

# Development and Delphi Method Analysis of Chinese as a Second Language Instructional Method Classroom Observation Coding Scheme

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**Abstract-** Statistics show that the popularity of Chinese as a second language (CSL) continues to increase. CSL-related institutes are being established throughout Asia, Europe, and the Americas. Therefore, research on CSL instructional methods is gaining more interest among educators and scholars. However, a systematic comparison of different CSL instructional methods is lacking. This study aimed to develop a coding scheme based on the qualitative observation-analysis of long-term in-class video recordings of the instructional processes of various CSL courses, for use as a research tool that assists in the evaluation and analysis of CSL instructional methods. The study applied the Delphi method to assess the validity of the coding scheme and to provide an example of how the coding scheme is applied. Our CSL-IMCC-scheme is a highly reliable analytical tool with high validity that allows teachers and researchers to conduct long-term classroom observations. In our scheme, we have also explored other common and innovative CSL instructional methods, such as computer-aided language teaching. We expect this scheme to serve as a valuable reference for future CSL-related research.

**Keywords-** Chinese as a Second Language; CSL; Instructional Method; Delphi; Coding Scheme

## I. INTRODUCTION

The British scholar and authority on linguistics David Graddol predicted that by the year 2050, Chinese will be the most popular language in the world [1]. With increased international trade and cultural exchange, the learning of Chinese as a Second Language (CSL), is increasing [2]. In France, the number of CSL students increases by 30% per year making Chinese the fifth-most-learned language in that country [3]. In United States, according to statistics from the Census Bureau in 2006, among those wishing to learn a second language, Mandarin Chinese has become the second most popular, preceded only by Spanish [4]. According to statistics from the World Chinese Language Association in Taiwan, millions are learning Mandarin in more than 5,000 institutes in Japan [5]. According to the Ministry of Education (MOE), the number of students studying Mandarin in Taiwan continues to increase. In 1996, the number of CSL students was 4,713; by 2010, that number had increased by 1.5-fold [6]. In the United States, for example, almost 800 colleges have Chinese-language departments, and the Chinese Language and Culture Development Committee of the Advanced Placement Program (AP) that was established in 2004 is responsible for producing AP Chinese-language test items. Students who successfully complete the program can earn college credit in Chinese language or take advanced Chinese courses, thus saving tuition and time [7]. It is clear that CSL is gaining popularity worldwide and that the Chinese language is becoming extremely important worldwide.

Due to this increasing importance, CSL-related institutes continue to be established throughout Asia, Europe, and the Americas. In Taiwan, for example, many college-level institutes have established master's-level CSL programs and learning centres. Quite a few Southeast Asian countries have included CSL in primary and middle school programs; also, CSL has been included in the pre-college curriculum in the United States [8, 9]. The trend of teaching Chinese to those whose mother tongue is not Chinese is taking root in various countries; the concept of Chinese as a Foreign Language (CFL) or CSL has clearly emerged and is receiving much attention from researchers. In particular, the question of how to develop an effective CSL instructional method has become an important challenge. Research on CSL instructional methods continues to increase. For example, some studies address the influences of instructional body language on learning effectiveness [10-12]. Some studies also address the application and effectiveness of different educational theories, instructional methods, and online multimedia tools [8, 13-19]. However, a systematic comparison of different instructional methods is lacking. In addition, most of the existing studies of CSL instructional methods are short-term action-research studies based on observation of a given classroom [20, 21]. Because CSL instructional methods have not yet been systematically compiled and compared, to our knowledge, it is difficult to assess the effectiveness, practicality, features, and limitations of each method. As a result, an empirical study of instructional activities and subsequent analysis of the proportion, features, and process of each instructional method will help us to better understand the features and limitations of the application of different instructional methods and will help us develop better instructional strategies. However, to explore the effectiveness of CSL instructional methods in details, it is

important to conduct a classroom observation analysis of each instructional process. Although coding schemes exist for general classroom observations [22-24], there is no coding scheme dedicated to CSL instructional methods, to our knowledge. Therefore, by conducting a long-term empirical classroom observation of multiple CSL cases (such as through analysis of video footage of a teaching process) based on empirical data, while acknowledging the popular constructs of language-teaching strategies, we have summarized common CSL instructional methods. This method not only allows us to better understand all potential CSL instructional methods but also to use the findings to develop an analytical coding scheme for different CSL instructional methods. The coding scheme can then be treated as a research tool to evaluate and analyse CSL instructional methods and content. This tool would not only help teachers and researchers to understand the current status and limitations of CSL instructional methods but also would encourage researchers to develop innovative methods that consider limitations while addressing educational theories and effectiveness.

Therefore, the purposes of this study were as follows:

- 1) Conduct long-term observation and in-class video recordings of the instructional processes of various Taiwanese CSL teachers based on qualitative observation-analysis.
- 2) Analyse the recorded instructional processes and compile a draft of the coding scheme for CSL instructional method analysis after referring to general linguistic teaching strategies.
- 3) Use the Delphi method to validate the draft; after the revision, to complete the CSL Instructional Method Classroom Observation Coding (CSL-IMCC) scheme.

Further, in our study, we provide examples of how the coding scheme is applied in the analysis and how its results can be used to formulate new CSL instructional methods. Through this effort, we hope that the scheme may serve as a new research tool for CSL research and that this article may help researchers to understand the potential limitations of the tool and relevant issues regarding CSL teaching.

## II. METHOD

### A. Research Design

To discuss CSL instructional methods, we recorded teaching sessions led by each CSL instructor and conducted a two-stage analysis. In stage 1, we referenced past research on language-learning classroom observations, made an initial observation of the videos, and formulated the CSL video-transcript observation dimension items. Based on these items, we conducted the video-transcript analysis and completed the transcript of all the video recordings. In stage 2, we conducted a qualitative analysis based on the stage 1 video transcript, summarized and formulated a draft of the analysis results, and included items from the CSL-IMCC scheme. We then used the Delphi method to test its validity before our professionally tested coding system was completed.

### B. Participants and Procedures

The participants were nine CSL teachers from the National Taiwan Normal University (NTNU) Mandarin Training Centre and 73 students from the nine courses. Table 1 shows basic information about the teachers.

TABLE 1 BASIC INFORMATION FOR TEACHER-PARTICIPANTS

Teacher Code	Years of Experience	Gender
A	2	Female
B	6	Female
C	16	Female
D	5	Female
E	15	Female
F	31	Male
G	5	Male
H	15	Female
I	37	Female

Before recording the videos, we announced our request at the centre for classes and teachers willing to participate in the study. The teachers and students from each class who agreed to be filmed signed consent forms. We set up a video camera to record the entire instruction session conducted for each of the nine Audio-visual Chinese courses. These courses currently compose the most complete and practical CSL program for adults in Taiwan. The courses consist of nine volumes based on difficulty level, each with textbooks, teachers' manuals, student assignments, and supplementary MP3 CDs. The curriculum is designed for foreigners whose mother tongue is not Mandarin, with the purpose of developing students' basic pronunciation, syntax, vocabulary, and day-to-day language usage. Every new word and phrase in the book is simultaneously spelled with

Mandarin phonetic symbols, Hanyu Pinyin and Tongyong Pinyin, to increase the methods by which the reader gains recognition. The assignment booklet complements the coursework by providing practice on the strokes, pronunciations, and shapes of new words, and the construction, paraphrasing, selection, and translation of sentences, allowing students to improve and understand their own learning performance.

The sites of filming were two classrooms in the Centre. Due to limited space, we placed the camera at the corner of the classroom and captured the movements of the teachers and their interactions with students, also trying to include the whiteboard or projector screen on which the teacher displayed relevant materials.

We referenced past studies of in-class observation video transcriptions [25-28] and developed the video-transcript observation dimension items based on our study purposes as shown in Table 2. Our purpose is to analyse teachers' instructional behaviours and interactions with students; each action by the teacher or student is recorded in chronological order.

TABLE 2 CHINESE ASA SECOND LANGUAGE VIDEO-TRANSCRIPT OBSERVATION DIMENSION ITEMS

Observation/Record Item	Description
Action number	Each action performed by the teacher and student is numbered based on temporal order. The first action in each class meeting (i.e., session) is numbered "1," PubMed with the following actions numbered accordingly.
Description of the teacher's action	The teacher's actions are described in detail.
Description of students' actions	The actions of students are captured by the camera.
The content of the teacher's lecture and conversation	Every word spoken by the teacher or in dialogue with students is recorded.
Student speaker coding	Each student who speaks in the session is given an alphabetic code; for example, A.
Content of students' responses and conversations	Every word in a student's response to the teacher's questions or his or her conversation with other students is recorded.
Target of a student's speech	When a student speaks, the responses of the person to whom he or she speaks, such as the teacher or student B, is recorded.
The language used in the conversation	The language used in the conversation is recorded. Besides Mandarin, sometimes a foreign student might use his or her mother tongue or the teacher may use another language for clarification purposes.
Written words	The words written by the teacher or a student on the whiteboard are recorded.
Written language	The language in which a word on the whiteboard is written, such as Chinese, English, or Japanese, is recorded.
Content of courseware	Whether an action involves the courseware and, if so, which part of the courseware is used, such as a certain passage on a certain page in the textbook, is recorded.
Time of occurrence	The start and end times of a recorded action are recorded.
Duration	Measured in seconds, the duration of a recorded action is recorded.
Other	Other incidents or descriptions, such as the detection of background noises, are recorded.

Afterwards, we invited three researchers specialized in CSL to observe each recording, to synthesize the content into video transcripts, and to record the content based on pre-determined items. Table 3 shows an example of how video transcripts were recorded. To ensure the inter-rater consistency of video transcripts, we first conducted the video-transcript-coding training program, in which each recorder performs the task on the same five-minute film; afterward, to ensure consistency in video-transcript coding, we watched and discussed the films with the raters to reach an agreement on how the content should be recorded.

After video transcription is completed, the researcher conducts a qualitative content analysis of the video transcript. Table 4 shows an example of this analysis.

The researcher analyses all the actions and divides them into vocabulary, syntax, sentence pattern, text, and dialogue based on the content of the Audio-visual Chinese course. We also referred to literature on language-teaching and common instructional methods [39-34]; the instructional method of an action or series of actions was written on the right side for descriptive purposes. Following this, the results were compiled for determination of an initial instructional-method coding scheme that covers items, content, sub-items and content of sub-items as shown in Table 5. Item refers to the instructional method of a certain dimension; content, the description of the method; sub-item, the detailed instructional method; and content of sub-item, the detailed definition of each instructional method.

TABLE 3 EXAMPLE OF VIDEO-TRANSCRIPT CONTENT

Action Number	Description of the Teacher's Action	Description of Students' Actions	Content of Teacher's Conversation	Student Speaker Code	Content of Students' Responses and Conversations	Target of a Student's Speech	Time of Occurrence	Duration (Seconds)
111	Hands on the monitor, the teacher looks at student I.		How much is your cup of green tea? (in Chinese)				00:06:52	2
112				I	It is very expensive. This cup of green tea costs 35 NT. (in Chinese)	Teacher	00:06:54	9
113	The teacher looks at student I and asks a question.		Where did you buy it? (in Chinese)				00:07:03	3
114				I	I bought it at the convenience store downstairs. (in Chinese)	Teacher	00:07:06	5
115	The teacher looks at the entire class.		Oh, very good. Who else likes green tea? (in Chinese)				00:07:11	6

TABLE 4 EXAMPLE OF HOW INSTRUCTIONAL METHOD QUALITATIVE ANALYSIS IS RECORDED

Instructional Actions and Conversations in the Video Transcript	Type of Instructional Content	Instructional Methods
<p>T: "These three batteries. These three batteries." (T holds the batteries in view of the students).</p> <p>Students: "These three batteries." (The students repeat after the teacher.)</p> <p>T: "How much?"</p> <p>Students: "How much?" (The students repeat after the teacher.)</p> <p>T: "Good! These three batteries. Hmm. Thirty NT."</p> <p>Students: "Thirty NT."</p> <p>T: "Thirty NT. Therefore, each battery costs 10 NT, doesn't it?"</p> <p>Students: "Yes!"</p> <p>T: "Are they cheap? Or expensive? Yes, I also think they are a bit expensive. But what choice do I have? What we have just learned...What I was saying, this battery...This is what we are going to learn in lesson four [the teacher extends four fingers], isn't it? This battery...This one, too. Good! But this lesson is more difficult. OK! Whose are they? Whose batteries [the teacher picks up the batteries from the desk] are these?"</p> <p>D: "They are the teacher's."</p> <p>T: "Yes! They are the teacher's, not the school's! The teacher's. OK! They are the teacher's. The teacher's [reads each word aloud]."</p> <p>Students: "The teacher's."</p> <p>T: "These."</p> <p>Students: "These."</p> <p>T: "Good. Three batteries."</p> <p>Students: "Three batteries."</p> <p>T: "How much?"</p>	Vocabulary	<ul style="list-style-type: none"> <li>Teaching with actual objects (i.e., batteries)</li> <li>Repeating: the students repeat after the teacher</li> <li>By replacing the batteries for the projector, the students review the previous lesson (i.e., "How much is it?").</li> <li>From the previous lesson (i.e., "How much is it?"), the teacher continues to the next lesson (i.e., "Whose is it?").</li> <li>Responding to the students' answers: each word is repeated aloud slowly and clearly.</li> <li>The sentence "How much are these three batteries?" is divided into separate sections ("these," "three batteries," and "how much"); each section is repeated individually.</li> </ul>

Students: "Thirty." (they respond in a non-uniform manner)

TABLE 5 EXAMPLES OF STRUCTURE OF DRAFT OF CODING SCHEME

Item	Content	Sub-item	Content of sub-item
Use of educational resources	The teacher uses educational resources such as word cards, pictures, the whiteboard, handouts, computers, and body language to facilitate vocabulary learning.	Word cards and vocabulary cards	The teacher uses word cards that he or she has designed or purchased from suppliers to facilitate learning; the purpose is to help learners memorize and understand vocabulary words.
		Whiteboard	By writing vocabulary words on the whiteboard, the teacher helps learners to quickly make connections between different words.

### C. Delphi Analysis

The video footage of the nine classes recorded by the research team lasted 2,500 minutes. The research team then conducted a qualitative analysis to formulate a draft of the instructional methods used, with the four dimensions of Vocabulary, Syntax and Sentence Pattern, Text and Dialogue, and Other. These dimensions contain five, three, five, and three instructional methods, respectively, totalling 16 instructional methods; each instructional method also contains sub-items.

To faithfully reflect the needs of CSL teachers, we carefully formulated the CSL-IMCC scheme. We invited the nine teachers to participate in our Delphi method study to formulate the final draft of the coding scheme. In our study, the one-on-one interviews underwent Delphi analysis; two rounds of Delphi method interviews were conducted. In each round, we asked the teacher's opinion of the appropriateness of the categorization and content description of each CSL instructional method and respective sub-item. We used the Likert 5-point scale to test the appropriateness of each statement. On this scale, the respondent is asked to determine each statement from "very appropriate" (rated "1") PubMed through "very inappropriate" (rated "5"), PubMed and he or she may write comments. We also asked the interviewed teachers to comment on the appropriateness of the instructional methods, accuracy in the use of words, and whether other common instructional methods were not included. Participants were also encouraged to provide open-ended suggestions. Following the Delphi method, we compiled statistics on the teachers' evaluations of the appropriateness of the items on the questionnaire in round 1, which also includes experts' evaluation of the appropriateness of each question item, frequency distribution, and percentage to reach an agreement in round 2. The Delphi method has been used by many other scholars [35-39]; its principle for determining appropriateness is as follows:

- 1) Very high appropriateness level:  $\text{mean} \geq 4.5$ , or  $\text{mode} = 5$ . When a CSL instruction method is deemed by most respondents to be "very appropriate," it is included as a "very appropriate" method.
- 2) High appropriateness level:  $4 \leq \text{mean} < 4.5$ ,  $\text{mode} = 4$ . When a method is deemed by most respondents to be "appropriate," it is included as an "appropriate" method.
- 3) Low appropriateness level:  $3.5 \leq \text{mean} < 4$ , or  $\text{mode} = 3$ . When most responses to a method are "no comment," it is considered to be an "unnecessary" method.

We compiled the comments that were highly homogeneous to include more important indicator items or deleted those not agreed by the experts. When adjusting the items and content of instructional methods, we also made reference to the recorded interviews. Each revision was fully examined and analysed until every item had achieved the highest level of appropriateness.

We conducted two rounds of investigations based on the Delphi method; all items achieved the highest level of appropriateness. With these corrections made, the CSL-IMCC scheme was finalized. In the scheme, the dimension of Vocabulary has six instructional methods and 25 sub-items, Syntax and Sentence Pattern has three instructional methods and nine sub-items, Text and Dialogue has five instructional methods and 13 sub-items, and other has four instructional methods and 12 sub-items; the four dimensions contain 18 instructional methods and 59 sub-items (Appendix 1).

#### 1. Vocabulary

Methods	Description	Sub-item	Description of Sub-item
1 Use of educational resources	The teacher uses educational resources such as word cards, pictures, the whiteboard, handouts, computers, and body	1-a-1 Word cards and vocabulary cards	The teacher uses word cards that he or she has designed or purchased from suppliers to facilitate learning; the purpose is to help learners memorize and understand vocabulary words.
		1-a-2 Teacher writes	By writing vocabulary on the whiteboard, the teacher helps learners to quickly make connections between different words.

Methods	Description	Sub-item	Description of Sub-item
	language to facilitate vocabulary learning.	on the whiteboard	
		1-a-3 Pictures and drawings	The teacher draws on the whiteboard or uses pictures to convey the meaning of a new word in a graphical manner, allowing learners to better understand the word's implications.
		1-a-4 Student writes on the whiteboard	The teacher invites a student to write new words on the whiteboard, allowing him or her to make connections between the new material and previous material and to gain deeper understanding.
		1-a-5 Supplementary handouts	The teacher provides courseware that he or she has designed or purchased from suppliers as supplementary material to assist learners.
		1-a-6 Computer-aided language teaching	The teacher uses the computer to facilitate teaching, providing learners with diverse learning settings and improving learning effectiveness.
		1-a-7 Body language	The teacher expresses the meaning of a new word with body movements or hand gestures, helping learners to better understand the word.
2	Analysis of a word's shape, pronunciation, and meaning	1-b-1 Shape and pronunciation	The teacher helps learners to better understand a new word by analysing its structure and shape. He or she also introduces other words with the same pronunciation.
		1-b-2 Pronunciation	The teacher guides learners to pronounce a word correctly by helping learners to analyse the correct mouth shape and whether and how the tongue needs to curl.
		1-b-3 Similar words	The teacher introduces other words that have similar meanings to the word being taught, helping learners to clarify the meaning of that word and to get to know other words.
		1-b-4 Near-synonym words	The teacher introduces near-synonym words, helping learners to better understand the word being taught and to get to know other synonyms.
		1-b-5 Antonyms	The teacher introduces antonyms of a certain word to expand learners' vocabulary.
		1-b-6 Explaining new words	The teacher clearly explains the meaning of a certain word to learners.
		1-c-1 Students read a new word or sentence aloud	The teacher asks students to read each new word or sentence aloud to improve their speaking ability.
3	Practicing spoken language	1-c-2 Repeating after the teacher, or leading in reading	The teacher asks the students to listen to what he or she reads aloud and then asks them to repeat after him or her.
		1-c-3 Oral sentence-making	The teacher asks the students to verbally create sentences using a new word, helping them to build sentence patterns, thereby improving their speaking ability.
		1-c-4 Teacher-student dialogue	The teacher engages in dialogue with students to help them practice, understand, and use new words.
		1-c-5 Student-student dialogue practice	The teacher designs dialogue-practice activities to help students practice what they learn in one-on-one or group activities.

	Methods	Description	Sub-item	Description of Sub-item
4	Combining grammar and sentence patterns	The teacher combines grammar with sentence patterns in teaching new words.	1-d-1 Grammar	The teacher uses new words within a grammar lesson by pointing out how a word needs to be used and which grammar rules to follow.
			1-d-2 Combining sentence patterns	The teacher combines new words with sentence patterns to help the students repeatedly practice how to use a new word.
5	Homework	The teacher assigns homework for students to practice new words, covering sentence-making, meaning, and word components.	1-e-1 Components	The teacher assigns the practice of a new word's components as homework.
			1-e-2 Sentence	The teacher assigns the practice of forming sentences with a new word as homework.
			1-e-3 Explanation	The teacher assigns the practice of explaining a new word as homework.
6	Previews and reviews	The teacher strengthens students' vocabulary by asking them to do pre-class previews and after-class reviews, making connections made to the material previously learned during classes.	1-f-1 Reviews (i.e., making connections to previously-learned information)	The teacher helps students to make connections to the items they have previously learned, helping students to acquire new words more effectively.
			1-f-2 Previews	The teacher asks students to preview material that has not yet been covered in class.

## 2. Syntax and Sentence Pattern

	Method	Description	Sub-item	Description of Sub-item
1	Use of educational resources	The teacher uses educational resources such as word cards, pictures, the whiteboard, handouts, computers, and body language to facilitate the learning of sentence types and grammar.	2-a-1 Supplementary courseware	The teacher provides courseware that he or she has designed or purchased from suppliers as supplementary material to assist learners.
			2-a-2 Whiteboard writing	The teacher uses instructional tools such as the whiteboard to write sentence patterns to help learners to make visual connections and, thus, to learn syntax or sentence patterns more effectively.
2	Analysis of syntax and sentence patterns	The teacher analyses syntactical structure and sentence patterns and makes connection to previously covered material, helping learners understand how to use these linguistic features.	2-b-1 Explaining applications	The teacher uses different methods, such as giving examples or asking learners to share their experiences, to help students to understand how to apply syntax and sentence patterns.
			2-b-2 Structures of sentence patterns	The teacher breaks down each sentence pattern and guides students in practicing correctly placing the subject, verb, adjective, and object contained in a sentence. (The object, in Chinese, is equivalent to both the direct and indirect objects in English.)
			2-b-3 Making connections to previously learned material	The teacher helps students make connections to previously learned material, helping them to acquire new sentence patterns more effectively.

Method	Description	Sub-item	Description of Sub-item
3	Practicing spoken language	2-b-4 Analysis of defective sentences	The teacher explains mistakes commonly made by learners to remind their students how to use sentence patterns and syntax properly.
		2-c-1 Repeating after the teacher, or leading by reading	The teacher asks students to listen to what he or she reads aloud and then asks them to repeat after him or her.
		2-c-2 Reading sentence patterns (and syntax), sentence samples, or modified sentences	The teacher asks each student or the entire class to read aloud samples of syntax and sentence patterns or to read aloud modified sentences.
		2-c-3 Practicing of sentence making	The teacher asks students to make sentences based on the syntax and sentence patterns shown in the textbook, helping them to gain familiarity with the structure of the language and to improve their oral language abilities.

### 3. Text and Dialogue

Methods	Description	Sub-item	Description of Sub-items
1	Use of educational resources	3-a-1 Video-assisted teaching	The teacher uses the computer or DVD player to facilitate teaching, which may provide learners with diverse learning settings and improve their effectiveness in learning.
		3-a-2 Audio-assisted teaching	The teacher uses the audio player/recorder to facilitate teaching, which may provide learners with diverse learning settings and improve their effectiveness in learning.
		3-a-3 Picture-assisted teaching	The teacher draws on the whiteboard or uses pictures to convey the meaning of a new word in a graphical manner, allowing the learner to better understand the word's implications.
2	Practicing spoken language	3-b-1 Reading text (i.e., dialogue)	The teacher asks each student or the entire class to read aloud a text (i.e., dialogue) to improve their oral abilities.
		3-b-2 Pronunciation correction	The teacher corrects a student's pronunciation.



Methods	Description	Sub-item	Description of Sub-items
3	Exploring the content of the text	text (through dialogue).	3-b-3 Taking turns reading the text aloud The teacher asks each student to read the text (i.e., dialogue) aloud to improve their oral abilities.
		3-b-4 Practicing dialogues from the textbook	The teacher asks students to form small groups to practice the text (i.e., dialogue) aloud to improve their oral abilities.
		3-c-1 Text-related discussions and questions	The teacher asks students to discuss the text or to share comments on related matters.
		3-c-2 The teacher discusses the text (i.e., dialogue), new words, vocabulary, syntax, and sentence patterns.	Learners ask each other questions The teacher instructs learners to ask questions to each other or to design questions and answers, allowing them to learn about the text in the process.
		3-c-3 Error-prone words	The teacher points out in the text words that are especially susceptible to errors among learners, to help learners avoid mistakes.
		3-c-4 Combining vocabulary with syntax and sentence patterns	The teacher combines the new words in the text with syntax and sentence patterns and guides the students to work on these materials.
	4	Designing homework	The teacher assigns text-related (i.e., dialogue-related) homework for students as practice.
		3-d-1 Homework	The teacher assigns text-related (i.e., dialogue-related) homework for learners as practice.
	5	Previews and reviews	The teacher strengthens students' vocabulary by asking them to do previews before class and
		3-e-1 Preview of text	The teacher asks students to preview the material to be covered in the next session and to review after class the material just covered, helping them to better and more easily understand the content of the text.

Methods	Description	Sub-item	Description of Sub-items
	reviews after class to		
	build connections to		
	material previously		
	learned during class.		

#### 4. Other

Methods	Description	Sub-item	Description of Sub-items
1	Writing and presenting papers	4-a-1 Writing and presenting papers and dialogues	The teacher asks students to write papers individually or to form groups, write dialogues, and present their work in class.
		4-a-2 Oral presentation of dialogue	The teacher asks students to share their experiences, give reports, or express what they have learned by reading aloud dialogues from the text.
		4-a-3 Discussing the contents of oral reports	The teacher asks the class to discuss the content of a student's oral report.
2	Implement tests and review the results	4-b-1 Listening and writing	The teacher asks students to write down on paper the words, phrases, or sentences that he or she speaks aloud.
		4-b-2 Written test	The teacher implements written tests.
		4-b-3 Listening comprehension	The teacher reads aloud a passage or plays an audio recording of a spoken passage; students give their answers accordingly.
		4-b-4 Discussing the test results	The teacher discusses the results of the tests and helps students to understand the causes of their mistakes and to improve their learning.
		4-b-5 Oral test	The teacher implements oral tests in which he or she asks questions and a student answers accordingly.
3	Supplementary courseware and activities	4-c-1 Supplementary courseware	The teacher provides courseware that he or she has designed or purchased from suppliers as supplementary material to assist learners.
		4-c-2 Classroom activities	The teacher designs various classroom activities (one-on-one or in groups) to help students to fully express what they have learned and are learning.
		4-c-3 Extracurricular activities	The teacher takes the class to off-campus settings, such as restaurants, public transit, or shopping centres, and guides them to use Mandarin to solve problems in day-to-day situations.
4	Teaching Mandarin through singing	The teacher helps the class to learn or to review vocabulary, syntax, and sentence patterns by singing Chinese songs of a modest level of difficulty.	4-d-1 Singing The teacher sings songs or plays audio or video recordings of songs on the computer or other devices to improve students' motivation and to review vocabulary, syntax, and sentence patterns they have learned or are learning.

### III. FINDINGS AND DISCUSSION

Based on CSL content, the coding scheme is divided into four dimensions: Vocabulary, Syntax and Sentence Pattern, Text and Dialogue, and Other. In our study, we further compared our coding scheme with other linguistic instructional methods to verify relationships and relevance. One of those methods, the instructional method of team collaboration proposed by [40], can be placed in the other dimension, in the classroom activity sub-item of "extracurricular course and activities." Some of the techniques in the lexical approach proposed by [41] were included in the "instruction method of combining grammar and sentence patterns" sub-unit of the Vocabulary dimension. In most of the existing research on CSL instruction, methods such as the use of whiteboards or body language are rarely mentioned, nor has any empirical study been conducted, to our knowledge, on the use of syntactically correct sentence patterns or other common methods, such as singing, in the teaching of related languages. After analysing and compiling previous long-term studies, our coding scheme may serve as reference for researchers and educators and help them improve the depth and diversity of research and education. This coding scheme may also help popularize many instructional methods already being used by CSL teachers. When researchers lack a systematic,

reliable, and valid instructional-method coding scheme, they also often lack effective tools to evaluate and observe the interactions, settings, and methods in teachers' actual practices. Our coding scheme allows researchers to gain a deeper understanding of how teachers use different CSL instructional methods. The analytical results can be applied to different behavioural analytical methods, such as sequential analysis [42-45], quantitative content analysis [46] or cluster analysis [47-49], that help us determine the processes of different CSL instructional behaviours.

To explain how our coding scheme may contribute to the research on this subject, we have provided examples. Teachers or researchers may use our scheme to observe how many times each instructional method is applied in class or to review it on video. CSL teachers may then recognize their preferences for certain instructional methods and be able to make improvements based on such realizations and reflections.

In our study, we used our scheme to code the behaviours that occurred in teacher A's session (Appendix 2). The result shows that the most common methods used in teaching vocabulary are teacher-student dialogue (sub-item 1-c-4) and whiteboard writing (1-a-2), which made up 24.2% and 20.3%, respectively, of all related methods used. Regarding syntax and sentence pattern, the most common method was repeating after the teacher, or leading in reading (2-c-1), which made up 43.6% of all related methods used. Regarding text and dialogue, the most common methods were reading text (dialogue) (3-b-1) and pronunciation correction (3-b-2), which made up 50.0% and 37.8%, respectively, of all related methods used.

#### APPENDIX 2 USE OF CHINESE AS A SECOND LANGUAGE INSTRUCTIONAL METHOD CLASSROOM OBSERVATION CODING TO CODE THE TEACHING BEHAVIOURS OF TEACHER A

Instructional Method Dimension	Sub-items												
<b>Vocabulary</b>	<b>1-a-1</b>	<b>1-a-2</b>	<b>1-a-3</b>	<b>1-a-4</b>	<b>1-a-5</b>	<b>1-a-6</b>	<b>1-a-7</b>	<b>1-b-1</b>	<b>1-b-2</b>	<b>1-b-3</b>	<b>1-b-4</b>	<b>1-b-5</b>	<b>1-b-6</b>
Frequency	0	53	30	0	0	5	24	34	18	25	4	7	101
Percentage	0	8.19%	4.63%	0	0	0.77%	3.70%	0.52%	2.78%	3.86%	0.61%	1.08%	15.61%
<b>Vocabulary</b>	<b>1-c-1</b>	<b>1-c-2</b>	<b>1-c-3</b>	<b>1-c-4</b>	<b>1-c-5</b>	<b>1-d-1</b>	<b>1-d-2</b>	<b>1-e-1</b>	<b>1-e-2</b>	<b>1-f-1</b>	<b>1-f-2</b>		
Frequency	27	123	13	119	3	18	29	0	1	12	1		
Percentage	4.17%	19.01%	2.00%	18.39%	0.46%	2.78%	4.48%	0	0.15%	1.85%	0.15%		
<b>Syntax and Sentence Pattern</b>	<b>2-a-1</b>	<b>2-a-2</b>	<b>2-b-1</b>	<b>2-b-2</b>	<b>2-a-3</b>	<b>2-b-4</b>	<b>2-c-1</b>	<b>2-c-2</b>	<b>2-c-3</b>				
Frequency	2	47	102	25	5	10	33	129	57				
Percentage	0.48%	11.46%	24.87%	6.09%	1.21%	2.43%	8.04%	31.46%	13.90%				
<b>Text and Dialogue</b>	<b>3-a-1</b>	<b>3-a-2</b>	<b>3-a-3</b>	<b>3-b-1</b>	<b>3-b-2</b>	<b>3-b-3</b>	<b>3-b-4</b>	<b>3-c-1</b>	<b>3-c-2</b>	<b>3-c-3</b>	<b>3-c-4</b>	<b>3-d-1</b>	<b>3-e-1</b>
Frequency	0	5	2	15	28	9	0	17	0	1	1	4	0
Percentage	0	6.09%	2.43%	18.29%	34.14%	10.97%	0	20.73%	0	1.21%	1.21%	4.87%	0
<b>Other</b>	<b>4-a-1</b>	<b>4-a-2</b>	<b>4-a-3</b>	<b>4-b-1</b>	<b>4-b-2</b>	<b>4-b-3</b>	<b>4-b-4</b>	<b>4-b-5</b>	<b>4-c-1</b>	<b>4-c-2</b>	<b>4-c-3</b>	<b>4-d-1</b>	
Frequency	43	55	137	6	1	3	2	0	1	10	0	0	
Percentage	16.66%	21.31%	53.10%	2.32%	0.38%	1.16%	0.77%	0	0.38%	3.87%	0	0	

Analysis of the results reveals the characteristics, habits, and limitations of each teacher's style. For example, teacher A often writes or draws on the whiteboard to teach vocabulary; the advantage of this instructional method is that learners are prompted to write the needed words and can learn the meaning of the words through the teacher's drawings, allowing much educational flexibility. The limitation, however, is that this method is more time-consuming than other strategies and reduces teacher-student interactions; further, factors such as classroom space and lighting may impact students' ability to see what is written on the whiteboard. Also, sometimes a teacher's handwriting may be difficult for students to comprehend [50]. The content on the whiteboard is also wiped away quickly; students do not have a saved copy of the content to practice afterwards [51]. With this coding scheme, teachers may understand the characteristics and limitations of their instructional methods and, in turn, determine how they may improve these methods further.

If teachers or researchers could also gather information on how students comprehend course content and how well they learn it, the data could undergo various quantitative and qualitative analyses, along with the results of instructional-methods analysis. Planners who develop training projects for teachers may also analyse how the teachers-in-training use instructional strategies and develop the strategies that best suit their personal styles. In summary, teachers may use the coding scheme to examine their own teaching methods, to arrange their own teaching scenarios, and to adjust their instructional styles; the scheme also allows researchers to analyse and compare different instructional behaviours and models.

#### A. Limitations and Unexplored Aspects of Our Research

Our study has certain limitations and aspects that are interesting but not yet explored. For instance, we have only discussed the common instructional methods used by CSL teachers, rather than analysing different methods based on the type of each learner. For example, auditory learners and visual learners [52] may prefer and benefit from different instructional methods; a single instructional method may not suit all learners [53]. Future researchers may design different methods targeted at different types of learners to improve educational quality and efficiency.

## IV. CONCLUSIONS AND SUGGESTIONS

Our CSL-IMCC scheme is a highly reliable analytical tool with high validity that allows teachers and researchers to conduct long-term classroom observations. Many of the instructional methods in our coding scheme have been discussed in previous studies and are represented therein: for example, the instructional method in the vocabulary dimension [41], the oral method mentioned by [54], and the general language-teaching methods mentioned by [40]. In our scheme, we have also explored other common and innovative CSL instructional methods, such as computer-aided language teaching. It is hoped that this scheme may serve as a valuable reference for future CSL-related research.

Also, with advancements in educational technology, the use of technology to facilitate language teaching continues to gain recognition [55, 56]; the resulting performance and processes have been widely debated [57-59]. To develop learning-management systems and courseware that are better suited for CSL, future researchers may apply our coding scheme to understand the limitations of different methods used by teachers in the classroom and, in turn, develop optimal courseware or digital systems for CSL instruction.

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