

## Development of Challenge – Based Learning Combined with Case-Based Learning Instructional Model for Enhancing Pre-Service Chinese Language Teachers' Instructional Design Competencies

Wang Hailing, Narongwat Ming-Mit, Areewan Iamsa-ard, and Sarayuth Sethakajorn

Curriculum and Instruction Program, Bansomdejchaopraya Rajabhat University

### บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์ 1) เพื่อศึกษาปัจจัยในการเพิ่มขีดความสามารถในการออกแบบการเรียนการสอนของนักศึกษาครุสูงภาษาจีน 2) เพื่อพัฒนาการเรียนรู้แบบท้าทายผสานกับรูปแบบการสอนแบบเรียนตามกรณีเพื่อเสริมสร้างสมรรถนะการออกแบบการเรียนการสอนของนักศึกษาครุสูงภาษาจีน และ 3) เพื่อศึกษาผลลัพธ์ของการนำการเรียนรู้ที่ท้าทายมาใช้ผสานกับรูปแบบการเรียนการสอนการเรียนรู้ตามกรณีเพื่อเพิ่มขีดความสามารถในการออกแบบการสอนของครุสูงภาษาจีนก่อนวัยเรียน ประชากรระดับที่ 1 ประกอบด้วยอัตติเด็นักศึกษา 116 คน และอาจารย์ 3 คนจากหลักสูตรการออกแบบการเรียนการสอนห้องเรียนภาษาจีนนานาชาติในภาคเรียนแรกของปีการศึกษา 2022 จากโครงการศึกษาภาษาจีนนานาชาติ มหาวิทยาลัย Southwest Jiaotong กลุ่มเป้าหมายระดับที่ 2 คือ ผู้เชี่ยวชาญ 5 คน กลุ่มตัวอย่างในระดับที่ 3 เป็นครุสูงภาษาจีนก่อนวัยเรียนที่เข้าร่วมหลักสูตรการออกแบบการเรียนการสอนห้องเรียนภาษาจีนนานาชาติ มหาวิทยาลัย Southwest Jiaotong ในภาคเรียนที่ 1 ปีการศึกษา 2566 จำนวน 41 คน เครื่องมือที่ใช้ในการวิจัย คือ 1) ชุดแบบสอบถามภาษาจีนก่อนวัยเรียน ครุสูงภาษาและการสัมภาษณ์อาจารย์ 2) ชุดแบบสอบถามเพื่อยืนยันรูปแบบการสอน 3) แผนการสอนโดยใช้การเรียนรู้แบบท้าทายผสานกับรูปแบบการสอนแบบกรณีศึกษา และ 4) เกณฑ์การให้คะแนนแบบบูรบิก วิเคราะห์ข้อมูลทางสถิติโดยใช้ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน สถิติการวิเคราะห์ข้อมูลเพื่อยืนยันรูปแบบการสอน และสถิติการวิเคราะห์ข้อมูลเพื่อการให้คะแนน

### ผลลัพธ์พบว่า:

1. ปัจจัยภายในและภายนอกจากแบบสอบถามและเนื้อหาการสัมภาษณ์แล้ว ปัจจัยที่เกี่ยวข้องกับวิธีการสอนมีนัยสำคัญที่สุด ทั้งนักศึกษาครุและอาจารย์ผู้สอนต่างเห็นพ้องต้องกันในเรื่องการเรียนรู้ตามกรณี การอภิปรายกลุ่ม และงานที่ท้าทาย โดยเชื่อว่า วิธีการสอนที่เหมาะสมสามารถปรับปรุงความสามารถในการออกแบบการสอนได้ปัจจัยต่างๆ เช่น สภาพแวดล้อมในการเรียนรู้และทัศนคติของอาจารย์ก็มีความสำคัญเช่นกัน แต่ก็ต้องการการสนับสนุนจากแหล่งที่ต่างกัน จากการค้นพบข้างต้น งานวิจัยนี้เสนอแนวทางการเรียนการสอนที่ผสานการเรียนรู้ตามความท้าทายและการเรียนรู้ตามกรณีเป็นปัจจัยที่สำคัญที่สุดในการสอนเพื่อเพิ่มขีดความสามารถในการออกแบบการสอนของนักศึกษาครุ

2. การเรียนรู้แบบท้าทายผสานกับรูปแบบการสอนการเรียนรู้ตามกรณีเพื่อเพิ่มขีดความสามารถในการออกแบบการเรียนการสอนของนักศึกษาครุ ประกอบด้วย 5 องค์ประกอบ ได้แก่ 1) หลักการและเหตุผล 2) วัตถุประสงค์ 3) เนื้อหา 4) วิธีการสอน & วัสดุและ 5) การประเมินผล แบบจำลองนี้เป็นไปตามมาตรฐานคุณประโยชน์ มาตรฐานความเป็นไปได้ มาตรฐานความเหมาะสม และมาตรฐานความแม่นยำ 100% ซึ่งประเมินโดยผู้เชี่ยวชาญ 5 คน

3. 98% ของนักเรียน 41 คนที่ลงทะเบียนในหลักสูตรการออกแบบการเรียนการสอนในห้องเรียนภาษาจีนนานาชาติ มีความสามารถในการออกแบบการเรียนการสอนที่ดี ผลลัพธ์นี้สนับสนุนสมมติฐานที่ว่า 80% หรือมากกว่าของผู้เข้าร่วมจะปรับปรุงความสามารถในการออกแบบการเรียนการสอนของตนให้อยู่ในระดับที่ดีผ่านการเรียนรู้ตามความท้าทายรวมกับรูปแบบการสอนการเรียนรู้ตามกรอบ

**คำสำคัญ:** การเรียนรู้บนพื้นฐานความท้าทาย การเรียนรู้ตามกรอบ รูปแบบการเรียนการสอน ครุศาสตร์ภาษาจีนล่วงหน้า ความสามารถในการออกแบบการเรียนการสอน

## Abstract

The purposes of this research were 1) to examine the factors for enhancing Pre-service Chinese language teachers' instructional design competencies, 2) to develop challenge-based learning combined with case-based learning instructional model for enhancing Pre-service Chinese language teachers' instructional design competencies and 3) to study the results of implementing of challenge-based learning combined with case-based learning instructional model for enhancing Pre-service Chinese language teachers' instructional design competencies. The sample population for Phase 1 comprised of 116 ex-students and three lecturers from the International Chinese Language Classroom Instructional Design course in the first semester of academic year 2022, from the International Chinese Education programme, Southwest Jiaotong University. The target group of phase 2 are 5 experts. The sample group in Phase 3 was 41 Pre-service Chinese language teachers who participated in International Chinese Language Classroom Instructional Design course at Southwest Jiaotong University in semester 1 academic year 2023. The research instruments were 1) a set of questionnaires for pre-service Chinese language teachers and interview for lecturers 2) a set of questionnaires for confirming instructional model 3) lesson plans using challenge-based learning combined with case-based learning instructional model and 4) rubric scoring criterion. Data were statistically analyzed by mean, standard deviation, data analytics statistics for confirmation of instructional model and data analytics statistics for scoring rubric.

The results were found that:

1. Combining the rankings of the internal and external factors from the questionnaire and the content of the interviews, the factors related to teaching methods were the most significant. Both pre-service teachers and lecturers agreed on case-based learning, group discussion and challenge tasks. They believed that appropriate teaching methods could improve their instructional design competencies. While factors such as learning environment and lecturers' attitude are also important, they need support from different sources. Based on the aforementioned findings, this research suggests an instructional approach that integrates challenge-based learning and case-based learning for the most crucial instructional factors to enhance pre-service teachers' instructional design competencies.

2. Challenge-based learning combined with case-based learning instructional model for enhancing pre-service Chinese language teachers' instructional design competencies include 5 components: 1) Principle and Rationale, 2) Objectives, 3) Contents ,4) Method of teaching & Materials and 5) Evaluation. The model is 100% conformed to utility standards, feasibility standards, propriety standards, and accuracy standards as assessed by 5 specialists.

3. It was discovered that 98% of the 41 students who enrolled in the International Chinese Language Classroom Instructional Design course had good instructional design competencies. This outcome supports the hypothesis that 80% or more of the participants would enhance their instructional design competencies to a good level through the challenge-based learning combined with case-based learning instructional model.

**Keywords:** Challenge-based learning; Case-based learning; Instructional model; Pre-service Chinese language teachers; Instructional design competencies

## Background

International Chinese Language Classroom Instructional Design (ICLCID) is one of the core courses for undergraduate majors in International Chinese Language Education (ICLE), and also the main subject for the Certificate for Teachers of Chinese to Speakers of Other Languages (CTCSOL) examination. The course is professionally oriented and focuses on classroom teaching (Guo, 2006). Using the classic principles of instructional design, it teaches international Chinese pre-service teachers how to design instruction, with the aim of improving pre-service teachers' instructional design skills for their professional development and improving the effectiveness of classroom teaching (Cui, 2008). The overall teaching objectives of ICLCID are to master the definition, scope, theories of instructional design, and the four instructional design models; to master the procedures of international Chinese classroom instructional design; to master the international Chinese curriculum standards and syllabus; to be able to analyses teaching objects and content; to be able to design teaching processes, teaching activities and teaching strategies; to be able to write lesson plans; to be able to evaluate learners' learning outcomes; and to have initial classroom instructional design skills; to explore the whole process of international Chinese language lesson planning; to discover the subtleties of second language teachers in dealing with lesson planning; to understand the close relationship between the ICLCID course and future careers, and actively participate in the learning activities of the course; to increase pre-service teachers interest and confidence and being competent in teaching Chinese; to cultivate the qualities of respect, equality, diversity, compassion and patience as language teachers (Vélez- Rendon, 2002).

By the time the ICLCID course is offered, pre-service teachers have systematically completed Introduction to International Chinese Language Education, Second Language Teaching Methods,

Pedagogy, Educational Psychology and have mastered the basic theory and teaching methods of international Chinese language education. pre-service teachers will soon begin their teaching practice after completing the ICLCID course. This course serves as a connecting link between the preceding and the following (Zhou & Li, 2015). Classroom instructional design is the design of teaching at the classroom level, and is a comprehensive application of instructional design theories and methods to the design of classroom teaching (Cui, 2008). The quality of classroom teaching has a direct impact on the quality of students' education, and how to improve the quality of classroom teaching is a fundamental teaching issue that concerns every teacher. Therefore, it is important to use the basic principles of instructional design to guide pre-service teachers to carry out scientific instructional design. However, there are several problems in the delivery of the course. Firstly, the instructional model is monotonous, with lecture- based teaching dominating the classroom; secondly, lecturers do not pay enough attention to developing pre-service teachers' instructional design skills; thirdly, after learning the course, pre-service teachers produce lesson plans in a boring form and content, which are difficult to use in classroom teaching. Teaching and learning reforms are imperative.

Competence in designing instruction is the foundation of a qualified Chinese language teacher. Confucius Institute Headquarters (2015) published the Standards for Teachers of Chinese to Speakers of Other Languages, it required international Chinese language teachers to be "familiar with relevant Chinese language teaching standards and syllabuses", "able to tailor their teaching to the characteristics of learners", "able to use a variety of teaching resources and supplement teaching materials according to teaching needs" and "able to design meaningful tasks and group activities". International Society for Chinese Language Teaching (2022) published the Professional Competence Standards for International Chinese Language Teachers, it identified the competencies of junior, intermediate and senior international Chinese language teachers. The Accreditation Standard for junior level teachers stipulates that teachers should "master the basic principles and methods of writing teaching plans", "be able to set teaching objectives that are appropriate to the age, cultural background, Chinese language level, interests, cognitive characteristics and learning needs of learners", "be able to reasonably determine the content of Chinese language teaching and design teaching activities that are appropriate to the teaching objectives", "be able to master the methods and techniques of lesson plan design" and "complete the design of lesson plans for specified teaching content".

As can be seen from the two authoritative documents above, the classroom instructional design skills are one of the core competencies necessary for international Chinese teachers. However, the researcher found that most pre-service teachers were weak in the professional competence standards for international Chinese language teachers in terms of teaching analytical skills, classroom instructional design skills and teaching evaluation skills, although they had studied a lot of theory. The development of teaching skills, including instructional design skills, needs to be internalized

through 'doing'. Teacher education programme are really about producing qualified teachers, and developing pre-service teachers' ability to design lessons is a basic requirement. This study focuses on cultivating the instructional design competencies of pre-service Chinese language teachers in the ICLCID course, especially the core competencies of instructional analysis and design (Southwest Jiaotong University, Undergraduate Program of Teaching Chinese to Speakers of Other Languages, 2022).

As a teaching and learning model, Challenge-based learning is currently receiving attention in universities. The most prominent starting point of challenge-based learning was the "Apple Classrooms of Tomorrow—Today" (ACOT2), a project initiated in 2008 by Apple, Inc. to identify the essential design principles of the 21st century learning environment (Apple Computer Inc., 2009). Nowadays, with the popularization of information in the era of globalization, examples of challenging learning can be found in educational institutions at different stages around the world. The European Federation of Innovative Universities (ECIU) is one of the main drivers of Challenge Education, which has identified challenge-based learning as a teaching approach. The main feature of this approach in the initial stage is to solve sociotechnical problems. It allows students to identify, analyze and find solutions to various sociotechnical problems, enabling them to actively participate in authentic, relevant and related to their environment. The learning experience is typically multidisciplinary, involves different stakeholder perspectives, and aims to find a collaboratively developed solution, which is environmentally, socially, and economically sustainable (Rådberg, et al., 2020). These challenges are usually initiated by students, guided by teachers, and a complex challenge requires innovation, creativity and at least multidisciplinary interventions to address. These interventions may require the joint efforts of learners, external stakeholders and training partners (based in industry or the public sector), and the collaboration may continue after the formal end of the academic period, as the sociotechnical issues to be addressed are usually directly related to those of the companies or the public sectors (Högfeldt, et al., 2019; Membrillo-Hernández, et al., 2019). Challenge-based learning requires learners to formulate real questions about an area of direct relevance to society, carry out in-depth research and come up with convincing solutions. Throughout the process, they need to reflect on their learning and the impact of that solution on the world, and ultimately publish their solutions to audiences around the world.

Case-based learning originated in the 1920s at the Harvard Business School in the USA, which adopted a unique case-based approach to teaching, with cases drawn from real-life situations or events in business management. The case-based approach helped to foster and develop students' active participation in classroom discussions and, when implemented, was quite successful. By the 1980s, this case study approach was gaining attention in teacher education, particularly in the 1986 Carnegie Task Force report, *A Nation Prepared: Teachers for the 21st Century*, particularly recommends the value of case studies in teacher education programme as a highly effective model

of teaching and learning. A case is a story that portrays the dilemma faced by a real person in a complex real-life situation and the actions or decisions that must be taken. A case is a depiction of a real event that includes content that is thought-provoking, debatable and provocative. In the field of educational research, most scholars define cases as stories, events, accounts or descriptions of practice (Richert, 1992; Shulman, 1992). These descriptions are neither fictional scenarios nor abstract generalized theoretical statements, but are descriptions of a story or event that contains one or more pedagogical problems and may also contain solutions to the problems. According to Hammond (1989), case- based learning refers to the process whereby the teacher provides and presents a case to the students and they are confronted with the issues and act as decision makers. According to the case study philosophy, "the teacher is an expert in a general sense, but she/he rarely presents her/his professional views and conclusions directly" (Ellet, 2007, p 45), but rather focuses on organizing collaborative learning where students think independently to summarize ideas and derive professional conclusions.

Challenge based learning and case based learning encourage pre-service teachers to: 1) actively participate in their own learning and learn in a collaborative and cooperative way, 2) understand why they need to learn these contents (cases/problems) and how to solve the challenges they will encounter in their future teaching work, 3) collaborate with schools, students, and experts who will work in the future, 4) the cultivation of classroom teaching competence and the cultivation of problem-solving, critical thinking and cooperation support each other, and 5) the cultivation of qualified future teachers. In the cultivation of core teaching skills, taking the teaching design competencies as an example, it requires pre-service teachers to set teaching objectives in advance, integrate textbooks and teaching resources, design teaching processes and activities, choose appropriate teaching methods, and write a specific lesson plan. The cultivation of these skills can be supported by case studies, allowing pre-service teachers to analyze excellent cases for imitation and replication. By analyzing typical cases of error, similar mistakes can be avoided in practice. At the same time, pre-service teachers can independently accept challenges and analyze the whole process of lesson design resulting in a product --- a standard lesson plan. In this process, challenge-based learning and case-based learning will be fully utilized to assist pre-service teachers in analyzing, exploring, summarizing, and ultimately presenting products.

Teaching is a complex event and real teaching is the result of teacher-student interaction in specific contexts. In the absence of an actual classroom setting, pre- service teachers need to be taught not only how to teach, but also how to achieve different teaching objectives through interaction with students (Feiman, 1973). These two 'how to's' cannot be achieved by lecturing, but rather by actively developing new teaching models. With the advent of the post-methodological era in education and the popularization of various educational technologies, the traditional paradigm of

'classroom teaching' as the basis of learning and the sole source of knowledge has been replaced by new models. The common feature of the new models is that they place students at the center of the process through experiential learning. In experiential learning, they must connect their understanding and problems to the real world, while teachers are only supporters and facilitators in the learning process. (Junaidi, Gistituati & Bentri, 2021).

Challenge-based learning can provide significant benefits for the quality education of higher education students. Students develop key 21st century skills for future employment and lifelong learning through Challenge-based Learning, a student-centered active learning approach based on solving scientific/societal challenges in interdisciplinary teams, with external partners, and through 'engage, investigate and act' learning steps. (Johnson, et al., 2009). Challenge-based learning no longer creates clear and unequal boundaries between students and teachers. Everyone has equal power in the process of acquiring skills and knowledge, and it encourages peer learning, where peers work together to develop actions to solve practical problems (Cheung, et al., 2011). For students born in the digital age, this process of active participation in learning is a very effective tool as they are motivated and willing to actively participate. This learning process and experience can help them to find solutions to current practical problems through critical thinking. (Ifenthaler, Gibson, & Zheng, 2018). Shulman (2004, p. 31) defines a case as 'an account of an experience in which our intentions have been unexpectedly obstructed, and the surprising event has triggered the need to examine alternative courses of action', and Shulman (2002, p 67) views cases as 'a way to bridge the abstract nature of principles and teaching standards to classroom practice'. A case can present three different dimensions at once: case scenario, participants, and real-life scenario. Merseth (1994) suggests three purposes for the use of cases in the teacher education program, namely: (a) it is a good practice example or model that describes theoretical principles in the form of contexts for practice; (b) it can help learners to analyze complex teaching situations and guide practical decision making; (c) it stimulates reflection and helps pre-service teachers to develop skills for reflective practice.

In conclusion, challenge-based learning and case-based learning can help pre-service teachers to develop teaching competencies, which is the core of a teacher competency. This paper combines and transforms challenge-based learning and case-based learning to make the new teaching model more in line with the teaching objectives and characteristics of the Introduction to International Chinese Language Education course, and to cultivate the comprehensive teaching competencies of future teachers. At present, there is no precedent for empirical research on the combination of the two teaching models, but from all the literature and teaching practice, the combination of the two-teaching pattern formation to form a new teaching model that fully meets the teacher education is feasible. As the rationale shown above, the author realizes the importance of studying "development of challenge-based learning combined with case-based learning for

enhancing pre-service Chinese language teachers' instructional design competencies". In an attempt to prepare pre-service Chinese language teachers for the complex future teaching career, this current study focuses on developing a new instructional model to enhance classroom instructional design competencies with the expectation that the research findings can be used as a guideline for international Chinese language teaching and learning.

### **Objectives of the Study**

1. To examine the factors for enhancing pre-service Chinese language teachers' instructional design competencies.
2. To develop challenge-based learning combined with case-based learning instructional model for enhancing pre-service Chinese language teachers' instructional design competencies.
3. To study the results of implementing challenge-based learning combined with case-based learning instructional model for enhancing pre-service Chinese language teacher's instructional design competencies..

### **Research Hypothesis**

After implementing challenge-based learning combined with case-based learning instructional model, pre-service Chinese language teachers' instructional design competencies will be overall improved at 80% (Good Level).

### **Definition of Terms**

**The factors to enhance pre-service Chinese language teachers' instructional designing competencies** refers to the internal and external factors collected from students using questionnaire and interviews for lecturers designed by the researcher. The internal factors involve the information about students while external factors consist of information about the lecturers and circumstances. In addition, the factors will be obtained by structured interviews with the lecturers.

**Development of challenge-based learning combined with case-based learning instructional model** refers to a new instructional framework which consists of the stable teaching activities and procedures. Such a developed instructional model with 5 components: 1) Principle & Rationale, 2) Objectives, 3) Contents, 4) Methods of teaching & Materials and 5) Evaluation. It is confirmed by the experts in 4 aspects: 1) Utility Standard, 2) Feasibility Standard, 3) Propriety Standard and 4) Accuracy Standard (Stufflebeam, D.L. 2012)

**Challenge-based learning combined with case-based learning instructional model** refers to a new instructional model that combines the advantages of challenge-based learning and

case-based learning while discarding the disadvantages of both (Sukacke, et al., 2022; Gragg, 1954; Sen, 2017). The instruction is divided into 4 steps:

**Step 1: Inquiry Focus (before class):**

**Step 2: Space and Time for Consideration (before class)**

**Step 3: Active Participation in Learning (in class)**

**Step 4: Synthesize Key Ideas and Practices (after class)**

**Pre-service Chinese Language Teachers' Instructional Design Competencies** refers to the level of standard Professional Competence Standards for International Chinese Language Teachers (2022). The students can pass of 3 items about teaching analytical skills, classroom instructional design skills and teaching evaluation skills under standard, each of standards are rubric score.

**Pre-service Chinese Language Teacher's** refers to the students who enroll in International Chinese Language Classroom Instructional Design (ICLCID) course, semester 1 academic year 2023 in Southwest Jiaotong University.

**Southwest Jiaotong University** refers to one of China's universities, located in Sichuan Province, is a comprehensive university directly under the Ministry of Education of China. There are complete specialties, including engineering, science, humanities and arts. The programme of International Chinese Language Education is a first-class major in Sichuan Province at 2021.

## Research Methodology

**Phase 1** was conducted to answer research objective 1: to examine the factors for enhancing pre-service Chinese language teachers' instructional design competencies.

**Table 1** Summary how to conduct research from phase 1

Research process	Research objective 1	Conduct research	Target group	Instrument	Data analysis	Output
Phase 1	To examine the factors affecting pre-service Chinese language teachers' instructional design competencies in Southwest Jiaotong University	<p>1. Study Principles and Methods of International Chinese Language Classroom Instructional Design course and factors.</p> <p>2. Design a questionnaire on internal and external factors.</p> <p>3. Present the questionnaire to the advisors for checking correctness and completion.</p> <p>4. Assess the validity of questionnaire on factors by 5 experts through IOC</p> <p>5. Design Likert 5-point rating scale questionnaire.</p> <p>1. Study literature on pre-service Chinese language teachers' instructional design competencies factors affecting it.</p> <p>2. Design the interview of 10 open-ended questions on factors.</p> <p>3. Present the open-ended interview to the advisors for checking correctness and completion.</p> <p>4. Assess the validity of open-end interview on factors by 5 experts through IOC</p>	<p>116 pre-service Chinese language teachers from Southwest Jiaotong University</p> <p>3 lecturers from Southwest Jiaotong University</p>	<p>Questionnaires by 24 items</p> <p>Interview by 10 questions</p>	<p>Descriptive Statistics i.e., Frequency, mean (<math>\mu</math>) standard deviation (<math>\sigma</math>) for questionnaires</p> <p>Content analysis</p>	<p>The result of the factors to enhance pre-service Chinese language teachers' instructional design competencies</p>

**Phase 2** was conducted to answer research objective 2: To develop challenge-based learning combined with case-based learning instructional model for enhancing pre-service Chinese language teachers' instructional design competencies in Southwest Jiaotong University.

**Table 2** Summary how to conduct research from phase 2

Research process	Research objective 2	Conduct research	Target group	Instrument	Data analysis	Output
Phase 3	To study the results of implementing of challenge-based learning combined with case-based learning for enhancing pre-service Chinese language teachers' instructional design competencies	<ol style="list-style-type: none"> <li>Study contents, objectives, methods of teaching, materials, evaluation.</li> <li>Design lesson plans by format given, including learning objectives, contents, steps to teach, learning materials, learning resources, evaluation, and note after teaching.</li> <li>Present the lesson plan to the advisors for checking correctness, completion and improvement.</li> <li>Assess the validity of the designed lesson plans by 5 experts through Index of IOC according to the certain criteria.</li> <li>Conduct a try-out of the developed lesson plans with section A for further improvements and implementation with the sample group section B.</li> </ol> <ol style="list-style-type: none"> <li>Study the rubric scoring criteria aligned with teaching objectives and content.</li> <li>Design rubric scoring criteria.</li> <li>Present the developed rubric scoring criteria to the advisors for checking correctness, completion and improvement.</li> <li>Assess the validity of the designed rubric scoring criteria by 5 experts through IOC according to the certain criteria.</li> <li>Conduct the designed rubric scoring criteria with section A for further improvements and implementation with the sample group section B.</li> </ol>	The 42 pre-service Chinese language teachers from Section B who enroll in International Chinese Language Classroom Instructional Design (ICLCID) course in Southwest Jiaotong University are obtained by cluster sampling.	Lesson plans using challenge-based learning combined with case-based learning instructional model Rubric scoring criteria	Descriptive analysis, i.e., frequency and percentage. Descriptive analysis, i.e., frequency and percentage.	Results of implementing challenge-based learning combined with case-based learning instructional model to enhance pre-service teachers' instructional design competencies. Pre-service teachers' performance according to rubric scoring criteria into their levels descriptor.

**Phase 3** was conducted to answer research objective 3: To study the results of implementing of challenge-based learning combined with case- based learning for enhancing pre-service Chinese language teachers' instructional design competencies.

**Table 3** Summary how to conduct research from phase 3

Research process	Research objective 2	Conduct research	Target group	Instrument	Data analysis	Output
Phase 3	To study the results of implementing of challenge-based learning combined with case-based learning for enhancing pre-service Chinese language teachers' instructional design competencies	<ol style="list-style-type: none"> <li>Study contents, objectives, methods of teaching, materials, evaluation.</li> <li>Design lesson plans by format given, including learning objectives, contents, steps to teach, learning materials, learning resources, evaluation, and note after teaching.</li> <li>Present the lesson plan to the advisors for checking correctness, completion and improvement.</li> <li>Assess the validity of the designed lesson plans by 5 experts through Index of IOC according to the certain criteria.</li> <li>Conduct a try-out of the developed lesson plans with section A for further improvements and implementation with the sample group section B.</li> </ol> <ol style="list-style-type: none"> <li>Study the rubric scoring criteria aligned with teaching objectives and content.</li> <li>Design rubric scoring criteria.</li> <li>Present the developed rubric scoring criteria to the advisors for checking correctness, completion and improvement.</li> <li>Assess the validity of the designed rubric scoring criteria by 5 experts through IOC according to the certain criteria.</li> <li>Conduct the designed rubric scoring criteria with section A for further improvements and implementation with the sample group section B.</li> </ol>	The 42 pre-service Chinese language teachers from Section B who enroll in International Chinese Language Classroom Instructional Design (ICLCID) course in Southwest Jiaotong University are obtained by cluster sampling.	Lesson plans using challenge-based learning combined with case-based learning instructional model Rubric scoring criteria	Descriptive analysis, i.e., frequency and percentage. Descriptive analysis, i.e., frequency and percentage.	Results of implementing challenge-based learning combined with case-based learning instructional model to enhance pre-service teachers' instructional design competencies. Pre-service teachers' performance according to rubric scoring criteria into their levels descriptor.

## Results

### Part 1: Results of the analysis of objective 1. To examine the factors for enhancing pre-service Chinese language teachers' instructional design competencies.

According to the data from the pre-service Chinese language teachers, there are two categories of factors that influence their competence in designing lessons: internal factors at a high level ( $\mu=4.23$ ) and external factors at a high level ( $\mu=4.00$ ). The top three internal factors all come from the beliefs of pre-service teachers about teaching models, which are, “I believe the cases with teaching scenarios made me feel interested in studying them” ( $\mu=4.63$ ), “I believe that the challenging tasks given by the lecturers could help me to better apply what I have learned” ( $\mu=4.53$ ) and “I believe that the involvement of experts and international students (stakeholders) in the classroom can help me to better design my instruction” ( $\mu=4.52$ ). The lowest ranked internal factor is “I have new ideas based on my responses to learning about instructional design in the ICLCID course”, with a mean of 3.28. Among the external factors investigated for pre-service teachers, the top three factors mainly come from instructional models and lecturer factors, which are, “Lecturers provide opportunities for group discussion” ( $\mu=4.36$ ), “Lecturers treat us with kindness and patience” ( $\mu=4.34$ ) and “Lecturers provide us with various authentic cases to make us want to learn” ( $\mu=4.31$ ). The factor of teaching materials ranks last ( $\mu=3.31$ ), and pre-service teachers generally believe that the teaching materials they use are insufficient to support their learning. The interviews with lecturers also identified internal and external factors, with internal factors referring mainly to human factors, i.e. the behaviors of pre-service teachers and lecturers, and external factors referring mainly to environmental factors, i.e. the structure of knowledge brought about by the curriculum, the underpinning of placements, the integration of learning in and out of the classroom provided by the university, and the safeguarding of the teaching resources and the teaching environment.

### Part 2: Results of the analysis of objective 2. To develop challenge-based learning combined with case-based learning instructional model for enhancing pre-service Chinese language teachers' instructional design competencies.

Overall, the 5 components of the instructional model – principle and rationale, objectives, contents, methods of teaching & materials, and evaluation are unanimously confirmed by 5 specialists or 100% of all specialists based on appropriateness in 4 areas: utility, feasibility, propriety, and accuracy.



Figure 1 Development the challenge-based learning and case-based learning instructional model after implementation

**Part 3: Results of the analysis of objective 3. To study the results of implementing of challenge-based learning combined with case-based learning instructional model for enhancing pre-service Chinese language teachers' instructional design competencies.**

After the implementation of challenge-based learning combined with case-based learning teaching model, the performance of pre-service Chinese language teachers assessed by analytical RSA is at a good level ( $\bar{x} = 13.06$ ), and holistic rubric assessment is at a good level ( $\bar{x} = 39.17$ ). For the analytic RSA results, instructional design skills are the aspect that pre-service teachers can most obviously develop, followed by instructional analysis skills and instructional evaluation skills. The majority of pre-service teachers (98%) demonstrated good instructional design skills. Of these, 18 were excellent (43%), 23 were good (55%), and 1 was medium (2%). None of the pre-service teachers had a pass or poor level of instructional design competencies. Overall, it can be observed that the instructional design competencies of most of the pre-service teachers (98%) improved after the

implementation of the challenge-based learning combined with case-based learning instructional model. This result is consistent with the research hypothesis that after implementing the challenge-based learning combined with case-based learning instructional model, pre-service teachers' instructional design competencies will increase by 80% overall (good level or above). Therefore, we can conclude that the challenge-based learning combined with case-based learning teaching model is effective in improving pre-service teachers' instructional design competencies.

## Discussions

**Part 1: Results of the analysis of objective 1. To examine the factors for enhancing pre-service Chinese language teachers' instructional design competencies.**

In terms of the findings, the factors that influence the instructional design competence of pre-service Chinese language teachers are discussed as follows.

Respondents' internal factors. On the whole, the overall evaluation score of the internal factors of the respondents is relatively high ( $\mu=4.23$ ). From the perspective of specific individual items, it is found that the average value of item 4 is the highest ( $\mu =4.63$ ), followed by item 3 ( $\mu=4.53$ ), and item 11 had the lowest average level ( $\mu=3.28$ ).

From the above data, firstly, pre-service teachers clearly recognized the importance of the International Chinese Language Classroom Instructional Design course. They knew that the course was a core course to develop their instructional design competence, and they had a clear understanding of classroom instructional design competence, which they thought was very important for their future professional development and personal growth. Secondly, the pre-service teachers were highly motivated to learn the course and were willing to interact with the lecturers and their peers, to participate in group discussions and to carry out timely formative assessment of themselves. More importantly, the pre-service teachers considered the soundness of the teaching methodology to be extremely important in improving their instructional design skills. They emphasized that the use of case in the classroom could increase their motivation to learn, that challenging tasks were useful, and that they would be willing to consult with experts and international students to better design Chinese language teaching if experts and international students were involved. This fully supports the necessity of using challenge-based learning and case-based learning in this study, and the potential of using this model to improve pre-service teachers' instructional design skills. It can be seen that pre-service teachers have a better motivation and foundation for improving their instructional design competence, which will help to motivate pre-service teachers in learning the international Chinese language classroom instructional design course, which is consistent with the findings of objective 1. Respondents in terms of external factors. The external factors of the respondents are generally high ( $\mu=4.00$ ). Considering only each item, it was found that factor No.7 "Lecturers provide opportunities for group discussion" is the highest mean ( $\mu= 4.36$ ), followed by factor

No.4 “Lecturers treat us with kindness and patience” ( $\mu=4.34$ ) and the fewest mean is factor No.10 “The learning materials can fully support us in developing the instructional design competencies” ( $\mu=3.31$ ). In the teaching process of the International Chinese Language Classroom Instructional Design course, the attitude of the lecturer towards students is certainly very important. In fact, in the questionnaire, pre-service teachers like their lecturers very much, but more importantly, the lecturer's teaching ability and the teaching methods are recognized. What kind of teaching model is more effective in cultivating instructional design skills? The pre-service teachers have provided the answer. They think that the lecturer's use of case and group discussions is very effective, and they also like the extra-curricular tasks, which makes the learning time more flexible. The lecturers do not seem to have done enough to set challenging tasks.

From this, adopting challenge-based learning and case-based learning, emphasizing the guiding role of cases in instructional design, and emphasizing cooperation and interaction among peers based on existing experience can indeed improve the instructional design skills of pre-service teachers. From the perspective of pre-service teachers, in addition to the lecturer's teaching mode, the selection of textbooks and teaching materials is also very important. They are not satisfied with the existing teaching materials, which is the basis for this research to improve the instructional design competencies and collect many real, interesting, and vivid cases. Pre-service teachers also hope that the lecturer can provide timely feedback on their learning performance and believe that formative assessment is very important. In the challenge-based learning and case-based learning teaching models, this is also an important aspect. This model attaches great importance to formative assessment and uses various assessment methods to encourage pre-service teachers to reflect and improve.

In short, both internal and external factors jointly influence the teaching of the International Chinese Language Classroom Instructional Design course, which not only emphasizes the importance of teaching methods, but also emphasizes the internal motivation of pre-service teachers to learn. Appropriate teaching methods and a strong interest in learning are the key to improving instructional design skills in the classroom. Both internal and external factors jointly affect the improvement of pre-service teachers' instructional design skills. Adopting challenge-based learning and case-based learning can promote the improvement of pre-service teachers' instructional design competencies.

**Part 2: Results of the analysis of objective 2. To develop challenge-based learning combined with case-based learning instructional model for enhancing pre-service Chinese language teachers' instructional design competencies.**

After 5 experts confirm the 5 components of the teaching model to determine the implementation of the teaching model. Through the confirmation results of 5 experts, the challenge-based learning combined with case-based learning instructional model have been unanimously agreed and supported.

Principle and Rationale aspect. The utility, feasibility, propriety, and accuracy of the Principle and Rationale of this model have been unanimously recognized by experts, which shows that the Principle and Rationale of challenge-based learning combined with case-based learning instructional model is robust and has a relatively solid theoretical foundation. The instructional mode is conducive to the improvement of pre-service teachers' instructional design competencies, which provides effective support in theory.

Teaching objectives aspect. The teaching objectives of this model have been unanimously approved by five experts. Clear teaching objectives are the prerequisite for achieving teaching effects. The clarity of the teaching objectives of this model can improve pre-service teachers' instructional design competencies.

Teaching methods and materials. The content and materials of the challenge- based learning combined with case-based learning instructional model have been unanimously approved by experts. The well-designed challenge tasks and real, interesting, vivid cases have good adaptability to the teaching model, which can effectively promote the improvement of pre-service teachers' instructional design competencies.

Assessment aspect. The assessment component was unanimously endorsed by the experts, highlighting the effectiveness and appropriateness of assessment and feedback in improving the instructional design skills of pre-service teachers. In addition to evaluating group collaboration in solving case problems, it also includes teaching analysis and design for each unit, as well as learning reflection for each unit. This truly achieves timely formative assessment.

In conclusion, the experts unanimously recognized the utility, feasibility, propriety, and accuracy of challenge-based learning combined with case-based learning instructional model, indicating that the robustness and adaptability of the model. The endorsement of the experts has provided a good basis for the subsequent implementation of the instructional model in the ICLCID course to enhance the instructional competencies of pre-service teachers.

**Part 3: Results of the analysis of objective 3.** To study the results of implementing of challenge-based learning combined with case-based learning instructional model for enhancing pre-service Chinese language teachers' instructional design competencies.

After the implementation of the challenge-based learning combined with case-based learning instructional model, the changes and development of classroom instructional design competencies of pre-service Chinese language teachers are discussed as follows.

Firstly, instructional analytical skills are the basis of the ability to design teaching and learning. Through the implementation of challenge-based learning and case-based learning, pre-service teachers' instructional analysis skills have been improved. From the data, 9 achieved excellent, accounting for 21%,

29 achieved good, accounting for 69%, and only 4 were in the medium, accounting for 10%, with none in pass or poor. Most pre-service Chinese language teachers (90%) have achieved a good or excellent level of instructional analytical skills, exceeding the expected 80% in the research hypothesis. This indicates that the challenge-based learning combined with case-based learning instructional model has a significant positive impact on pre-service Chinese language teachers' instructional design competencies. Through the study of a large number of cases, and by setting a variety of challenging tasks when analyzing the cases and taking the pre-service teachers into real Chinese language classrooms, the pre-service teachers were able to master and be familiar with the two authoritative syllabus and standards of the programme, and can use the two language learning frameworks to analyze their teaching; through the use of the cases and contact with real international students (stakeholders involved, see Nichols, et al., 2008; Gaskins, et al., 2015), the pre-service teachers were able to analyze the learners comprehensively and objectively; through analyzing a variety of teaching materials, they are able to grasp the concepts and contents of the teaching materials and choose appropriate language materials and auxiliary resources in the light of the learners' situation. The strengths of the cases were well utilized in the teaching experiments of this study (Doyle, 1990; Merseth, 1996; Koc, 2011; Holland & Pawlikowska, 2019; Watson, Dubay, & Jackson, 2023). It can be seen that pre-service teachers' instructional analytical skills has been significantly improved through the implementation of this teaching model.

Secondly, classroom instructional design skills are key. Through the implementation of challenge-based learning and case-based learning instructional model, pre-service teachers' instructional design skills have been improved. This is reflected in the fact that 20 pre-service teachers (48%) are at the good level and 22 students (52%) are at the excellent level, with none in medium or pass or poor. As many cases provide excellent positive examples and negative lessons, pre-service teachers can identify strengths and weaknesses in them. Through analysis, they can promote the strengths of the cases and avoid the mistakes made by their predecessors (Shulman, 1992). The five sub-skills of instructional design skills are progressive in a step-by-step way. By setting different challenging tasks, pre-service teachers can connect and repeatedly practice these skills. In addition, excellent video cases provide a simulated classroom environment for pre-service teachers. The unit tasks assigned by the lecturer are all used in real contexts. Pre-service teachers are required to research international students, observe teaching in real classrooms and then design and modify their own work. Therefore, under the guidance of this teaching model, pre-service teachers have learned to set instructional objectives, mastered well different types of Chinese language instructional processes, and can choose different teaching methods based on teaching objects and contents, design rich classroom activities, and write standardized lesson plans.

Finally, instructional evaluation skills are an important component of classroom instructional design competencies. Compared to instructional analytical skills and instructional design skills, the score for this part is weaker. Other Chinese scholars (Liu, 2012; Sheng, Zhong & Zhang, 2015) arrived at the same

conclusion, indicating that teaching evaluation skills performed more poorly in comparison. But overall, it has reached a good level. From a data perspective, 5 are excellent, accounting for 12%, 31 are good, accounting for 74%, and 6 are in the medium, accounting for 14%. Most pre-service Chinese language teachers (86%) have achieved a good or excellent level of instructional evaluation skills, exceeding the expected 80% in the research hypothesis. This indicates that the challenge-based learning combined with case-based learning instructional model has a significant positive impact on pre-service Chinese language teachers' instructional design competencies.

In the instructional evaluation skills, the pre-service teacher's skills to evaluate students' academic performance is better because through learning cases and completing tasks, the pre-service teachers can grasp the performance of Chinese language learners in the classroom and can set different formative and summative assessments. The pre-service teacher is confident and enthusiastic about evaluating students. However, the skill of evaluating teaching effectiveness is difficult to achieve, although the lecturer has given the pre-service teachers some opportunities to practice in class, such as each person using their teaching design for a 10-minute lecture. But this is not real teaching. The pre-service teachers have some reflection and can objectively evaluate their teaching and instructional design, but in the end, it is just a talk on paper. As described by Liu (2012), pre-service teachers have an overly idealized view of the classroom. This skill needs to be gradually improved after pre-service teachers become real teachers.

In summary, instructional analytical skills, classroom instructional design skills and instructional evaluation skills are important dimensions of classroom instructional design competencies, and these aspects contribute significantly to the improvement of pre-service teachers' classroom instructional design competencies. The experiment proves that most of the pre-service teachers (98%) acquire good or excellent level by implementing the challenge-based learning combined with case- based learning instructional model instructional model. The findings from the teaching experiments of both instructional models outlined in chapter 2 (Carlos, Rodrigues & Ribeiro, 2022; Han, et al., 2013; Frommelt, Hugener & Krammer, 2019) support the perspective that they are effective.

### **Recommendations for Further Research**

The improvement and development of the instructional design competencies of international Chinese language teachers is of great significance to improving the quality of Chinese language teaching, building a specialized team of Chinese language teaching talents, and realizing the transformation of Chinese language teaching from the stage of expanding scale to the stage of improving quality. It also poses higher demands and greater challenges for the development of international Chinese language teachers' instructional design skills. Against this background, university lecturers should no longer mechanically and blindly train a batch of international Chinese language teachers who are like assembly line parts, but should re-examine the training goals, curricula and

teaching modes, which are the keys to cultivating talents. International Chinese Language Classroom Instructional Design, as a professional course in the field of international Chinese education, plays a crucial role in improving the instructional design competencies of pre-service Chinese teachers. How to innovate teaching models and make the instructional design of pre-service teachers more practical and outstanding will be the focus of future research and thinking.

The research method of this thesis is a mixed research method, which includes both qualitative and quantitative research. However, in the third research objective, quantitative research methods are mainly used. In future research designs, interview methods should be introduced in the third research objective and text analysis should be used to conduct in-depth analysis of the reflection logs of pre-service teachers, thus perfectly combining qualitative and quantitative research methods to make the results more convincing, scientific, and persuasive.

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