed language learning mode (Sparks et al., 2009; Kim et al., 2015; Lin et al., 2017). The role of individual differences in an online multimodal language learning setting directed by a teacher is still underdeveloped.

Furthermore, online multimodal learning is gaining attention and becoming more and more accepted by educators. On the one hand, the rapid development of ICT makes multimedia more accessible in online classrooms; there are also emerging gadgets, websites, and teaching and learning applications. It is more viable to offer learners a multimodal learning experience via multiple resources. On the other hand, the COVID-19 pandemic struck the whole world; most learning activities were forced to be transformed from face-to-face classrooms to online learning. In order to provide learners with a more effective learning experience, online multimodal

learning is gaining attention. The studies in online multimodal learning are limited (Moreno & Mayer 2007; Gilakjani, Ismail, & Ahmadi, 2011); further studies' demands are precise.

This research aimed to fill these gaps and further explore the role of L2 Chinese learning motivation and strategy use and investigate learners' perspectives of online multimodal learning. The following research questions were brought up (RQ):

RQ1: What is the role of learning strategies in L2 Chinese development in an online multimodal learning mode?

RQ2: Is motivation a predictor of better L2 Chinese learning performance in an online multimodal learning environment?

RQ3: What are the learners' perceptions of the online Chinese multimodal learning experience?

## DESIGN OF ONLINE MULTIMODAL CHINESE LEARNING

### 2.1 Overview

This research's online multimodal Chinese learning environment had two main elements: online synchronous live teaching session via ZOOM (main-component) and computer-assisted self-directed after-class Chinese language learning online multimodal feedback. Based on previous studies on multimodal learning, the following methods to organize an online multimodal Chinese learning environment was proposed:

- a. Employing multimodal materials to teach;
- b. Applying computer-assisted language learning (CALL);
- c. Giving multimodal assignments;
- d. Offering multimodal corrective feedback (CF).

### 2.2 Employing multimodal materials to teach

VARC sensory modalities directed the multimodal teaching and learning materials, namely, Visual, Aural, Read/Write, and Kinesthetic, suggested by Fleming and Mills (1992).

*Visual.* Both the teaching materials used in class and learning materials consisting of assignments after class were all illustrated by graphs, charts, diagrams, and pictures. The textual enhancement technique (Meguro, 2017) was also implemented to present the target language to promote visual input, including bolding, underlining, italicizing, repetition, adding stress, etc.

Specifically, the realia and flashcards were used when the new vocabularies were introduced; Quizlet was also frequently employed to boost visual input and facilitate vocabulary learning. Regarding Chinese characters (Hanzi), Chinese radicals and pictures were regularly utilized, seen in the example picture below (Figure 1). Apart from pictorial teaching materials, the students' electronic workbook and after-class quizzes were also well-illustrated by all kinds of visuals. Also, the students were asked to watch short learning videos related to target knowledge after class.





Figure 1. Example of Chinese character learning by radical and visuals

*Aural.* During the online synchronous live teaching sessions, the teacher intensely interacted with students through target language input, conversations, listening practice, and group discussions. The students were presented with audios while reading target learning texts. Besides, music was applied to teach and practice Chinese tones and pronunciations. Students were asked to listen to Chinese podcasts to review and be exposed to Chinese language in the computer-assisted self-directed after-class Chinese language learning sessions.

*Read/write.* Reading and writing are text-based; PDFs, textbooks, worksheets all fall into this category. However, differentiate from traditional face-to-face learning; in this course, reading and writing were conducted virtually. The students were provided with PDFs, e-books, and e-worksheets embedded in Moodle. Thus all reading practice was carried out virtually. When it comes to writing, considering Chinese characters (Hanzi) is a barrier for Chinese as L2 learners in composing, they were only asked to write short essays by typing via Pinyin instead of writing by hand. Nevertheless, when it comes to critical Chinese characters, they were asked to practice using their pen or Ipad pencil to write by hand. For the purpose of simplifying Chinese characters' (Hanzi) writing and direct students to write well, the following way was used (Figure 2).

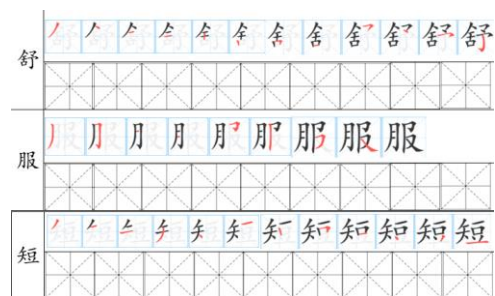


Figure 2. Example of Chinese character writing practice

*Kinesthetic.* Kinesthetic learning includes demonstrations, stimulus, field trips, practice, and applications. The kinesthetic learning mode is related to reality; kinesthetic learning can be implemented "either through concrete personal experiences, examples, practices or stimulation" (Fleming & Mills, 1992, p. 140-141). In traditional face-to-face classrooms, kinesthetic learning can be achieved by carrying out diverse classroom activities, role play, learning games, etc. In the context of an online classroom, it is challenging to conduct. In this study, the Total Physical Response (TPR) teaching approach (Asher, 1969) was employed for kinesthetic learning. TPR is widely used in language teaching; it is focused on language and physical action coordination. In

this course, the teacher frequently used TPR in the online live lessons, gave learners orders and explanations with body motions and gestures in Chinese; the learners were also encouraged to respond with body language and Chinese language.

## 2.3 Applying CALL

Computer-assisted language learning (CALL) is a type of computer-based learning with two significant characteristics: personalized and interactive learning. It is an instrument that makes it possible for teachers to promote the process of language learning. CALL could be used to strengthen what has been taught in class (Gilakjani, Ismail, & Ahmadi, 2011). Four main CALL tools were used in this study: Moodle, ClassroomScreen, Kahoot, and Quizlet. Moodle<sup>i</sup> was employed as a learning materials and virtual classes management tool; all learning materials and class information were uploaded on Moodle. Students can get access to it whenever they want. Moodle is written in PHP and distributed under the GNU General Public License, an open and free learning management system (LMS) (Rogers, 2009). Moodle is broadly employed in schools, colleges, corporations, and other industries for blended learning, distance education, flipped classrooms, and other e-learning programs (Costello, 2013; Horvat et al., 2013).

ClassroomScreen<sup>ii</sup> was applied during synchronous virtual live lessons. It is a comprehensive instrument allowing teachers to use various tools to manage the classroom into one screen display. ClassroomScreen, created by Netherlands teacher Laurens Koppers, allows teachers to manage their classrooms via multiple instruments: select their virtual background, set a timer, create a traffic light for any task, choose students to answer questions with a random name generator, apply on-screen text guidance, set visual noise level parameter, draw on a whiteboard, etc. (Information obtained from the official website, seen as a footnote).

Kahoot was mainly used for entertaining quizzes, especially on grammar practice. Kahoot<sup>iii</sup> is a medium for game-based instruction, widely used in schools and other educational institutions as educational technology. Kahoot allows teachers to create their learning games such as multiple-choice quizzes, accessed through a computer or the mobile phone Kahoot app (Information obtained from the official website, seen as a footnote). The example of the application of Kahoot is displayed in Figure 3.



*Note.* The learners can drag the boxes and put them in the correct order; Kahoot will give each participant a score based on the correctness and time spent on the quiz game. The generated game link is as follows: <https://create.kahoot.it/details/duplicate-of/31413b8f-8768-4fc6-a99d-1937294c1039>

*Figure 3.* Example of applying Kahoot for grammar practice

Like Kahoot, Quizlet<sup>iv</sup> is also an online application for teaching and learning that enables teachers and learners to employ flashcards and games to facilitate learning<sup>v</sup>. In this study, Quizlet was mainly used for vocabulary learning; the teacher used a Quizlet to give vocabulary instructions, and learners also applied them to review vocabularies engagingly via flashcards and vocabulary matching games.

## 2.4 Giving multimodal assignments

Assignments are essential in the learning and teaching process; appropriate and well-designed assignments can help learners acquire learning content. This study's multimodal assignments comprise WeChat-based<sup>vi</sup> practice, electronic worksheets, including quizzes and video recording.

The WeChat-based practice was carried out twice a week. The teacher gave the students several tasks in the previously assigned WeChat group. These tasks included vocabulary, speaking, and grammar that they have recently learned. And the key feature of this assignment is that students were requested to type in Chinese via Pinyin and send voice messages. It was organized like a chatting mode that contains the target learning content instead of a challenging task.

The electronic worksheets contain both textual and visual elements; they were designed based on the class's learning content. The students can use the worksheets and quizzes to practice what they have learned to consolidate their knowledge. The electronic worksheets and quizzes were uploaded through Moodle, and the students could get access to them online.

The video recording assignment required students to record a 2-5 minutes short video to summarize the learning content, present their thoughts on the topics they have learned, or tell a short story using the target learned language points in Chinese. This assignment was given to the learners twice a month.

## 2.5 Offering multimodal corrective feedback

Corrective feedback (CF) refers to feedback that students receive from teachers or learning peers in a second language on the oral or written mistakes they produce in their L2 output (Hinkel, Sheen, & Ellis, 2010). CF was claimed to play a crucial role in supporting L2 learners in their L2 development (Lyster, 2012; Sheen, 2011). Tedick and Gortari (1998) classified different types of CF into these categories:

- a. *Explicit correction: Expressly pointing out that what the student said was incorrect, the teacher presents the correct form.*
- b. *Recast: The teacher tacitly rephrases the student's mistake or provides the correction without exactly revealing it.*
- c. *Clarification request: The teacher can imply that the student has made an error by saying something like "Excuse me?" or "I do not understand," which suggests that rewording might be necessary.*
- d. *Metalinguistic clues: Without presenting the correct form, the teacher raises questions or gives comments or information concerning the structure of the student's utterance, such as, "Do we say it like that?", "That is not how you say it in French," or "Is it feminine?".*
- e. *Elicitation: The teacher directly extracts the proper form from the student through questioning (e.g., "How do we say that in French?"), by pausing to leave the student*

*finish the teacher's utterance (e.g., "It is a....") or by requesting students to rephrase the utterance (e.g., "Say that again."). Elicitation questions vary with metalinguistic clues as they call for more than a yes/no response.*

- f. *Repetition: The teacher repeats the student's error and changes intonation to highlight it.*

In this study, the CFs involve teacher-to-student CF and student-to-student CF. The teacher gave immediate and delayed feedback in oral and written forms when students make mistakes in their speaking or writing. The students were also encouraged to be involved in giving each other CF. The teacher set up a WeChat group for after-class discussion and assignments to establish an interactive and collaborative learning setting for the learners. The students were encouraged to correct each other's mistakes or typos in the WeChat group.

## METHODOLOGY

### 3.1 Participants

The participants in this study were fifteen adult learners aged 18-26 learning Chinese as a foreign language. They were originally from Spain, Italy, Argentina, Colombia, and Mexico and have lived in Barcelona for a long time. Seven of them were males, and eight of them were females. They were multilingual who spoke more than one language (Catalan, Spanish, Italian, and English); however, they did not speak any other Asian languages apart from Chinese. The participants have pre-intermediate Chinese proficiency level; they have all passed HSK<sup>vii</sup> (Level III) and are learning for HSK (Level IV).

Furthermore, the participants studied Chinese at a school in Barcelona; they volunteered and were offered some Chinese learning books and crafts as bonuses for their participation. The Chinese online course was where the study's experiment took place. Due to the COVID-19, the Chinese lessons were provided in an online mode. It is noted that the participants were requested not to take other Chinese courses and not to learn additionally except for the learning materials and the tasks assigned in this experiment to control the variables of additional learning.

### 3.2 Instruments

#### *The consent form and Linguistic background questionnaire*

Before the experiment, the consent form and linguistic background questionnaire were given to all of the participants. The consent form explained the purpose and the process of the study; students were well informed before participating. Besides, all of the participants' prior language learning experience and Chinese proficiency level were reported via the linguistics background questionnaire.

#### *Strategy Inventory for Language Learning (SILL)*

Adapted Strategy Inventory for Language Learning (SILL) Version 7.0 developed by Oxford (1989, 1990) was employed to measure the strategy use of the participants. There are 50 five-point Likert-scale questions in the SILL regarding memory strategies, cognitive strategies, compensation strategies, metacognitive strategies, affective strategies, and social strategies (Hsiao & Oxford, 2002)

SILL version 7.0 was also developed originally for learners learning English as a second or foreign language; however, it was used in research examining English learning and often

modified and used to research in other fields. For example, Gavriilidou and Mitits (2016) adapted SILL to Greek; Winke (2013) modified SILL to investigate Chinese as an L2 acquisition; similarly, Zhang (2020) utilized adapted SILL to examine the effect of strategy use on L2 Chinese listening development. In this study, the SILL was derived from the previous study conducted by Zhang (2020).

#### *Motivation Questionnaire*

The motivation questionnaire comprises 38 five-point, Likert-scale questions; it was obtained from Winke (2013) and Zhang (2020), who adapted the questionnaire from Kormos and Dörnyei (2004). Winke (2013) employed the questionnaire to investigate the motivation for highly proficient Chinese learners; Zhang (2020) applied the questionnaire to explore the role of motivation on L2 Chinese beginner learners' listening gains. The motivation questionnaire examined the participants' motivation in these aspects "integrativeness, incentive values, attitudes towards learning the L2, linguistic self-confidence, language use anxiety, task attitudes and willingness to communicate" (Dörnyei 2002).

#### *The Chinese Language Proficiency Test – HSK*

The Chinese language proficiency tests were extracted from the official HSK (Hanyu Shuiping Kaoshi) tests (Level IV). The Hanyu Shuiping Kaoshi (HSK)<sup>viii</sup> is the standardized test of Mandarin Chinese language proficiency for CSL/CFL learners, translated into English as the Chinese Proficiency Test. The Center for Language Education and Cooperation, an agency of the Ministry of Education of the People's Republic of China, administers the examination.

#### *Questionnaire of the Perceptions of the Online Multimodal Chinese Learning*

The Questionnaire of the Perceptions of Online Multimodal Chinese Learning was employed in this study to identify students' perceptions of the online multimodal Chinese learning experience. There are ten 5-point, Likert-scale questions regarding the general perceptions, learning ability development, Chinese proficiency growth, and the design of the online multimodal learning (the implementation of the multimodal materials in teaching, the application of computer soft-wares and technology, multimodal assignments, and multimodal CF). The questionnaire was conducted via Google Forms.

#### *Focus group interview questions*

A Focus group interview was designed to explore the participants' perceptions of the online multimodal Chinese learning experience qualitatively. The questions parallel with the questions in the survey, targeting more details on the participants' thoughts. The following questions were brought up:

- a. What part do you like or dislike in the online multimodal Chinese learning experience?
- b. Do you think the learning mode is beneficial to your Chinese learning and why?
- c. How do you like this learning modality compared with a face-to-face learning environment?
- d. What is your idea regarding the influence of the learning experience on your learning motivation and strategies?
- e. What do you think of the multimodal materials employed for learning the teaching?
- f. What do you think of the computer software and applications used in the class?

- g. What do you think of the multimodal assignments given to you during the three-month learning journey?
- h. What do you think of the multimodal feedback that both the teacher and classmates gave to you?

### 3.3 Data collection

The courses were carried out entirely online, and the data was also collected online. The duration of the experiment was three months, 12 weeks. Each week, there were 4 hours of instruction time, on Monday, Wednesday, Friday, and Sunday; 1 hour for each session. Apart from the instruction sessions, there were also around 7 hours (about one hour per day) of self-regulated learning each week.

The participants were requested to take a pre-test online to examine their Chinese proficiency level before the experiment. After the pre-test, they started their three-month online multimodal Chinese learning journey. The participants took the same online Chinese class instructed by the same teacher. They also get exposed to the same learning material, assignments, and feedback. After the three-month experiment, the participants were asked to take a post-test, the post-test was at the same level as the pre-test, but the testing content was completely different. Shortly after the test, the learners' perceptions of online multimodal Chinese learning were distributed via Google Forms. After completing the questionnaires via Google Forms, the participants were invited to have an online Zoom discussion (focus group interview) on their thoughts of the learning experience. The teacher asked several open-ended questions and the students discussed in groups different aspects of the online multimodal Chinese learning; it is noted that the focus group interview session was recorded in an audio format for further analysis. When it comes to the SILL and the Motivation Questionnaire, they were handed out to the participants to complete an electronic format at the end of the second month.

## DATA ANALYSIS

### 4.1 Scoring

The scoring of the motivation questionnaire and the SILL was carried out by summing up the marks that the participants gave from both questionnaires. Creating composite scores of the strategy use and motivation is to identify each variable's role as a unit.

The teacher scored the Chinese proficiency tests (HSK Level IV) according to the official HSK (level IV) examination materials. The three-month experiment's Chinese proficiency growth was computed by subtracting the pre-test score from the post-test score.

### 4.2 Data analysis

SPSS 20 was used as the analysis tool in this study. Statistical analyses on the collected SILL, motivation, and growth of Chinese proficiency during the first three months were performed. In order to analyze the associations between the calculated variables (Motivation score, SILL score) and the students' performance, non-parametric correlational analyses (Spearman Correlation) were carried out. This study chose the Spearman correlation

intentionally as a non-parametric statistical tool due to the restricted and not normally distributed sample.

### 4.3 Results of statistical analysis

The results of the Spearman correction analyses are provided in the multi-variable correlation table below (Table 1). As shown in Table 1, there is a moderate but not significant correlation between Strategy and Motivation ( $r = .492$ ,  $n = 15$ ,  $p = .063$ ), which depicts that the two independent variables do not strongly affect each other. Table 1 also indicates that strategy use and the HSK4 Gains are strongly related, the correlation is significant ( $r = .879$ ,  $n = 15$ ,  $p < .001$ ). This suggests that L2 learning strategies were strong predictors of L2 Chinese learning outcomes in this study. Besides, Table 1 demonstrates that L2 Chinese learning motivation and HSK4 Gains resulted in a significant correlation ( $r = .606$ ,  $n = 15$ ,  $p < .05$ ), indicating that motivation also plays a role in the participants' L2 Chinese learning outcomes.

Table 1  
*The results of the Spearman correlation*

			Motivation	Strategy	HSK4 Gains
Spearman's rho	Motivation	Correlation Coefficient	1.000	.492	.606*
		Sig. (2-tailed)	.	.063	.017
		N	15	15	15
	Strategy	Correlation Coefficient	.492	1.000	.879**
		Sig. (2-tailed)	.063	.	.000
		N	15	15	15
	HSK4 Gains	Correlation Coefficient	.606*	.879**	1.000
		Sig. (2-tailed)	.017	.000	.
		N	15	15	15

*Note.* The HSK4 Gains indicate the three-month Chinese proficiency development; the variable was computed by subtracting the HSK4 Pre-test score from the HSK4 Post-test score.

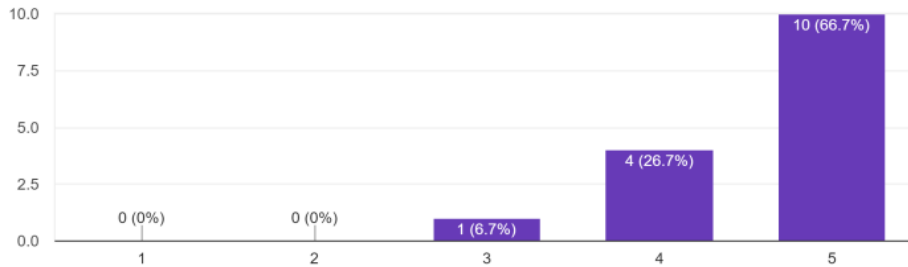
### 4.4 Learners' perceptions of the online Chinese multimodal learning experience

The participants' perceptions of the online Chinese multimodal learning experience were classified into the following components: general impression and effectiveness, motivation, learning ability and strategies, design of the online multimodal Chinese lesson, multimodal materials for teaching and learning, application of computer software, and technology (CALL), multimodal assignments and multimodal feedback.

Figure 4 displays the result of the first two questions regarding the general impression and effectiveness. It was revealed that most participants held a positive view of the learning experience and think online multimodal learning is beneficial to their L2 Chinese development.

1. In general, I enjoy this learning experience.

15 responses



2. I think the online multimodal learning is advantageous for my Chinese learning.

15 responses

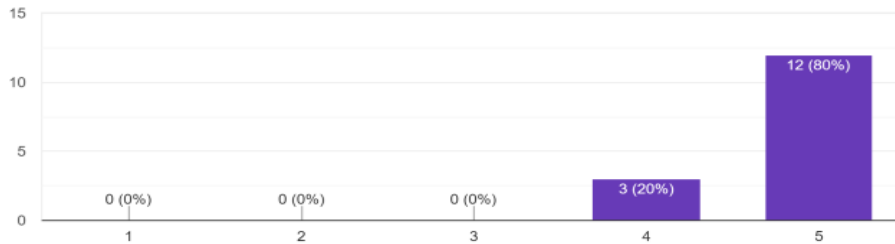


Figure 4. General Impression and effectiveness

Concerning motivation growth during the online multimodal Chinese learning, it is shown from Figure 5 that more than half of the participants (66.7%) strongly agree that the learning model makes them more motivated and intrigued in learning; 13.3% of the participants also agreed with the statement. However, one participant did not agree with that, and 13.3% of the participants had a neutral perspective.

3. This learning model makes me motivated and interested in learning.

15 responses

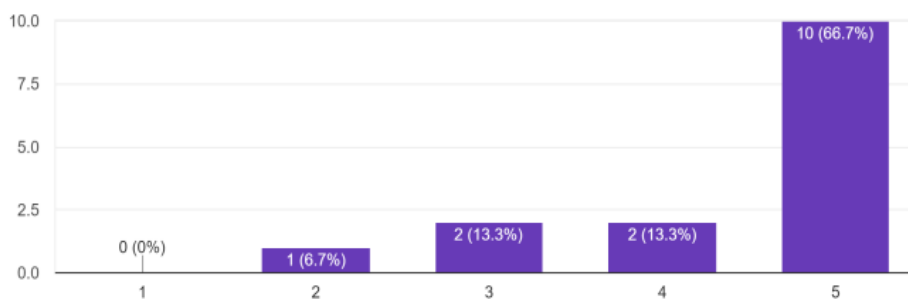


Figure 5. Motivation



Regarding the improvement of learners' learning ability and strategies, an overall positive attitude was found. As presented in Figure 6, 66.7% of the participants strongly think that the learning experience assists them with their learning ability and strategies. Similarly, 26.7% of the participants also agree with the statement to a moderate positive degree. Nevertheless, there is one disagreement, holding a moderate negative view.

4. The learning model helps me with my learning ability; I am more aware of how should I learn.

15 responses

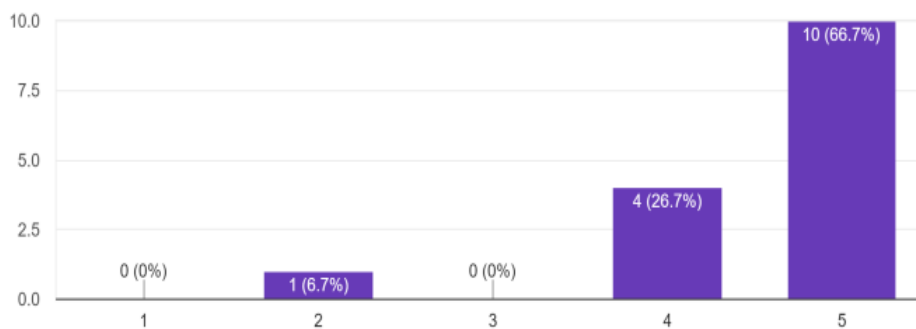


Figure 6. Learning ability and strategies

When it comes to designing the online multimodal Chinese lesson, a general positive standpoint was discovered. Figure 7 shows that all participants favor the design since there are no apparent disagreements; the favorable attitude varies individually. 53.3% of the participants strongly agreed that they favored the course design; 40% agreed with the argument, whereas one participant had a neutral perspective.

5. I like the design of the online multimodal Chinese lesson.

15 responses

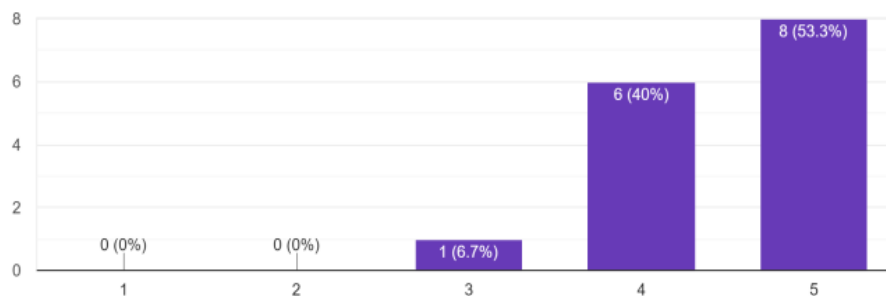


Figure 7. Design of the online multimodal Chinese lesson

The design of the online multimodal Chinese learning sessions comprised four main parts: multimodal materials for teaching and learning, CALL, multimodal assignments, and multimodal feedback.

As illustrated in Figure 8, most participants (71.4%) positively adored the multimodal materials employed in the study. Some participants (21.4%) also showed their favor in the materials provided in class. There is one participant who has a neutral thought.

6. I like the multimodal learning materials and the way that the teach teach.  
14 responses

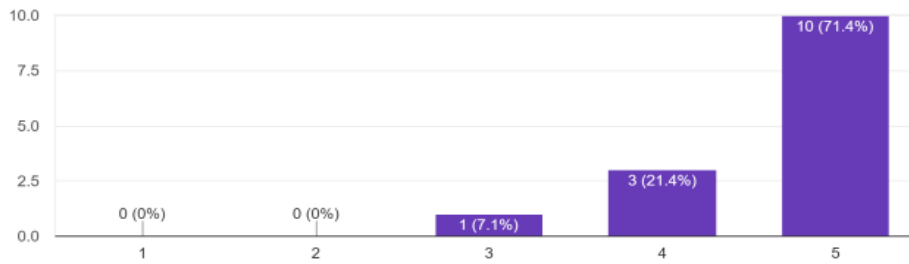


Figure 8. *Multimodal materials*

In this study, computer software and educational technology were applied in the class design. Figure 9 demonstrated the participants' perceptions of the implementation of computer software and technology. No negative attitude was uncovered; 13.3% of the participants had a neutral viewpoint; 13.3% acknowledged that computer software and technology support their Chinese learning. Most of the participants (73.3%) exceptionally agree with the positive role of CALL.

7. The application of computer soft-wares and technology helped with my Chinese learning.  
15 responses

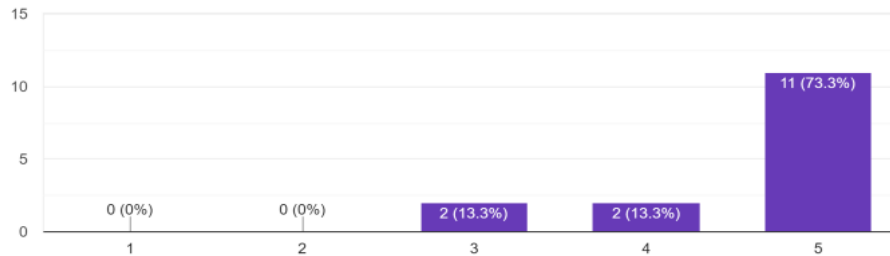


Figure 9. Application of computer software and technology / CALL

Unlike the other parts of the design, as illustrated in Figure 10, there were more disagreements and neutral perspectives on the multimodal assignments (two disagreements, two had neutral views). Despite that, most participants still held positive opinions; 40% liked the multimodal assignments very much, and 33.3% were moderately fond of the assignments.

8. I like the assignments conducted in various modalities (Wechat, Moodle, Worksheet, Video,etc).  
15 responses

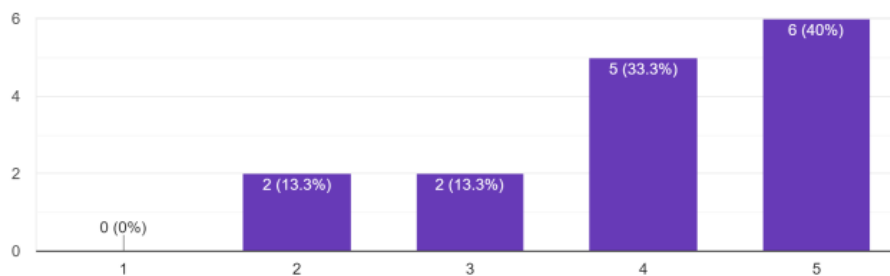


Figure 10. Multimodal assignments

Two questions were designed to explore participants' perspectives on the multimodal feedback that happened in the study. One question is for teacher feedback, another one for peer feedback (classmates' feedback). Figure 11 displayed the results that most participants were aware of the positive role of both teachers (66.7% strongly agree; 26.7% agree) and peer (53.3% strongly agree; 46.7% agree) feedback. One participant was not very sure about the effectiveness of teacher feedback.

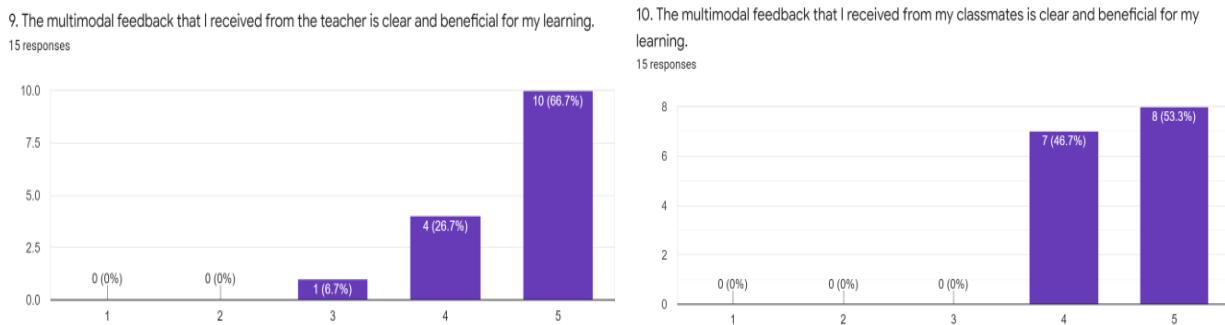


Figure 11. Multimodal feedback

## DISCUSSION

### 5.1 Strategy use and L2 Chinese learning development

Some studies have shed light on the effect of learning strategies and Chinese learning. Winke (2013) researched the effect of strategy use on advanced Chinese as L2 learners; she discovered that learning strategies have an insignificant role in listening skills development. A similar study was conducted by Zhang (2020) for a group of Chinese as L2 beginner learners. Unlike Winke's (2013) finding, Zhang (2020) revealed that strategy use played a moderate role in beginner-level Chinese listening development in general. However, the effect of strategy use was more substantial in the first month; the significant correlation was reduced later. Unlike previous research investigating the role of strategy use on some specific language learning components, this study considers the L2 Chinese learning development as a whole. It uncovered that applying learning strategies significantly affects learners' L2 Chinese learning outcomes ( $r = .879$ ,  $p < .001$ ). It indicates that overall strategy use measured by SILL played a substantial role in L2 Chinese learning for pre-intermediate learners.

### 5.2 Motivation and L2 Chinese learning development

The effectiveness of motivation was also widely studied by multiple researchers. It was revealed that motivation had a more substantial effect on reading skills development, but it had a weaker role in listening and speaking (Winke, 2013). Nonetheless, Baleghizadeh and Hossein Rahimi (2011) conducted a study on EFL university students in Iran; they found out that intrinsic motivation was significantly correlated with the participants' listening performance. In a recent study, Zhang (2020) uncovered that motivation was moderately correlated with listening gains in each month's learning result. Surprisingly, when he taps into the overall listening development and motivation, he discovered that motivation significantly impacted overall listening gains during the three-month experiment.

Similar to former studies (Winke, 2013; Zhang, 2020), a significant correlation ( $r = .606$ ,  $p < .05$ ) between motivation and general Chinese learning outcomes was found in the present study. Even though the motivation was found not to be as strong as strategy use, motivation also played an essential role in the online multimodal Chinese learning setting.

### 5.3 Learners' perceptions of the online Chinese multimodal learning experience

Based on the questionnaire results, it is concluded that the participants had overall positive perspectives on their learning experience. The beneficial role of online multimodal learning in Chinese learning was affirmed by most of them. Besides, even a few of the participants disagreed; it is agreed by most of them that online multimodal learning can help with being more motivated and applying more strategies to learning. Concerning the online multimodal Chinese learning design, all of the components (multimodal materials, CALL, multimodal assignments, multimodal feedback) were favored. A small percentage of participants had opposing views on multimodal assignments, which might explain that giving assignments in various modalities might be overwhelming for the students. When an educator designs multimodal assignments, the workload should be considered.

The details of the participants' perceptions were disclosed through the focus group interview. The interview was transcribed. The following selected extracts revealed the participants' detailed thoughts on the online multimodal learning (The students were anonymized by selecting the first initial of their surnames; if the first initials were repeated, the initial would be chosen from their given names).

#### a. Likes or dislikes of the online multimodal Chinese learning experience

*Student J argued, "It is pretty interesting. I like it! I mean, I thought online learning would be very boring, and I did not expect much actually, but the class made me feel even more participated than in a normal classroom." Agreed by students X, F, A, M, C, L, and S. Student P claimed, "Before I have taken some online English courses, it was the teacher talking all the time, well, she was nice, but I just could not focus well. This time I think I am more concentrated in the class because I have to interact with others."*

The participants showed their favor in the online Chinese learning experience; they also mention that student-centeredness, sense of participation, and interaction were the elements they liked. It is suggested that teachers should try to transfer the traditional teacher-centered teaching method to a student-centered interactive way, especially when they need to teach online.

#### b. The role of the learning mode in their Chinese learning outcomes

*Student A said, "I did not even notice that my Chinese has improved that much, but the second test told me that I learned so many things during only three months. My Chinese has improved a lot; I have to say. Especially the vocabulary and reading. However, I don't feel my speaking has improved a lot. Because I used to hang out with Chinese friends to speak Chinese, now, I have to stay at home all the time, everything is closed! I hope the COVID-19 will end soon! Bless Us!" This was agreed by students H, M, C, X, D, F, J, and G.*

From the extract, we can notice that the student did think that the online multimodal learning assisted them in Chinese learning; however, the speaking skills development was limited due to less social interaction during the COVID-19 pandemic. Teachers should try to

increase learners' speaking skills, such as organizing some online peer talk or language corner sessions with native speakers.

c. Online multimodal learning VS. face-to-face learning

*Student M claimed, "Yeah, I like online learning; it is more convenient, I can have my lessons at home. But I still prefer to meet my mates in person! Miss you guys so much! We should hang out together soon. However, in the future, when I have a full-time job. The online learning style would be a great fit for me."*

*Student H said, "It is a difficult question. I mean, I like both. Maybe a combination will be better? Because I can manage my time easily via online learning. But I also want to have some conversations with others in person."*

*Student L disagreed, "I prefer fully online learning. I think if we can have our class like the same in the normal classroom, why not just transfer to only online. If you want to meet people, just call up or go out together. Especially now, better not meet lots of people." Agreed by Students D, F, P, G, T, and O.*

There are some disagreements regarding the learning modes. Most of them prefer fully online multimodal learning; some prefer blended learning, some of them like face-to-face classrooms more. The choice of learning modality depends on various factors, such as personal preference, individual needs. With the development of technology and digital devices' popularisation, online learning is still developing very fast. How can educators bring learners better and more effective learning experiences? It has become an essential topic to explore.

d. The influence of the learning experience on learning motivation and strategies

*Student D claimed, "I feel like I know how to learn Chinese better, so yes, I think it helped me with my strategies a lot. For motivation, I have always been motivated to learn Chinese because I want to work in Shanghai in the future. Maybe it helped me to be more motivated? I am not so sure, actually, but strategies, definitely, yes." Agreed by students J, H, O, and T.*

*Student X mentioned, "Before I always felt difficult to learn Chinese characters, like remembering them. In this course, I learned some strategies to improve this. So I learned strategies, and I have more motivation to learn, I guess." Agreed by students P, S, M, C, and G.* The effect of the online multimodal learning experience on learners' learning strategies development is evident. It is because the teacher implements Chinese learning strategies in the lessons. Concerning motivation, it seems that highly motivated learners did not rely on other sources for motivation improvement.

e. Perspectives on multimodal materials

*Student E stated, "I like the materials given for Chinese learning, especially the videos; they are interesting, and I can know more about Chinese people's real life. The pictures are also very useful for me because they can help me better with Chinese character learning and new words."*

*Student C mentioned, "It's easy for me to be distracted and get bored actually. Umm, maybe my attention span is shorter than others? But this time I think I can focus better and pay attention. Because we always change different learning activities at class. I can see pictures, reading out loud with you, listening and so on. What I like the most is the songs that you use to teach us. I love music, you know, so it's great for me."*

Applying visuals and audios in the materials is highly favored by the students. Difference learners have their learning preferences; employing multiple modality materials helps them meet their needs and maximize their learning outcomes.

f. Perspectives on the application of CALL

*Student S mentioned, "I like Quizlet and Kahoot, it's just so convenient. When you make us play kahoot, I don't feel like I am having a class. It's more like playing games. But I actually learnt things from the practice. Quizlet is very user-friendly, I used to use it for other subjects, now I also use it for Chinese vocabulary learning." Agreed by students H, E, G, M, and F.*

Learners are highly engaged in learning through computer software and applications. It transfers traditional rote learning to interactive and game-based learning.

g. Perspectives on the multimodal assignments

*Student G complained, "I think these assignments are very good. I like the WeChat group discussion and the quizzes. But I think there was too much to do. I feel a bit tired after finishing all of the assignments. But yes, they helped me in remembering the things that we learnt."*

*Student T disagreed with G, "I think it is fine. If you plan your time well, it won't be a big deal. I think these assignments were very helpful. I like the quizzes in Moodle, also our chats in WeChat. I feel more connected with our classmates by chatting. I also feel happy because I am actually using Chinese."*

Some learners confirmed the effectiveness and functionality of multimodal assignments. In general, they liked the multimodality of the assignments. Nevertheless, some complaints about the amount of work; this should also be attentively considered since this will affect learner's attitude and motivation.

h. Perspectives on the multimodal feedback

*Student F stated, "The feedback is very helpful. I can improve and make less mistakes." Agreed by Students A, L, E, S, and D.*

*Student O claimed, "I am always confused about the tone 2 and tone 3 and mix them up when I speak Chinese. The tone check activities are very helpful for me. Teacher and our classmates' feedback make me aware of my mistakes and I can notice them well so that I can pay more attention. I think my tones are better now, isn't it?"*

The learners are aware of the teacher-to-student as well as the student-to-student corrective feedback and noticed their functions. It is important to give learners constructive corrective feedback to assist them in reducing mistakes and errors.

## CONCLUSION

In sum, this study examined the function of learning strategies and motivation in an online multimodal Chinese learning environment for pre-intermediate Chinese learners. The learners' perceptions of online multimodal Chinese learning were also explored via quantitative (questionnaire) and qualitative methods (focus group).

Based on the proposed research questions, the following conclusions were brought up:

- (1) Strategy use was a highly significant predictor of Chinese learning outcomes in the online multimodal learning setting.

- (2) Motivation also played a significant role in the Chinese language proficiency development in the online multimodal learning environment.
- (3) The learners had an overall positive perspective on the learning experience. Further qualitative analysis shows that the learners prefer a student-centered, interactive, multimodal learning atmosphere. The learners favored four main aspects of the online multimodal Chinese learning class. The concern of the workload of the multimodal assignments was raised.

## **6.1 PRACTICAL IMPLICATIONS**

A highly significant positive role of strategy use was found in improving pre-intermediate Chinese learners. Chinese teachers and instructors need to help their students develop better learning strategies and use them daily. In curriculum designing and lesson planning, learning strategies should be well included.

Motivation was also a significant predictor in Chinese proficiency development; teachers should try to motivate students to learn or at least try to keep their motivation. Pre-intermediate learners might not rely on motivation to have an outstanding learning outcome since their motivation has become more stable from the prior learning experience. However, if some reasons demotivate a learner, their learning will be affected. Thus, for pre-intermediate learners, it is vital to maintain learning motivation.

On the subject of designing online multimodal Chinese lessons, this paper provided some suggestions in the following aspects: multimodal materials, CALL, multimodal assignments, and multimodal CF. It is recommended that teachers shall employ multiple modality materials to give instructions. Such as VARK sensory modalities brought up by Fleming and Mills (1992); the VARK sensory modalities include visual, aural, read/write, and kinesthetic. Teachers can prepare their teaching materials with various visuals (static and dynamic), sounds, realias, etc. They can employ these multimodal materials with clear instructions, body language, and interaction activities when they teach.

When it comes to CALL, computers' application is a must; successful CALL implementation in the classroom can facilitate the learning process. For example, as suggested in the paper, teachers can apply various software or applications to give instructions, organize classroom activities and conduct classroom management. The recommended educational applications are Kahoot, Quizlet, Quizzes, and ClassroomScreen. Some social media apps such as WeChat and WhatsApp can also be employed to organize learning groups and generate after-class target language use.

As for multimodal assignments, the efficacy was approved by some participants in the study. It is suggested that teachers could make the assignments more diverse for language learning, considering adding multimodal elements. Such as using social media, instant messaging, podcast, video watching. However, the amount of work should be carefully considered since students will be demotivated when pressured with too much workload. Offering dynamic and engaging multimodal assignments with the proper workload can make learners more engaged in learning.

Concerning multimodal CF, there are several essential points to be considered. First of all, CF needs to be clear and constructive; teachers need to point out the mistakes that students made in a clear but mild way. Additionally, teachers need to encourage learners to give their learning peers feedback, point out each other's mistakes, and learn from each other. Furthermore,

teachers should provide CF opportunities; for example, in this study, WeChat group chatting is where most CF happened. It is proposed that teachers could organize a chatting group for students to use the target language, where both the written and speaking mistakes or errors can be exposed.

## 6.2 LIMITATIONS

The study's limitations are threefold: Firstly, the sample size of the current study is comparatively small (i.e., only 15 participants); consequently, it is difficult to generalize the research findings, which indicates that the findings can not be predicted in broader scenarios. However, to minimize the margin of error, the results should be taken as an indicator or inference for more in-depth studies with greater sample size.

Another limitation is that the Chinese proficiency test does not include speaking. Thus the data might not reflect the comprehensive Chinese learning outcomes. In the future, more inclusive tests might be employed or exploring Chinese language skills (listening, reading, speaking, and writing) development separately.

Finally, motivation and learning strategies were only assessed once. Students' motivation and strategy might change over time. The current research only tested one time for the independent variables, and the one-time trial does not explain any possible changes. In the future, a category of tests over a given period could be employed.

### Endnote:

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<sup>i</sup> <https://moodle.com/>

<sup>ii</sup> <https://www.classroomscreen.com/>

<sup>iii</sup> <https://kahoot.com/what-is-kahoot/>

<sup>iv</sup> <https://quizlet.com/>

<sup>v</sup> <https://quizlet.com/blog/a-new-milestone-for-quizlet-50-million-monthly-learners> Inside Quizlet blog. Retrieved February 10, 2021.

<sup>vi</sup> WeChat is a Tencent-designed Chinese multi-purpose messaging and social media software. <https://www.wechat.com/en/>

<sup>vii</sup> Chinese Proficiency Test (HSK), an international standardized test of Chinese language proficiency, assesses non-native Chinese speakers' abilities in using the Chinese language in their daily, academic and professional lives. HSK consists of six levels, namely HSK (level I), HSK (level II), HSK (level III), HSK (level IV), HSK (level V), and HSK (level VI). <http://www.chinesetest.cn/gosign.do?id=1&lid=0>

<sup>viii</sup> <http://www.chinesetest.cn/gosign.do?id=1&lid=0>



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