MOBILE INTERACTIVE TEACHING MODEL FOR COLLEGE IDEOLOGICAL AND POLITICAL COURSES IN GUANGXI

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Thesis Title Mobile Interactive Teaching Model for College Ideological and Political Courses in Guangxi

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ABSTRACT

The aim of this research is to investigate and assess the mobile interaction mode (MIT) in order to enhance instructional interaction and learners' learning. The objectives of this study were realized through three different research phases. In the first phase, 120 teachers engaged in ideological and political education in 8 universities and colleges in Guangxi were selected as a sample using convenience sampling technique to find out their views on mobile interactive teaching through a questionnaire survey.

In the second phase of the study, a mobile interactive teaching model was constructed on basis of literature analysis, and the final model was determined through two rounds of Delphi method expert consultation. Subsequently, five lessons were designed around the model and 15 ideological and political teachers from randomly selected N universities were invited to apply the model for a month-long teaching practice.

In the third phase, a quality test form was used to test the teaching quality of teachers who used and did not use the MIT model to analyze the differences in teaching effectiveness. The results found that, compared to the comparison group that did not use the mobile interactive teaching model, the experimental group's performance on each teaching dimensions increased significantly: “Student academic performance" increased from approximately 4.03 to about 4.27. “Student engagement” rose from approximately 3.75 to about 4.52. “Level of knowledge acquisition” went up from approximately 4.1 to about 4.45. “Student satisfaction” moved from approximately 3.98 to about 4.37. “Classroom atmosphere” improved

from approximately 3.73 to about 4.53. “Course coverage” advanced from approximately 4.15 to about 4.35. “Student self-confidence” increased from approximately 4.28 to about 4.43. Thus, it can be proved that the teaching model can effectively improve the quality of teaching.

Keywords: Ideological and Political Courses in Colleges and Universities; Mobile Interactive Teaching (MIT) model

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Contents

Contents (Continued)

List of Figures

List of Tables

List of Tables (Continued)

Chapter 1
Introduction

Rationale

The traditional teacher-led teaching model has many problems, such as low student participation and insufficient classroom interaction. This model often leads to students passively accepting information and lacking the opportunity to independently think, explore and understand new knowledge. Mobile interactive teaching model, as an emerging teaching mode, aims to promote teacher-student interaction by information technology and improve students' learning interest and motivation. The ideological and political courses in colleges and universities were chosen as the research object not only because of its important position in college and university courses, but also because its teaching model is in urgent need of innovation and optimization.

The purpose of this research is to probe into how to promote the active, proactive and innovative capacity of students by means of mobile interaction. This study adopts the method of empirical research, which is carried out in three phases. The first phase was to investigate the status quo of mobile interactive teaching by means of a questionnaire. In the second phase, a mobile interactive teaching model was constructed on basis of the literature, and practical teaching was carried out after designing lessons around the model. In the third phase, compare and analyze the practical teaching effect.

The results of the study show that compared with the comparison group that did not use the mobile interactive teaching model, the experimental group's performance in all teaching dimensions improved significantly. This indicates that the mobile interactive teaching mode has a significant advantage in improving the teaching effect. As the teaching mode of Guangxi universities is representative, the findings of this study would be widely applied.

Although this study has achieved certain results, there are still some limitations, such as the limited number of samples and the results may not be generalizable. Future research can further expand the sample range and explore the application effects of mobile interactive teaching models in different types of courses.

In conclusion, by exploring and promoting the mobile interactive teaching model, this study aims to improve students' learning motivation, initiative and innovation, and to enhance the teaching effect and quality of universities and colleges in Guangxi and even the whole country. The results of this study not only bring more interactivity and participation to ideological and political courses in colleges and universities, but also provide a reference for the innovation of teaching model in other courses.

Research Question

How to design and evaluate mobile interactive teaching (MIT) model for college ideological and political courses in Guangxi?

Objective(s)

1. To study the current status of the mobile interactive teaching for college ideological and political courses in Guangxi.
2. To design a mobile interactive teaching (MIT) model for college ideological and political courses in Guangxi.
3. To evaluate the mobile interactive teaching (MIT) model for college ideological and political courses in Guangxi.

Research Hypothesis/Hypotheses

After the mobile interactive teaching (MIT) mode is applied to ideological and political courses in colleges and universities, the teaching effectiveness of teachers would significantly improve compared to before the experiment.

Scope of the Research

The Variable

Independent Variable

1) In phase 1, the independent variable is "Teachers' attitudes and experiences with mobile interactive teaching software and devices".

2) In phase 3, the independent variable is the mobile interactive teaching (MIT) model.

Dependent Variable

1) In phase 1, the dependent variable is "Effectiveness of Teaching Practices and Students Interaction".

2) In phase 3, the dependent variable is teaching quality.

Content (s)

1) Status survey: Investigate the current situation of mobile interactive teaching for ideological and political courses in Guangxi colleges and universities. After designing the questionnaire, the questionnaire was evaluated by experts. A sample of 120 teachers from eight universities in Guangxi was selected by the method of convenience sampling, and their opinions on the mobile interaction were investigated by means of a questionnaire.

2) Design and application of model: A mobile interactive teaching model was constructed on basis of literature analysis, and the final model was determined through two rounds of Delphi method expert consultation. Subsequently, five lessons were designed around the model and 15 ideological and political teachers from randomly selected N universities were invited to apply the model for a month-long teaching practice.

3) Evaluating the MIT model: After creating the quality of teaching test form, five experts were invited to evaluate the test form. Then, the quality tests were conducted separately for teachers who used and did not use the MIT model. Finally, the quality test results of the two groups of teachers were summarized and compared to analyze the differences and draw conclusions for further promotion and application of the MIT model.

Time

Jan to August 2024

Advantages

1. Regionalism: By selecting the Guangxi region as the subject of this research, a new perspective is provided to explore mobile interactive teaching model. This regional study allows good practices to be disseminated and adopted, providing new opportunities for educational practices in different regions.

2. Attention to popular fields: The research focuses on the application of mobile interactive teaching model for ideological and political courses. This not only

reflects tracking of current trends in educational technology but also shows attention to innovation in educational practices.

3. Empirical Research: In this paper, I use an empirical approach to make it possible to know more directly and deeply about the practical functioning of the teaching mode. This carries significant value for further improving teaching methods and assessing effects. Meanwhile, this scientifically rigorous and persuasive approach adds authority and credibility to the study.

4. Highlighting practicality: This research not only focuses on theoretical studies but also on practical applications. The practical research of mobile interactive teaching model for college ideological and political courses will contribute to the innovation of teaching methods.

5. Innovation: The research demonstrates a clear innovation by implementing mobile interactive teaching model for ideological and political courses. It has not only enriched the way of instruction, but also stimulated the study passion of the students, and raised the study efficiency.

Definition of Terms

Ideological and political courses in colleges and universities

It refers to a set of courses offered uniformly in Chinese universities and colleges for the education of mainstream ideological thoughts and theories. It does not refer to one course in particular, but contains a series of courses that are interconnected. In this article, it refers specifically to the compulsory courses for undergraduates in colleges and universities, which mainly include Basic Principles of Marxism, Introduction to Mao Zedong Thoughts and the Theoretical System of the Chinese Characteristics Socialism, Outline of Chinese Modern History, Ideology and Morality and Rule of Law, Situation and Policies, and General Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era.

Mobile interactive teaching

It refers to a modern teaching method that improves teaching quality by integrating mobile devices (such as smartphones, tablets) and Internet technologies (such as mobile applications, mobile virtual technology, etc.). This teaching model emphasizes the interaction between teachers and students. With the help of smart

devices and related software tools such as Xuetangx and Rain Classroom, it breaks physical space and stimulats the students to participate actively in study.

Among them, Xuetangx provides rich online courses and teaching resources, supports video playback, online quizzes and interactive discussions, and helps students continue to learn and review after class. Rain Classroom enhances teacher-student interaction and improves classroom participation and learning effects through real-time interactive functions such as online questions, classroom discussions and instant feedback. Smartphones, with their portability, enable students to acquire learning resources, take part in online discussions and submit homework anytime and anywhere, which is suitable for learning in fragmented time. Tablets, with their larger display and powerful multimedia functions, are suitable for watching teaching videos, taking electronic notes and participating in interactive learning activities.

This combination of software and hardware further enhances the teaching effect, provides more flexible and personalized options for teaching, and enables teachers and students to interact, discuss and give feedback anytime and anywhere. This not only effectively improves students' learning efficiency, but also significantly enhances their learning experience. Simultaneously, the mobile interactive teaching model also enriches educators' teaching methods, enabling them to flexibly adjust teaching methods and content based on students' needs and learning progress through the coordinated application of software and hardware, thereby further improving teaching effectiveness.

Research Framework

The research framework of this thesis contains the research rationale, research objectives, sample groups, and research methodology. The framework diagram is shown below.

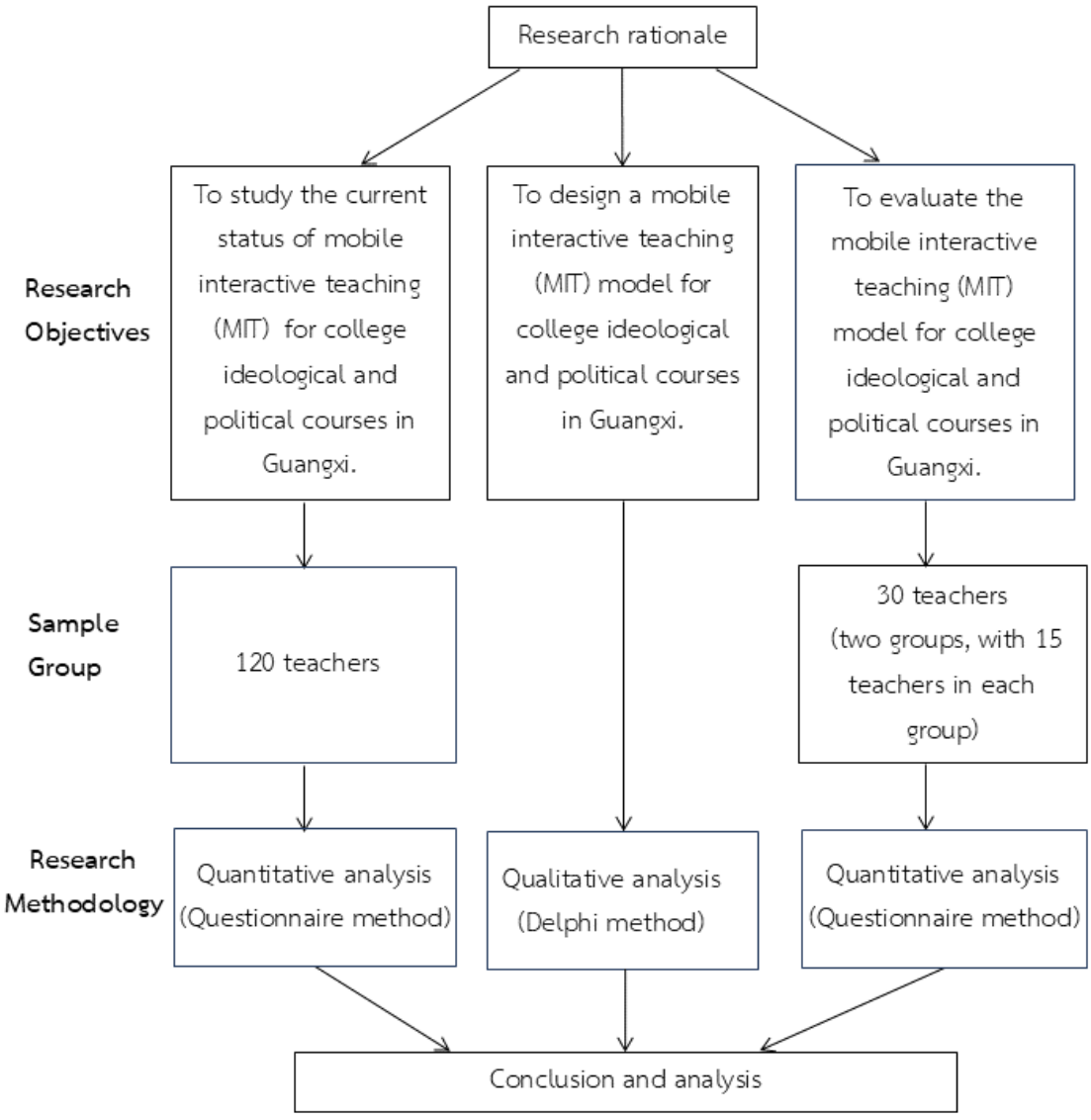

Figure 1.1 Research Framework

Chapter 2
Literature Review

Focusing on the three research objectives of this study, the literature review will be conducted in the following areas:

1. Mobile learning
2. Concept of the integration of mobile learning and classroom teaching
3. Model study on the integration of mobile information technology and curriculum
4. Research on the integration of ideological and political education teaching and mobile learning
5. Related basic theories

Mobile Learning

Along with the fast developing of the internet, the mobile communication and the network technique, the mobile learning is becoming more and more popular. At the same time, there are more and more examples of education and teaching with the help of computers, cell phones and other kinds of smart devices using digital and mobile technologies. With the development of mobile technology, the field and content of mobile learning are constantly changing, mobile learning research shows a diversified trend, and different scholars have different understandings of mobile learning and the mode of use. Throughout the research on mobile learning at home and abroad, it can be found that the research related to mobile learning is roughly divided into two categories: the theoretical research on mobile learning and the exploration of mobile learning application mode. Among them, the theoretical research of m-learning emphasizes on the definition of m-learning. Specifically, it can be divided into two types of definitions, one emphasizing the definition from the perspective of technology, and the other emphasizing the definition from the perspective of learning mode.

1. Technology-centered definition

Clark Quinn (2000) considers m-learning as digital learning via information devices, which include Palms, Windows CE devices and digital cellular phones.

Keegan (2002) argues that mobile learning is a new stage in the development of distance learning and e-learning.

Paul Harris (2003) views m-learning as a intersection between mobile technology and e-learning, which provide learners with an anytime learning experience and make learning richly interactive. Mobile learning makes it possible for students to "have an educational moment" at any time using their mobile phone or PDA.

Aleksander Dye (2003) believes that m-learning is a way of learning in which the learner chooses the time and place of learning independently with the support of mobile computing devices, and can communicate with the teacher.

Yu Shengquan (2007) believes that mobile learning refers to the process in which learners access learning resources, communicate and collaborate with others, and realize personal and social knowledge construction through mobile devices (such as cell phones, PDAs with wireless communication modules, etc.) and wireless communication networks at any time and any place.

Scott McQuiggan et al. (2016) sees the evolution of instructional technology resulting in an experience that enables anytime, anywhere learning through instant, on-demand access to a personalized world.

The Mobile Learning Laboratory of the Center for Modern Educational Technology at Peking University (2001) sees mobile learning as the more convenient and flexible realization of interactive teaching and learning activities via mobile devices, relying on multimedia technologies and wireless mobile networks.

Definition given by the European Learning2Go project: Learners can use some mobile devices, such as PDA, Smartphone, tablet PC, Games Console, etc., to freely choose the time and place to study

According to Huang Ronghuai et al. (2008), "Mobile learning is learning that occurs when the learner is in a non-fixed and non-predefined location, or learning that occurs through the effective use of mobile technology."

According to Crompton H, Burke D (2020), mobile learning is learning that happens with the help of mobile devices, across contexts, and with social and content interaction.

2. Definition of learning methods centered

Some researchers have found m-learning should not be limited to the device level, but should be discussed in terms of the changes that m-learning can bring to the way learners learn.

The EU's e-Europe Action Plan has launched a special research program on mobile learning called "MOBIlearn Action", which believes m-learning is an extension of digital learning. The collaborative research involves nine countries from Europe as well as non-EU countries such as the USA, Israel, Switzerland and Australia. The main aim of the research is to investigate two elements both theoretically and practically. The first one: effective learning, teaching and tutoring in mobile environments. The second one: study teaching design and digital learning content development of mobile learning.

Ye Chenlin, et al. (2004) define mobile learning as a new learning way that involves accessing education information, resources, and services via wireless mobile technology and devices, such as mobile phones and personal digital assistants (PDA, Pocket PC). Compared to learning ways, mobile learning has the advantages of convenience, personalized instruction, rich interactivity, and contextual relevance.

Ogata H. and Yano Y. (2005) argued that m-learning emphasizes more on mobility and that m-learning environments are mobile, as well as teachers, students and technicians. Mobile learning has the main characteristics of permanence (permanence), accessibility, timeliness (immediacy), interactivity and situating of instructional activities.

Ding Kuntang and Li Huanqin (2010) believe that the development prospects of m-learning are mainly reflected in three aspects: First, since m-learning is not limited by time and place, it makes learning informal and personalized; Second, by using mobile technology in schools, m-learning will be integrated into all aspects of teaching and learning activities in schools. Third, mobile learning practices support lifelong learning.

Guo Shaoqing, et al. (2011) believe that m-learning refers to the form of digital learning in which learners use wireless mobile technology and wireless devices to obtain educational information, resources and services, and realize the rich interaction between teaching and learning via mobile technology in appropriate situations. Mobile learning should include the following basic connotations: First, the

form of learning is mobile and convenient. Second, the learning content and activities are interactive and effective. Third, it relies on mobile technology and digital learning technology to complete the wireless transmission of education content and information. Fourth, learning activities are contextually relevant. Fifth, learners can flexibly use their time to obtain knowledge and information when they need it most.

Chung C J, et al. (2019) argued that m-learning supports a "learner-centered" learning environment that enables students to use mobile devices to learn, experience, explore, and interact with resources in the real and digital worlds.

According to Pu Shengyu (2023), mobile learning is a way of learning based on Internet technologies, digital platforms, and artificial intelligence technologies, all of which emphasize the convenience, timeliness, and interactivity of learning. This mobile learning supports both traditional teaching in the classroom and corresponding digital learning outside the classroom.

In summary, the common points of the definitions of mobile learning at home and abroad are as follows:

(1) The technical basis for the realization of mobile learning is mobile terminal technology, wireless communication technology, mobile Internet technology, etc. It is a new type of independent learning form that is able to obtain and select educational information, resources and services through wireless mobile communication devices (such as computers, cell phones, etc.).

(2) With the support of wireless communication technology, the mobility of the device allows mobile learning to break through the limitations of time and space, so that learners can learn anytime and anywhere, emphasizing the main position of the learner.

(3) Mobile learning supports a "learner-centered" learning environment that emphasizes mobility, access, immediacy, context, universality, and convenience, enabling students to use mobile devices to learn, experience, explore, and interact with resources in the real and digital worlds.

Concept of the integration of mobile learning and classroom teaching

Technical Support

As at June 2023, the number of mobile terminals used in the world has exceeded 8.3 billion, which provides an effective carrier for mobile learning, and mobile learning has gradually become a hot spot of education informatization research. Mobile learning not only provides good services for students, but also has become a major means for college teachers to utilize mobile terminal devices and mobile communication technology to conduct teaching activities, implement teaching reforms, and improve teaching level. The combination of IT and classroom teaching can be understood as information technology prompts clearer and richer teaching resources, more vivid and diverse teaching forms, more reasonable and scientific teaching structures and learning styles, greatly improved teaching efficiency, and significantly optimized teaching results.

Yu Haiyan (2015) believes that the popularization of mobile Internet is more conducive to the development of m-learning, and the wide application of MOOC in the field of education shows that the mobile learning platform can not only enable college students to obtain professional knowledge, but also to obtain a closer contact with the outside world, and to understand the current professional hotspots.

Wang Zhuli (2016) believes that mobile terminal technology (smartphones) and wireless communication technology (stable network connection) are essential tools for "Internet +" classroom teaching. In addition, most mobile platforms have basic functions such as scoring, discussion, grouping, uploading or downloading, polling, statistics, etc., such as MosoInk Cloud Class, Super Star Learning, etc. These mobile cloud platforms developed based on WeChat technology help to record the learning process and learning activities in real time and carry out teaching research.

Wang Shuaiguo (2017) discussed how to conduct teaching reform in colleges and universities in the context of mobile Internet and big data, and how to effectively use teaching tools to conduct blended teaching and other research directions. After analyzing the questionnaire survey, it was found that the Rain Classroom app, because of its powerful functions, has "synchronized feedback on slides", "classroom exercise response system", "courseware push", "pop-up' classroom discussion", "data collection sub-item" and other five functional points. And its application in teaching scenarios makes it popular among teachers and students.

Wang Jinguo (2022) believes that with the popularization of mobile terminals such as smartphones, tablets and 5G networks, it provides a platform for learners to learn independently. In addition, there are more online teaching platforms that support mobile learning, such as Super Star Learning, Tencent Classroom, MosoInk Cloud Class, Rain Classroom and other apps.

Dai Qingling (2022) believes that Super Star Learning is a professional m-learning platform for mobile terminals (smartphones and tablets). It combines the advanced teaching techniques, the advanced ideas and the real class instruction, which makes the teaching approach diversified, and enhances the teaching effect. According to statistics, there are currently more than 6,000 colleges and universities in the country that have built online open courses based on this platform, and published and shared course teaching resources. The platform provides a variety of functions such as data upload and score statistics, which can record the entire process of teaching and interaction between teachers and students in real time.

Fu Xiangping (2023) believes that mobile learning is the use of personal electronic devices to learn across different time and space environments through social interaction and content interaction. There are several types of apps that support the development of mobile teaching activities in teaching: platform system apps, tool apps, image processing apps, learning management apps, reading apps, and video apps. The more widely used in teaching activities are MOOC, Xuexi Qiangguo, Super Star Learning and Rain Classroom

Hu Xia, et al. (2022) believe that with the development of "Internet + Education", online and offline hybrid teaching has emerged, and it has become more and more common to carry out teaching based on mobile learning platforms such as Super Star Learning, Mosoteach, Rain Classroom. Teachers can use mobile teaching platforms to enhance students' interest in participating in classroom interactions, but they should also combine specific teaching content and teaching objects, carefully design teaching and think about what form of interaction to take, and explore solutions to build effective classroom teaching interactions.

Xin Xiaotao, et al. (2023) believe that the Rain Classroom app is widely used because of its powerful functions. Currently, more than 2,600 college teachers in China use Rain Classroom, of which 1,437 colleges and universities have deployed the Rain Classroom big data management platform. The functions of the Xuetangx

app are equally powerful. Students can conduct online learning and course selection, watch videos, complete homework, and discuss courses. To this end, a hybrid teaching model based on "Xuetangx + Rain Classroom" is proposed to achieve challenging, interactive, academic inquiry and personalized teaching goals.

Zhang Tianxin (2023) believes that mobile learning is a new learning method that is not restricted by time and place. With the development of mobile wireless devices and the popularization of mobile application software, teachers can rely on mobile learning apps such as Rain Classroom and Tencent Classroom to strengthen students' pre-class and after-class course learning. In addition, you can also push extracurricular English learning materials to students every week, introduce English learning skills, and assign English group tasks through mobile platforms such as WeChat and QQ.

Liu Chunming et al. (2024) believe that various Internet education platforms are actively promoting the launch of mobile learning platforms or improving their functions to meet the needs of explosive growth in the industry. With the advancement of online education courses, a large number of mobile learning platforms for teachers and students have developed rapidly, such as MOOC, MosoInk Cloud Class, Super Star Learning APP, etc.

Shao Changhai (2024) believes that with the rapid development of information technology, mobile learning has become an indispensable learning method for college students, and learning through WeChat on mobile terminals has gradually become a way to achieve mobile learning. WeChat public platform is a functional module within WeChat. Platform managers can edit five categories of content such as text, sound, pictures, videos, and graphic messages on the web page. It can interact with people who follow the public account one-to-many or one-to-one, and can also connect the account with a third-party development platform to add more powerful interactive functions.

Table 2.1 Technical support for mobile learning

Elements / Researcher	Mobile Terminal Technology		Wireless Communication Technology	Mobile Application Software						
	1	2	3	4	5	6	7	8	9	10
Yu Haiyan (2015)	●	●	●							●
Wang Zhuli (2016)	●	●	●					●	●	
Wang Shuaiguo (2017)	●	●	●			●				
Wang Jinguo (2022)	●	●	●			●		●	●	
Dai Qingling (2022)	●	●	●					●		
Fu Xiangping (2023)	●	●	●	●		●		●		●
Hu Xia, et al. (2022)	●	●	●			●		●	●	
Xin Xiaotao, et al. (2023)	●	●	●			●	●			
Zhang Tianxin (2023)	●	●	●		●	●				
Liu Chunming, et al. (2024)	●	●	●					●	●	●
Shao Changhai (2024)	●	●	●		●					
Total	**11**	**11**	**11**	**1**	**2**	**6**	**1**	**6**	**4**	**3**

1-Tablet
2-Smartphone
3-5g network
4-Xuexi Qiangguo app
5-WeChat or QQ
6-Rain Classroom
7-Xuetangx
8-Super Star Learning
9- MosoInk Cloud Class
10-MOOC

2. Learning Environment

Yang Jiumin et al. (2013) proposed a flipped classroom based on micro-video resources and put it into practice. Before class, the main preparation activities were to record micro-videos and publish resources and students carried out independent

learning and collaborative learning based on micro-video experimental resources. In class, practical evaluation was mainly carried out, and collaborative communication and guidance and question-answering were carried out.

Yang Fang et al. (2017) designed a hybrid teaching activity based on MOOC and Rain Classroom. Rain Classroom is able to incorporate complicated IT techniques into PPT and WeChat. Through the creation of the virtual classroom, it provides a highly effective interaction between the teachers and the students in the phase of pre-class preparation, classroom teaching and post-class review, thereby improving students' independent learning ability and adapting to students' personalized learning needs.

Yu Yan and Zhu Pengwei (2020) believe that the advantages of a mobile learning mode based on mobile terminals are: first, learning can be carried out anytime and anywhere, fully integrating and utilizing fragmented time; second, it meets students' personalized learning needs; third, it facilitates communication between teachers and students, enabling two-way interaction; and fourth, it enhances students' independent learning ability and learning efficiency.

Song Xiaoe (2022) believes that apps deliver learning data to teachers, and teachers can refer to the data to adjust the progress and rhythm of classroom teaching in a timely manner, and provide targeted and accurate teaching guidance to each student. Teachers can use the mobile app and mobile learning platform on weekends to review exercises and provide English tutoring for different students to achieve personalized tutoring. Practice has shown that this model has produced very good results.

Dai Qingling (2022) believes that the mobile teaching model is conducive to resource sharing, student interaction, and more flexible and targeted classroom teaching. In addition, mobile teaching can improve students' learning interest and improve learning efficiency.

Wang Yu (2023) believes that with the development and progress of artificial intelligence technology and its wide application in the field of education, college students can use smart apps in mobile devices to achieve mobile learning anytime and anywhere. Applications on mobile devices can offer students a more individualized and intelligent learning experience. It provides recommendations for more accurate learning, develops smart study programs, and follows the learning process according to the individual needs and circumstances of study. Moreover, students may select study resources and methods based on their needs, interests, study progression and pace.

Jiang Shu, et al. (2023) introduced the Super Star Learning app into the teaching of physical chemistry. Through videos, animations and other resources, vivid and real pictures are restored, allowing students to be immersed in the scene and more easily understand and master theoretical knowledge.

Liu Yingyi and Yuan Ze (2023) believe that teachers can issue questionnaires before class and interact with students to understand how students independently acquire and use online learning resources. At the same time, teachers can design and integrate online learning resources based on different mobile terminal devices, around learning objectives, content and activities, to meet the personalized needs of learners.

Chen Chen (2023) believes that the advantages of the hybrid teaching model of college mathematics based on mobile learning are more abundant teaching resources, more significant teaching effects, and more harmonious teacher-student relationships. In classroom teaching, teachers should try their best to create opportunities for interaction and cooperation to allow students to participate deeply. During this process, pay attention to carefully observe and evaluate students' performance, and provide various supports for their learning activities.

Liu Shuang (2024) combined the learning characteristics of undergraduate students and their understanding of mobile learning, and tried to build a hybrid teaching model of college English based on the Super Star Learning app. Through a survey of students, it was found that this form of classroom can not only stimulate students' enthusiasm for independent learning, but also meet the personalized learning needs of students of different levels. At the same time, it also assists teachers to enrich the classroom and improve classroom teaching effects.

Table 2.2 Characteristics of learning environment for mobile learning

Elements / Researcher	Contextual Learning		Collaborative Learning		Personalized Learning		
	1	2	3	4	5	6	7
Yang Jiumin, et al. (2013)	●	●	●	●	●	●	●
Yang Fang, et al. (2017)	●	●	●	●	●	●	●
Yu Yan, et al. (2020)	●	●	●	●	●	●	●
Song Xiaoe (2022)	●	●		●	●	●	●
Dai Qingling (2022)	●	●	●	●			●
Wang Yu (2023)	●	●	●		●	●	●
Jiang Shu, et al. (2023)	●	●	●				●
Liu Yingyi, et al. (2023)	●	●	●	●	●	●	●
Chen Chen (2023)	●	●	●	●	●	●	●
Liu Shuang (2024)	●	●	●	●	●	●	●
Total	**10**	**10**	**9**	**8**	**8**	**8**	**10**

1-Real learning environment
2-Simulated learning environment
3-Group discussion
4-Interactive cooperation
5-Accurate learning content
6-Accurate learning summary
7-Independent learning

3. Instructional design

Dou Juhua and Wen Shan (2015) designed an app-based college English teaching model. The mobile teaching using app mainly consists of three parts: pre-class, in-class, and post-class. The most important work in the pre-class teaching preparation stage is to clarify the teaching objectives, summarize the teaching focus, case-based teaching tasks, and produce micro-class teaching resources. In class, students' knowledge internalization is completed through teaching activities such as group discussions, situational dialogues, role-playing, and speeches. The post-class teaching part mainly requires students to summarize the knowledge they have learned and submit it to the app in the form of a log.

Pu Qingping, et al. (2016) utilized constructivist learning theory and systematic instructional design theory to construct a teaching model where the APP serves as the teaching platform, students and teachers as the main subjects, and the time segments of pre-class, in-class, and post-class as the main guiding structure. This model emphasizes students' active exploration, teachers' active guidance and app's active linkage, advocates autonomous learning before class, interactive collaboration during class and feedback optimization after class, and ultimately realizes personalized education, interactive teaching and in-depth learning.

Gu Jiafang and Xu Ke (2020) believe that by using the Rain Classroom plug-in embedded in PowerPoint, teachers can issue pre-class preview courseware with MOOC video exercises and voice to the WeChat client of students' mobile phones, and receive feedback from students in a timely manner. In class, they can realize real-time answering, bullet screen interaction, and timely collection of classroom data to improve the efficiency of classroom education. After class, review questions are pushed and students’ questions are answered in real time to understand their learning effects. It can be seen that Rain Classroom connects teachers and students in every link before, during and after class, and realizes data collection throughout the teaching cycle.

Dai Qingling (2022) conducted an empirical study and found that the mobile teaching model based on Super Star Learning has relatively obvious advantages compared with traditional teaching methods. It is mainly reflected in the advantages of sufficient pre-class preview, enhanced classroom participation, improved independent learning ability, improved learning efficiency, and conducive to knowledge absorption and internalization.

Wang Jinguo (2022) organized and implemented teaching into three stages: pre-class knowledge construction, in-class knowledge internalization, and post-class consolidation and reinforcement. Pre-class knowledge construction mainly refers to the construction of knowledge through self-study and interactive discussion of online learning materials. In-class knowledge internalization refers to the interaction that enables learners to conduct in-depth analysis and understanding of knowledge, and internalize knowledge into their existing cognitive framework. Post-class consolidation and reinforcement means that when students encounter difficulties in completing post-class learning tasks, they can communicate with teachers or classmates through the Super Star Learning to help themselves consolidate and improve their knowledge.

The hybrid teaching model of university mathematics based on mobile learning designed by Chen Chen (2023) is divided into three stages. Pre-class preparation stage: design teaching plans based on current teaching content and teaching needs, and upload information resources and guide students to learn independently. In-class teaching stage: give full play to students' main position in the classroom through various methods such as inspiration and guidance, group discussion, and task-driven, and guide students to actively think about problems and express ideas. Post-class extension stage: arrange scientific and reasonable extension tasks for students to cultivate students' inquiry ability and knowledge transfer ability.

Xiao Hong and Liu Linhua (2023) used the Super Star Learning to design the "Marketing Planning and Management" course framework into seven learning modules. In the pre-class independent learning stage, teachers publish learning task lists based on the teaching plan. After receiving the task list, students read the learning materials, familiarize themselves with the content in advance, and record questions that arise during learning, and enter the classroom with questions. In the in-class discussion learning stage, teachers use the teaching tools provided by the mobile learning platform to design a variety of classroom interactive activities such as quick answers, in-class exercises, case discussions, questionnaire voting, and random selection. In the post-class learning stage, teachers publish homework on the mobile learning platform and students who complete the learning tasks on time will receive extra points bonus, and students who have not completed them will receive reminders.

Table 2.3 Instructional design for mobile learning

Elements / Researcher	Pre-class Preparation		Classroom Interaction		Post-class Extension		
	1	2	3	4	5	6	7
Dou Juhua (2015)	●	●	●	●	●	●	
Pu Qingping (2016)	●	●	●	●	●	●	●
Gu Jiafang (2020)	●	●	●	●	●	●	●
Dai Qingling (2022)	●	●	●		●	●	●
Wang Jinguo (2022)	●	●	●		●	●	●
Chen Chen (2023)	●	●	●	●	●	●	
Xiao Hong, et al. (2023)	●	●	●	●	●	●	●
Total	**7**	**7**	**7**	**5**	**7**	**7**	**5**

1-Teachers publish learning materials
2-Students learn independently
3-Use the app to interact
4-Adjust teaching focus based on app feedback
5-Teachers publish homework and answer questions
6-Students complete homework and discuss
7-Export student learning data and summarize reflections

4. Teaching Resources

Pu Qingping, et al. (2016) believe that mobile learning is a digital learning model based on portable mobile devices (smartphones, tablets). By developing an app client, learning materials and learning content are systematically integrated, and multiple media such as display text, pictures, audio, video, animation, etc. are simultaneously loaded on the platform to provide students with learning tasks, establish multi-dimensional communication channels between teachers and students (comments, messages, chats), provide online simulation exercises, homework completion, and online test assessments.

Yang Fang et al. (2017) shared MOOC videos, exercises, and voices related to the course through Rain Classroom, forming a teaching model of pre-class preparation, in-class teaching, and post-class review.

Chang Wei (2021) constructed a mobile learning model suitable for students' mobile learning environment characteristics and teaching content through teaching app and related English learning platforms. This model emphasizes the necessity of teachers' intervention in learning content and learning environment, by having teachers publish important learning content online or guide students to independently choose digital resources in learning apps according to their own circumstances.

Wang Jinguo (2022) believes that online resource development includes micro-videos that carry the core content of teaching, as well as auxiliary teaching resources such as learning tasks related to teaching activities, teaching interaction activities, and learning effect evaluation.

Hu Zhiwei (2023) believes that mobile learning refers to the process of further and in-depth expansion of digital learning with the help of multimedia, Internet, wireless communication, computer network and other technologies and mobile communication equipment. It can provide massive information services and learning resources to break the limitations of traditional factors such as time and space on learners' learning anytime and anywhere, and also help to achieve two-way interaction between learners and educators. The advantages of mobile learning are to innovate teaching models, promote educational reforms, and improve the assessment system.

Zhang Tianxin (2023) believes that mobile learning supported by network mobile devices provides English learners with rich and diverse learning resources that keep pace with the times, including vivid and interesting learning resources such as pictures, voice, and short videos. In particular, the original sound reproduction of classic film and television clips or theme scenes on the app enhances the learning experience.

Liu Yingyi and Yuan Ze (2023) believe that online learning resources can not only support learning activities, but also provide learners with a variety of learning content, such as audio, video, graphics, interactive questions and answers, etc. With the rapid development of informatization and the Internet, new forms of various online resource platforms are becoming increasingly powerful, the number of digital images and digital videos is huge, and cloud storage and cloud sharing methods have also made it easier to obtain remote resources.

Xiao Hong and Liu Linhua (2023) believe that mobile teaching resources uploaded to mobile learning platforms, such as videos, audio, cases, exercises, PPT courseware, etc., make the originally monotonous book knowledge presented in a

variety of forms, and students can choose learning resources on demand to meet the needs of personalized learning.

Table 2.4 Teaching resources for mobile learning

Elements / Researcher	Multimedia Resources	Online Courses	Digital Learning Materials
Pu Qingping, et al. (2016)	•	•	•
Yang Fang, et al. (2017)	•	•	•
Chang Wei. (2021)	•	•	•
Wang Jinguo. (2022)	•	•	•
Hu Zhiwei. (2023)	•	•	•
Zhang Tianxin. (2023)	•	•	•
Liu Yingyi, et al. (2023)	•	•	•
Xiao Hong, et al. (2023)	•		•
Total	**8**	**7**	**8**

2.5 Evaluation Feedback

Adewale Adesina, et al. (2014) believes that computer-based process evaluation systems and online evaluation driven by peer evaluation can help students conduct independent learning and improve learning performance.

Yang Fang, et al. (2017) used the powerful interactive function of Rain Classroom to ensure that every teaching stage (pre-class, in-class, post-class) can be interactive in real time, and collected all students' learning behavior data to help teachers quantify the learning effect and grasp the learning trajectory, so as to adjust the teaching progress and focus in time and better achieve the integration of teaching and learning.

Wang Jinguo (2022) believes that teachers should promptly remind students to complete their stage learning tasks on time through learning tools and chat tools. In addition, they should use platform data to conduct statistical analysis on students' completion of homework, participation in discussions, etc.

Zhang Tianxin (2023) proposed that we should be good at using the combination of intelligent evaluation of mobile learning app and teacher evaluation to assess students' ability level in stages from all aspects of students and teach students in accordance with their aptitude in a targeted manner. Mobile learning is combined with traditional learning methods, which can take into account multiple

evaluation methods such as student self-evaluation, teacher self-evaluation, intelligent evaluation and student mutual evaluation.

Jiang Shu, et al. (2023) believe that homework can be posted through Super Star Learning app, and evaluated by mutual evaluation between teachers and students and peers. This evaluation method is fair evaluation based on reference answers, which can enable students to establish a learning concept of learning from others and create a learning community. Through a questionnaire survey of students, the results show that most students have deepened their understanding and absorption of knowledge through peer evaluation, and students' sense of self-achievement has been greatly improved.

Table 2.5 Teaching evaluation for mobile learning

Elements / Researcher	Student Self-Assessment	Peer Assessment	Teacher Evaluation
Adewale Adesina. (2014)		•	•
Yang Fang, et al. (2017)	•		•
Wang Jinguo. (2022)	•		•
Zhang Tianxin. (2023)	•	•	•
Jiang Shu, et al. (2023)	•	•	•
Total	**4**	**3**	**5**

Model study on the integration of mobile information technology and curriculum

The most widely used technology integration models are TPACK (Technological Pedagogical Content Knowledge) model and SAMR (Substitution Augmentation Modification Redefinition) model. TPACK focuses on the interactive relationship between technology, teaching and subject content, while SAMR focuses on the appropriate selection, application and evaluation of technology in the teaching process. In addition, there are also the BOPPPS teaching model based on constructivism, the APT (Assessment Pedagogy Technology) teaching model, and so on.

1. BOPPPS model

Lü Ning (2021) believes that the BOPPPS teaching model is centered on participatory learning, which requires teachers to adopt a variety of interactive methods to achieve communication between teachers and students, and the Super Star Learning happens to have a variety of interactive forms. Therefore, a BOPPPS model based on Super Star Learning was constructed and implemented in an undergraduate college in Nanning. Relevant course materials were uploaded and learning tasks were released before class. During class, a variety of teaching means or teaching methods (such as real-time interactive answering and discussion) were adopted to lead students to actively participate in classroom teaching activities. After class, students summarized knowledge and teachers evaluated. Practice has shown that this model can improve students' subjective initiative in learning, liven up the classroom atmosphere, enhance the interactive communication between teachers and students, and improve the teaching quality of the course.

Gao Yuan, et al. (2021) constructed six links on the mobile teaching platform based on the WeChat official account and the BOPPPS teaching model as the concept, and applied it at the School of Medical Information Engineering of Chengdu University of Traditional Chinese Medicine. The teaching model is implemented in three stages: before class, during class, and after class. Before class: through the "task distribution" function, the course knowledge introduction materials and teaching objectives are pushed to students online before class to stimulate students' interest. During class: the "group discussion" and "classroom practice" functions are activated, driven by problems and solutions, and the flipped classroom format is appropriately introduced to carry out classroom teaching in the form of student-student interaction and teacher-student interaction, so as to strengthen students' deep participation in the classroom learning process. After class: enable the "class portrait" function, and summarize the students' learning situation with star ratings and five-dimensional radar views according to the degree and effect of students' participation in each link, as a basis for teaching feedback and teaching evaluation.

Ren Haoyuan, et al. (2022) matched the teaching material sharing function, exercise test function, teaching interaction function, process incentive and evaluation function, and learning information statistics function of the Xuetangx APP with the closed-loop teaching process of the BOPPPS model, constructed the Xuetangx + BOPPPS model of practical training teaching mode, and applied it to the audit comprehensive simulation training course. The results show that this model can

effectively stimulate students' enthusiasm for participating in practical training teaching and improve the efficiency and effect of practical training teaching.

Le shuai, et al. (2024) built a new online and offline hybrid teaching model by integrating the online interactive teaching platform of Rain Classroom and the short video teaching resources of micro-classes under the BOPPPS teaching model. The model was implemented in three stages: before class, during class, and after class. In the pre-class stage, a virtual class was established through Rain Classroom, and the PPT, micro-class videos, and pre-class exercises used in the class were pushed two days in advance for students to preview. During class, a participatory teaching method was adopted, which was student-centered. Through the real-time answering and bullet comments interaction functions of Rain Classroom, the classroom learning atmosphere was activated to achieve the effect of interactive learning between teachers and students. After class, timely guidance and question-answering were provided through Rain Classroom to help students review and improve their independent learning and dialectical thinking abilities. The results show that the BOPPPS teaching model based on Rain Classroom and micro-classes significantly improved students' learning interest and classroom participation, and also improved students' grades.

Table 2.6 Application of BOPPPS model combined with mobile learning in teaching

Elements \ Researcher		Lü Ning (2021)	Gao Yuan, et al. (2021)	Ren Hao, et al. (2022)	Le Shuai, et al. (2024)	Total
Technical Support	Mobile Terminal Technology	●	●	●	●	4
	Wireless Communication Technology	●	●	●	●	4
	Mobile Application Software	●	●	●	●	4
Learning Environment	Contextual Learning	●	●	●	●	4
	Collaborative Learning	●	●	●	●	4
	Personalized Learning	●	●	●	●	4
Instructional Design	Pre-class Preparation	●	●	●	●	4
	Classroom Interaction	●	●	●	●	4
	Post-class Extension	●	●	●	●	4
Teaching Resources	Multimedia Resources	●	●	●	●	4
	Online Courses	●			●	2
	Digital Learning Materials	●	●	●	●	4
Evaluation Feedback	Student Self-Assessment	●	●	●	●	4
	Peer Assessment	●			●	2
	Mobile Terminal Technology	●	●	●	●	4

2. SAMR Model

He Yan and Liu Ping (2020) conducted an empirical study on college English mobile learning based on the SAMR model, and used software to analyze the impact of each integration level on learning strategies and learning effects. The experiment shows that according to the different integration levels of the SAMR model, targeted technical reinforcement in teaching can make learners' learning strategies and learning effects have a certain degree of difference. High-level technical integration methods can have a more positive impact on learning strategies and learning effects.

Zhou Xiao (2020) believes that the MosoInk Cloud Class app can realize the combination of online and offline teaching in a mobile environment, which is a new model of interactive teaching. Teachers should actively and adeptly use emerging information technologies, especially mobile teaching platforms to assist teaching. Based on the SAMR model theory, exploring the teaching path of MosoInk Cloud Class app in vocational colleges can promote teacher-student interaction and collaborative inquiry learning. The teaching mode is divided into three stages: before class, during class, and after class. In the pre-class stage, it is used to push information resources for learners to preview. Before class, "group work", "in-class tests", "brainstorming" and other activities are carried out from time to time to facilitate the implementation of multiple evaluations of learners. During class, the platform can be used for communication and discussion, answering questions and assigning homework. Practice has proved that using the MosoInk Cloud Class in the classroom can improve students' interest in learning, promote communication and interaction between teachers and students, and students and students, and realize the whole process evaluation of students' learning data.

Zhang Xianyao, et al. (2022) summarized the general paradigm of geography virtual practice teaching, namely virtual reality, reorganized classroom, virtual inspection, and practical expansion, and proposed the SAMR-GE integration to carry out geography virtual practice teaching. Google Earth 3D technology allows students to conduct immersive and interactive learning, achieve learning advancement in the item-by-item solution of task situations, and realize the transformation from shallow learning to deep learning.

He Yan and He Peifen (2022) applied SAMR model to address the issues of inappropriate technological choice, inflexible integration and low efficiency in the current intelligent mobile learning of higher vocational courses. They grasped the teaching links from the "whole process", based on knowledge and ability, focused on the core literacy of higher vocational students such as professional ability, method

ability and social ability, reconstructed the teaching objectives of higher vocational courses, and optimized teaching activities. The research results show that the higher vocational college course teaching using smart mobile terminals under the SAMR model has a significant promoting effect on the cultivation of higher vocational college students in the four ability dimensions of knowledge, occupation, method and society.

Zou Cuiying and Gong Wei (2023) believe that the SAMR model dynamically describes the process of integration of information technology and education as a linear system from bottom to top and from low to high. Based on the SAMR model, a mobile technology-assisted college English teaching model is designed and teaching practice is carried out. The model takes offline classroom teaching as the main approach and online self-learning as the secondary approach. This arrangement makes full use of mobile devices, mainly smartphones, to assist classroom teaching, improve classroom teaching efficiency, improve teaching results, and promote interaction between teachers and students, and between students.

Wang Qiuge and Zhang Bo (2024) tried to build a mobile learning model for physics courses based on mobile devices under the SAMR model. In the construction of the mobile learning model, they tried to focus on three stages (before, during and after class), and pay attention to the "six steps" of physics classroom implementation, namely: introduction, thinking, cooperation, display, comment and testing. In this way, the "three goals" of physics course knowledge, skills and education can be achieved. The SAMR model is used to evaluate and reflect on the technical integration level of the "three stages", "six steps" and "three goals" of the physics classroom. It is concluded that the SAMR model makes physics mobile learning conform to the theoretical characteristics of constructivism and humanism, forming a new paradigm of real-time, efficient and flexible mobile learning in the Internet technology environment, and creating an online and offline hybrid mobile learning model with teacher-student interaction.

Table 2.7 The application of SAMR model combined with mobile learning in teaching

Elements \ Researcher		He Yan, et al. (2020)	Zhou Xiao (2020)	Zhang Xianya, et al. (2022)	He Yan, et al. (2022)	Zou Cuiying, et al. (2023)	Wang Qiuge, et al. (2024)	Total
Technical Support	Mobile Terminal Technology	●	●	●	●	●	●	6
	Wireless Communication Technology	●	●	●	●	●	●	6
	Mobile Application Software	●	●	●	●	●	●	6
Learning Environment	Contextual Learning	●	●	●	●		●	5
	Collaborative Learning	●	●	●	●	●	●	6
	Personalized Learning		●	●	●	●	●	5
Instructional Design	Pre-class Preparation	●	●	●	●	●	●	6
	Classroom Interaction	●	●	●	●	●	●	6
	Post-class Extension	●	●	●	●	●	●	6
Teaching Resources	Multimedia Resources	●	●	●	●	●	●	6
	Online Courses	●	●		●	●		4
	Digital Learning Materials		●	●	●	●		4
Evaluation Feedback	Student Self-Assessment	●	●		●			3
	Peer Assessment		●		●		●	3
	Teacher Evaluation	●	●	●	●	●	●	4

3. TPACK Model

Zhao Yuqin and Huang Hefei (2020) studied the TPACK model, reconstructed teaching from three aspects: teaching mode, teaching resources and teaching strategy, and designed a mobile teaching mode based on the TPACK model. This model changes the original teaching mode from "task" driven to "problem-based learning" (PBL) to cultivate students' problem-solving ability. In the early stage of completing thematic assignments, the team-based learning (TBL) model is introduced to help students with weak foundation and learning ability to get into thematic assignments as soon as possible. In the later stage of the course, for students with strong learning ability and good learning effect, the research-based learning (RBL) model is introduced in combination with the teacher's scientific research, focusing on student-centeredness and introducing different teaching modes according to different individual students.

Li Jiaojiao (2023) designed the course teaching from three aspects, namely, course teaching content, course teaching methods and course teaching evaluation, based on the TPACK competency framework, and used the online teaching platform to teach in a combination of online and offline methods. The main steps are to use the statistics course built on the online teaching platform of Shanxi Institute of Energy in the pre-class stage to upload PPT, teaching data, teaching cases and other course materials in advance. In class, topics are posted and students are interacted with using the Super Star Learning app. After class, in-class assignments are posted to test students' learning outcomes. Through the students' pre-class preparation, the students' participation in discussions during class and the answers to the homework after class, students' problems can be discovered in a timely manner and tutored, so that students can participate more actively in teaching activities and become the main body of teaching activities.

Gong Di (2024) believes that TPACK refers to a model that deeply integrates teaching content, teaching methods and technology to optimize knowledge representation and improve teaching effectiveness. Based on the relevant research on TPACK, its analysis dimensions are refined to analyze the review class. When designing the teaching links before, during and after class, the digital learning platform is used to collect and analyze individual student data to help students perceive, understand, internalize and transfer knowledge, thereby improving the effectiveness of teaching.

Cai Lijiao (2024) based on the TPACK theoretical framework, starting from the three dimensions of TCK, TPK and PCK, proposed research on hybrid teaching model

of ideological and political education under the TPACK framework. The digital teaching process is mainly conducted through the Rain Classroom app, which is divided into three stages: before class, during class, and after class. Before class, the Rain Classroom is equipped with multimedia materials such as courseware, micro videos and so on, and the situation instruction is used in order to stimulate the emotional experience of students. During class, teachers need to innovate teaching methods, enrich classroom teaching forms, and encourage students to naturally enter the classroom learning link. After class, the task-driven method is mainly used to achieve classroom knowledge improvement by expanding task completion. Practice shows that 83% of students reported that the application of the TPACK model integrated with digital technology and smart tool apps has effectively improved their enthusiasm for learning inside and outside the class, made the teaching model more dynamic, and promoted the occurrence of deep learning.

Table 2.8 Application of TPACK model combined with mobile learning in teaching

Elements \ Researcher		Zhao Yuqin, et al. (2020)	Li Jiaojiao (2023)	Gong Di (2022)	Cai Lijiao (2024)	Total
Technical Support	Mobile Terminal Technology	●	●	●	●	4
	Wireless Communication Technology	●	●	●	●	4
	Mobile Application Software	●	●	●	●	4
Learning Environment	Contextual Learning	●	●		●	3
	Collaborative Learning	●	●	●	●	4
	Personalized Learning	●	●	●	●	4
Instructional Design	Pre-class Preparation	●	●	●	●	4
	Classroom Interaction	●	●	●	●	4
	Post-class Extension	●	●	●	●	4
Teaching Resources	Multimedia Resources	●	●	●	●	4
	Online Courses	●	●		●	3
	Digital Learning Materials	●	●		●	3

Table 2.8 (Continued)

Elements	Researcher	Zhao Yuqin, et al. (2020)	Li Jiaojiao (2023)	Gong Di (2022)	Cai Lijiao (2024)	Total
Evaluation Feedback	Student Self-Assessment	●	●	●	●	4
	Peer Assessment	●	●		●	3
	Mobile Terminal Technology	●	●	●	●	4

4. APT Model

Zhang Yi, et al. (2016) proposed an evaluation-based teaching model that integrates assessment, pedagogy, and technology, and conducted empirical research in primary school mathematics classes. The teaching design is to group students before class and guide them to study on their own. In class, all kinds of teaching methods such as situational teaching, cooperative learning, and research-based learning are used, and a variety of apps such as Keynote, iBooks, and iTeach are selected to support teaching. After class, each group will make a presentation report, and the teacher will organize students to conduct peer evaluation and personal self-evaluation around the evaluation scale. Meanwhile, the teacher will score the students' task completion and integrate multiple evaluation methods to evaluate the students.

Liu Dandan and Guo Peng (2019) constructed the APT model in the teaching of the "College Physics Experiment" course, using various forms of technical means such as WJX and Rain Classroom to carry out diversified teaching. The learning strategies are based on experimental content learning, exploratory learning, autonomous learning, and innovative learning. The evaluation methods mainly adopt self-evaluation, peer evaluation and teacher evaluation. According to the experimental content, the design of course evaluation is mainly pre-class evaluation, evaluation during teaching and cloud platform or (MOOC) online diversified evaluation.

Yang Ying and Wu Jun (2021) believe that the APT teaching model is a teaching framework constructed by determining the course objectives, and then providing path support, technical assurance, and evaluation tools. These three elements interact with each other to form the framework. The evaluation means

(Assessment) uses a combination of quantitative and qualitative evaluation ways to refine the standards and jointly construct a knowledge system in the interaction between teachers and students. The teaching method (Pedagogy) focuses on matching appropriate teaching methods and promoting in-depth teaching. Technical tools (Technology) are generally information technology hardware resources used for teaching, including interactive electronic whiteboards, mobile learning terminal devices, etc., and software resources include teaching demonstration tools, information retrieval tools, etc. Based on the above three points, the APT model was designed from the perspective of mathematics, enriching the practice of the APT model.

Sun Yunfang (2023) believes that to build a junior high school English smart classroom using the APT teaching model, we must first analyze the learners and the learning content, and then build a complete teaching model for implementation. Specifically, students should watch micro-class video courseware before class to conduct pre-class preparation. During class, we should innovatively use the information learning platform to conduct classroom exercises, activate the English classroom teaching atmosphere, and inspire students' thinking. It is necessary to enhance the teaching assessment after class, so as to guarantee the quality and efficiency of the English class in junior high school.

Table 2.9 Application of APT model combined with mobile learning in teaching

Elements	Researcher	Zhang Yi, et al. (2020)	Liu Danda, et al. (2023)	Yang Ying, et al. (2022)	Sun Yunfang (2024)	Total
Technical Support	Mobile Terminal Technology	•	•	•	•	4
	Wireless Communication Technology	•	•	•	•	4
	Mobile Application Software	•	•	•	•	4
Learning Environment	Contextual Learning	•	•		•	3
	Collaborative Learning	•	•	•	•	4
	Personalized Learning	•	•	•	•	4
Instructional Design	Pre-class Preparation	•	•	•	•	4
	Classroom Interaction	•	•	•	•	4
	Post-class Extension	•	•	•	•	4
Teaching Resources	Multimedia Resources	•	•	•	•	4
	Online Courses		•	•		2
	Digital Learning Materials	•	•	•		3
Evaluation Feedback	Student Self-Assessment	•	•	•	•	4
	Peer Assessment	•	•			2
	Mobile Terminal Technology	•	•	•	•	4

Research on the integration of ideological and political education teaching and mobile learning

Liang Chao (2012) believes that the advantages of m-learning are that learning can be done anytime and anywhere, teachers and students can interact and negotiate, and learners' learning records can be used to form data for feedback. To this end, it is proposed that m-learning can be adopted to solve problems such as collaboration and evaluation in the teaching of ideological and political courses. The specific operation is to divide the teaching activity design into three parts: teaching activity analysis, teaching activity organization and implementation, and teaching activity evaluation. The teaching activity analysis part mainly includes the needs of the activity and possible problems. The teaching activity organization and implementation mainly completes the organization method, environment construction and process of the activity. The teaching activity evaluation mainly focuses on the evaluation of the effect of the teaching activity.

Du Yi (2014) combined with the current ideological and political education situation in colleges in my country, proposed the idea of carrying out ideological and political education in colleges based on the "mobile learning" model, and provided relevant suggestions. For example, teachers interact with students in a "one-to-one", "one-to-many" or "many-to-many" manner through the mobile learning platform, share courseware and answer questions, create an interactive learning atmosphere, and stimulate students' subject consciousness and learning interest.

Around a scientific analysis of the ideological and political education system, Niu Yan (2019) proposed a mobile learning model of ideological and political education in colleges with "three-dimensional interaction" of classroom ideological and political education, daily ideological and political education, and propaganda ideological and political education. This model is supported by mobile devices to serve the course planning, content design, task drive, and teaching feedback of ideological and political education courses. It is a kind of talented person training mode, which integrates the classroom teaching with the extracurricular study seamlessly, and has highly personalized and interactive characteristics.

Zou Jingsi (2019) proposed to learn from the experience of the construction on Xuexi Qiangguo app and enhance the design framework for the construction of the ideological and political online platform in colleges. This can enrich the

traditional teaching model, activate the content of political teaching, expand the amount of information in classroom teaching, enhance the attractiveness of ideological and political education in colleges and universities, and promote students' learning initiative and interest.

Hao Jiajing (2020) believes that the content advantages of the Xuexi Qiangguo platform is reflected in clear officiality, distinct political nature, prominent ideological nature, and clear educational nature. The resources on the platform are rich and presented in a vivid way, so it has the function of conveying ideological and political education information to people.

Jin Lei (2021) believes that the information resources on the Xuexi Qiangguo platform are authoritative, professional, and political, which helps to improve the ideological and political quality and ideological and moral quality of college students. These resources can be transformed into learning resources and presented to learners in the form of pictures, texts, audio, and videos. In addition, the Xuexi Qiangguo app has functions such as chat, calls, and video conferencing, which promotes sharing and discussion of learning content between teachers and students, and among students, and autonomous learning of students in college.

Wang Yongming and Li Xujuan (2020) proposed to apply the hybrid teaching mode on basis of smartphone apps to the teaching of ideological and political courses. This mode integrates digital teaching methods with traditional classroom teaching to realize a new online and offline hybrid teaching mode, which is conducive to building a learning community of teachers and students in ideological and political courses. With the help of smartphone apps, students can express themselves boldly in a virtual environment, and teachers will share and discuss with their classmates to promote equal interactive learning between teachers and students, and among students. They took the teaching applying MosoInk Cloud Class in Qiqihar University as an example, and carried out online theoretical teaching and tutoring and answering questions based on the MosoInk Cloud Class app, and carried out various teaching activities with the help of study groups in offline classroom teaching. The practice provides a new thought for the reform of ideological and political teaching.

Du Xingbo and Song Hua (2022) believe that based on the Padagogy wheel model, the design of high school ideological and political teaching should focus on cultivating students' "political identity" literacy, and divide the entire teaching process into three parts: pre-class preparation, in-class learning, and post-class reflection. In the pre-class stage, students conduct independent pre-class learning based on textbooks and the Internet. In the in-class stage, teachers should require students to learn through classroom content and conduct relevant interactive activities on the online teaching platform. In the post-class stage, teachers should require students to deepen their cognition and deepen their recognition of knowledge through online exercises and offline practical activities. Practice has proved that teaching links and teaching activities designed based on the Padagogy wheel model can better stimulate the learning willingness of contemporary high school students.

Li Gang (2023) believes that under the influence of modern IT, college ideological and political education can use powerful technical advantages of Internet technology and combine cutting-edge scientific and technological ways to transform the educational time and space from the original classroom and class hours to a situation that is not bound by any time and space. Educators can use VR, AI, big data, cloud classrooms and other technical means, combined with the cognitive laws, development characteristics, and actual learning conditions of contemporary college students to change the traditional teacher-centered and passive learning education model.

Yan Weikai (2023) believes that teachers of ideological and political courses must pay close attention to social reality issues, combine virtual reality technology, use micro-courses, MOOC, flipped classrooms and other models, adopt case teaching, scenario simulation, topic discussion and other diversified means to promote the affinity of ideological and political courses and promote the change of classroom teaching mode from one-way indoctrination to two-way interaction.

Li Lihua and Qiu Chunrong (2023) introduced three external factors: mobile teaching organization, mobile learning resources and mobile learning platform, which included 10 external variables such as teaching objectives, teaching implementation, teaching interaction, teaching evaluation, learning content, learning media, learning situation, mobile devices, mobile software, and mobile network. They designed the TAM (TAM, Technology Acceptance Model) mobile learning model and carried out

mobile teaching design, mobile learning resource construction and mobile teaching practice in ideological and political courses. The statistical results show that the TAM mobile learning model of ideological and political courses has a high degree of recognition and effectiveness among students.

Ma Haiyan and Lv Ying (2024) used Internet technology with distinctive characteristics such as openness, interactivity and equality to innovate ideological and political education and teaching. For example, teachers of ideological and political education courses in colleges and universities can use platforms such as DingTalk, Tiktok, WeChat, and Weibo to share classroom knowledge and content such as Chinese traditional culture and revolutionary culture with students. Meanwhile, the emergence of Internet technology has spawned online education carriers such as MOOC, cloud classrooms, distance learning, and Super Star Learning. Educators can use online platforms to answer students' questions, and students can also communicate directly with teachers through various platforms, enabling teachers and students to break through time and space for interactive communication, which promotes learners' learning efficiency.

Table 2.10 Application of ideological and political education courses combined with mobile learning in teaching

Elements \ Researcher		Liang Chao (2012)	Du Yi (2014)	Niu Yan (2019)	Zou Jingsi (2019)	Hao Jiajing (2020)	Jin Lei (2021)	Wang Yongming, et al. (2020)	Li Gang (2023)	Yan Weikai (2023)	Li Lihua, et al. (2023)	Ma Haiyan, et al. (2024)	total
Technical Support	Mobile Terminal Technology	●	●	●	●	●	●	●	●	●	●	●	11
	Wireless Communication Technology	●	●	●	●	●	●	●	●	●	●	●	11
	Mobile Application Software	●	●	●	●	●	●	●	●	●	●	●	11
Learning Environment	Contextual Learning	●	●	●	●	●	●	●	●	●	●	●	10
	Collaborative Learning	●	●	●	●	●	●	●	●	●	●	●	10
	Personalized Learning	●	●	●	●	●	●	●	●	●	●	●	11
Instructional Design	Pre-class Preparation	●	●	●	●	●	●	●	●	●	●	●	10
	Classroom Interaction	●	●	●	●	●	●	●	●	●	●	●	10
	Post-class Extension	●	●	●	●	●	●	●	●	●	●	●	10
Teaching	Multimedia Resources	●	●	●	●	●	●	●	●	●	●	●	11
	Online Courses	●	●	●	●	●	●	●	●	●	●	●	10

Table 2.10 (Continued)

Elements	Researcher	Liang Chao (2012)	Du Yi (2014)	Niu Yan (2019)	Zou Jingsi (2019)	Hao Jiajing (2020)	Jin Lei (2021)	Wang Yongming, et al. (2020)	Li Gang (2023)	Yan Weikai (2023)	Li Lihua, et al. (2023)	Ma Haiyan, et al. (2024)	total
Resources	Digital Learning Materials	●	●	●	●	●	●	●	●	●	●	●	11
Evaluation Feedback	Student Self-Assessment	●	●	●	●	●	●	●	●	●	●	●	10
	Peer Assessment	●	●	●	●	●	●	●	●	●	●	●	8
	Teacher Evaluation	●	●	●	●	●	●	●	●	●	●	●	11

Related basic theories

Looking at the literature, researchers believe that the theoretical basis of mobile learning is different according to the different research and application directions of mobile learning.

Ye Chenglin and Xu Fuyin (2004) believe that the theoretical basis of mobile learning is closely related to learning theories such as informal learning, situational learning, contextual learning, action learning, and experiential learning. On one hand, these new learning theories provide a theoretical basis for mobile learning practice. On the other hand, mobile learning provides technical means and methods for the application of these learning theories in practice.

Ye Chenglin and Xu Fuyin (2004) believe that mobile learning theory has close relationship with context learning, situational learning, action learning, informal learning and experiential learning. On the other hand, the new learning theory provides the theory foundation for mobile learning. On the other hand, m-learning provides technical ways to apply these learning theories in practice.

Keskin and Metcalf (2011) sorted out the research literature on m-learning in all kinds of fields including enterprises, universities, and the military from the perspective of mobile learning theory, and listed theories and research related to mobile learning, including behaviorism, cognitivism, constructivism, context-aware learning, collaborative learning, conversational learning, lifelong learning, informal learning, as well as social and cultural theory, activity theory, etc., and combined with practical projects, sorted out the key elements of m-learning implementation concerned by each learning theory and the mobile technology it mainly relies on.

Jing Feilong and Qin Jie (2019) further analyzed the references and found that the theories associated with the hot topic of "Mobile Learning" include behaviorism, constructivism, contextual learning, informal learning and collaborative learning from the perspective of education, as well as structuralism, social cognition, conversation theory and activity theory from the perspective of linguistics.

Zhang Jingxin (2019) believes that the theoretical basis of mobile learning mainly includes constructivism learning theory, activity theory, dual coding theory, cognitive learning theory, and situational cognitive learning theory.

Yu Yan and Zhu Pengwei (2020) believe that mobile learning is the application of multimedia communication technology in education and teaching. This

learning model is closely related to informal learning and multi-intelligence theory, and its practice is guided by these theories.

Guo Dan and Zhang Qian (2021) believe that mobile learning is learner-centered, using mobile devices to present learning materials, and teacher-student interaction throughout the entire teaching process, and can conduct process evaluation and feedback, which can promote students' independent learning, promote students' learning and problem-solving effects. Therefore, the mobile learning teaching model is based on behaviorism, cognitivism and constructivism. This teaching model can improve students' innovation, criticism, thinking, communication and negotiation, problem-solving and other abilities, and cultivate application-oriented talents with high-level thinking, practical qualities and skills.

Song Xiaoe (2022) believes that teachers can quickly integrate learning resources and enrich the English teaching model outside the classroom by using the app mobile learning platform. The theoretical basis for the combination of smartphone app mobile learning and high school English teaching mainly includes informal learning theory, situational cognition and learning theory, constructivist learning theory, micro-learning theory, etc. Informal learning theory reflects that mobile learning can fully mobilize the fragmented time outside of formal classroom learning, making the time, place and method of learning more flexible. Situational cognition and learning theory reflect that smartphones can provide various information-based visual scenarios, allowing knowledge to be absorbed by learners in an interactive form. Constructivist learning theory emphasizes students' subjective initiative and gives students the choice and control. Micro-learning theory emphasizes flexible and autonomous choices, and the diversity of micro-learning methods can provide more inspiration for English teaching.

Summary: Although different scholars have proposed different theoretical foundations based on different application directions of mobile learning or their own research directions. However, looking at the research literature and works on the integration of information technology and curriculum, constructivism is an important theoretical foundation that Chinese scholars unanimously agree on. Constructivism advocated by the Chinese educational technology community focuses more on the internal construction of cognition, that is, the Chinese interpretation of ideas represented by Jonassen and Piaget. This study attempts to integrate mobile

terminal technology, wireless communication technology, mobile Internet technology and ideological and political courses to create an information-based teaching environment and realize a teaching method that can both play the leading role of teachers and fully reflect the subject status of students. To this end, this study attempts to use constructivist learning theory and symbolic interaction theory as the theoretical basis for the mobile interactive teaching model.

1. Constructivist learning theory

Definition

The constructivist learning theory was first proposed by Jean Piaget, the most influential Swiss psychologist in the field of cognitive development, and later gradually became the mainstream educational theory. Other representatives of this theory include Bruner and others. In their view, constructivist learning is the process of creating meaning and building understanding on the basis of prior knowledge and experience.

According to Piaget, knowledge comes from the effective and continuous construction between subject and object. It comes neither from the subject nor from the object, which means that everyone has their own understanding of the same knowledge. According to constructivist learning theory, knowledge does not come from teachers' teaching, but comes from others' help, learning resources and meaning construction. The key point of the constructivist learning theory should be student-centered and focus on students' active exploration, discovery, and construction of knowledge.

He Kekang (2008) thinks that under the guidance of constructivism, a new and more effective theory of cognition learning can be formed, and on this basis, a relatively ideal constructivist learning environment can be achieved. Constructivism provides sufficient theoretical support for the integration of IT and curriculum from the perspective of the meaning of learning and the four elements of the learning environment: collaboration, context, conversation, and meaning construction.

According to Yu Shengquan (2007), the learning process of constructivism is a process of actively constructing cognitive thinking, and it is also a process of acquiring and building new knowledge by interacting with the outside environment. Knowledge is not transmitted from outside to memory by teachers, but is obtained in a specific

context, which is social and cultural background, with the help of other auxiliary ways, adopting necessary learning materials, and through meaning construction.

Application of constructivism learning theory in teaching

Wang Yuan and Li Xiuling (2017) used WeChat app to design micro-mobile courses for college physical education based on the perspective of constructivist learning theory. The principles are student-centered, situational teaching as a platform, collaborative learning as the main body, and full use of various information resources. The teaching model is divided into four stages: the first is the teacher's pre-class preparation stage, the second is the classroom teaching control stage, the third is the extracurricular WeChat learning stage, and the fourth is the evaluation and feedback stage.

Mou Hongwei (2017) believes that constructivist theory provides a theoretical basis for the implementation of mobile learning, and mobile learning also supports the implementation of constructivist theory. Both have the characteristics of informal learning and emphasize situational learning. Vocational English mobile learning based on constructivist theory should achieve five points: first, analyze learners' needs; second, clarify teaching objectives; third, find appropriate teaching strategies; fourth, use wireless networks to connect rich teaching resources; fifth, use the MosoInk Cloud Class app to implement teaching.

Sun Xiaoyan (2020) conducted a survey on the use of smartphones for English mobile learning by non-English majors in three undergraduate colleges through questionnaires, student seminars and teacher interviews. The qualitative analysis was combined with quantitative analysis to explore how to effectively integrate smartphones into college English teaching. The study shows that English teachers need to think not only about how to help students choose appropriate English mobile learning resources, but more importantly, how to creatively integrate these resources into English teaching activities.

Hu Xiaohua (2023) believes that constructivism proposes that four elements (collaboration, context, meaning construction, and conversation) together constitute the environment of learning activities. On basis of the constructivist learning theory, the goal design, task design and evaluation design of mobile learning activities are explored, and the types of m-learning activities are split and reorganized. The mobile

learning activity design can be organically integrated with classroom teaching activities, thereby realizing the creative reconstruction of personal knowledge system.

Wu Tianyu (2019) believes that mobile learning based on smartphones can integrate a variety of media information, and has the advantages of a large number of learning resources, rich learning situations, and learning anytime and anywhere. Guided by constructivist theory, it attempts to use the powerful interactive functions of smartphones to explore the interactive French language mobile learning model based on smartphones, providing learners with a more vivid, real and efficient learning environment.

Xie Yajun (2015) believes that constructivism emphasizes that learners construct their own new knowledge in the process of interaction with the environment. Teachers use mobile teaching to create a knowledge construction environment, support team collaborative learning and information exchange, and promote learners' learning effects. To this end, he designed an English teaching model which conforms to mobile learning around constructivist learning theory. This model emphasizes student-centeredness, the use of mobile platforms to construct new knowledge character contexts, and advocates the unity of autonomous learning and collaborative learning.

The implications of constructivist learning theory for this study

Table 2.11 The relationship between the MIT model and constructivist learning theory

Relation / Stage	MIT model	Constructivist learning theory
Pre-class	Teachers use Rain Classrom, Xuetangx, WeChat and other platforms to release learning materials in advance, and students learn independently.	The process in which students actively construct knowledge, and by constructing a model of communication between each other, they propose new ideas or concepts and learn new knowledge.

Table 2.11 (Continued)

Relation / Stage	MIT model	Constructivist learning theory
During Class	Under the guidance of teachers, students participate in classroom learning activities, including discussions on knowledge, group learning, personalized guidance for students, and in-class tests.	Adhering to the student-centered concept, teachers should transform from knowledge transmitters to help students actively construct meaning, helping and promoting students to construct new knowledge.
Post-class	Students conduct independent research and study after class, complete homework through group discussions, etc.	Learning apps such as Rain Classrom and Xuetangx have become tools for creating scenarios for collaborative learning and interactive communication, which has increased students' interest in learning and promoted their active learning.
Goal	Improve learning efficiency and promote knowledge construction, internalization and transfer	Learners can choose to receive knowledge and construct their own knowledge system in a learning environment that suits them, so as to realize the internalization and transfer of knowledge.

2. Symbolic interaction theory

Definition

At present, the "interaction theory" has been defined primarily by economic, sociological, and psychological perspectives. This research is based on the view of social psychology. From the social psychological point of view, the interaction theory usually means "symbolic interactionism". The author of this theory was George Herbert Mead (1934). In Mind Self and Society, he gave a thorough description of the concept, classification and meaning of "symbols". Besides Mead, W.I. Thomas and C.H.

Cooley have also contributed greatly to symbol interaction theory. Subsequently, H.G. Blumer and M. Kuhn developed the Mead's concept of "symbol interactionism".

Application of symbolic interaction theory in teaching

He Yuan and Zhao Yinren (2009) studied the interaction between teachers and students in the classroom from the perspective of semiotics, and made it clear that the focus of education has shifted from instilling knowledge to emphasizing interpersonal interaction. Individuals learn and cognize in the interaction with others, and learning occurs in the process of interpersonal interaction with others.

Kang Xiaomei (2000) believes that the classroom interaction between teachers and students refers to the teaching-oriented activities carried out by teachers and students in the classroom environment, which is a social interaction at the class level and a series of interdependent behavioral processes manifested by the two subjects of teachers and students through classroom teaching activities. Classroom teacher-student interaction is a process in which both teachers and students use symbols to shape knowledge, abilities, emotions, attitudes, and values. Teachers and students are the character symbols of this interactive process.

Liu Bingxian (2014) studied the interactive symbols in the case teaching of ideological and political theory courses in colleges and universities, and analyzed its mechanism of action. In the case teaching field of ideological and political theory courses, teacher symbols, student symbols and text symbols interact with each other through the stimulation-interpretation mechanism. Teacher symbols and student symbols interact with each other through the guidance, regulation-feedback and influence mechanisms, forming a case teaching situation with specific implications.

Zhao Linjie (2018) believes that the teacher-student relationship under "Internet + Education" has new characteristics of equality, freedom, cooperation and mutual assistance based on the symbolic interaction theory. Students and teachers can use Internet technology as a medium to interact in the virtual network world with various symbols with social significance as intermediaries, which is a new type of teacher-student relationship. By reshaping students' concepts, enhancing students' participation awareness, and promoting emotional exchanges between teachers and students, a harmonious and democratic teacher-student relationship can be built.

Zhao Lunfen & Xie Hui (2020) took the symbolic interaction theory as the research perspective, and started from the five dimensions of the interaction subject,

situation, content, emotion and environment of the symbolic interaction research of the network ideological and political education platform to build a multidimensional modeling system of network ideological and political education in colleges and universities. The construction of this system integrates functions such as mobile social software. It organically combines entertainment, learning resources, and teaching interaction. The platform itself is a kind of network interaction ritual. College students use symbols (voice, text, expressions, situations, etc.) to conduct an effective network interaction on the network ideological and political platform, thereby achieving a certain emotional belonging. In addition, the symbolic interaction of the network ideological and political platform is more reflected in the interaction, mutual understanding, and active participation of the behavior subjects.

Chen Zuguo (2021) believes that in the classroom, the identity of the teacher, the teaching content, the teaching media, and the classroom teaching activities as interactive symbols constitute the basic elements of intuitive teaching. The symbolic interaction theory focuses on the generation of teacher-student interaction behavior, the embodiment of the interactive process, and the creation of interactive value. The symbolic interaction theory is integrated into the classroom intuitive teaching, with the purpose of deepening memory and understanding, the key to reducing learning costs, and the core of perfecting visual knowledge. It improves the intuitiveness and fun of classroom teaching, promotes the improvement of the technical content of classroom teaching, and highlights the individual characteristics, which is conducive to the improvement of classroom teaching quality.

Wang Lin and Li Shuanglong (2022) believe that classroom teacher-student interaction is a process in which teachers and students use symbolic media such as textbooks to promote individual socialization of students through interactive communication between teachers and students. In the process of classroom teacher-student interaction, teachers and students use all language and non-verbal behaviors to interact. The language, expressions, actions, and textbook texts used by teachers and students are all the contents of the interaction between the two. The content of these interactions is meaningful only when there is a consistent understanding of the meaning of the situation.

Zhu Hui (2023) believes that classroom interaction is a process in which teachers and students influence and interact with each other with meaningful symbols. The subjects of classroom interaction include teacher-teacher interaction, teacher-student interaction, and student-student interaction. The content of interaction includes knowledge interaction, emotional interaction, and concept interaction. The types of interactive behavior include language interaction and non-verbal interaction. There is a cross-cutting and mutually reinforcing relationship between various forms of interaction. In addition, interaction should be an equal interaction between teachers and students, but the interaction is aimed at student development as the primary purpose. Students will gain knowledge and quality development in the interaction.

The implications of symbolic interaction theory for this study

Table 2.12 The relationship between the MIT model and symbolic interaction theory

Relation / Stage	MIT model	Symbolic interaction theory
Pre-class	Teachers select videos and textbooks that are of interest to college students in advance, integrate them into high-quality digital learning resources, and then upload them to Rain Classrom or Xuetangx and publish relevant topics. After receiving the topics, students can ask their own	Through mobile technology, students can learn independently, and teachers and students, and students can learn from each other and help each other, so as to deepen their understanding of knowledge.

Table 2.12 (Continued)

Relation / Stage	MIT model	Symbolic interaction theory
	questions to teachers, or interact and discuss with other students to create a learning community.	
During Class	Teachers use the powerful interactive functions of Rain Classroom and Xuetangx to ensure real-time interaction between teachers and students, and between students, such as posting exercises and counting the correct rate on the spot, turning on the bullet screen function to liven up the classroom atmosphere and guide students' values in a relaxed and happy learning atmosphere.	The learning process is a process of dialogue, consultation, communication, interaction and mutual assistance between teachers and students, and between students.
Post-class	Teachers assign homework and collect students' learning experiences through Rain Classroom and Xuetangx, communicate and exchange with students, focus on evaluating students' learning process, and provide personalized guidance.	The Rain Classroom and Xuetangx apps help teachers reflect on their teaching after class and test students' abilities. They provide a platform for real-time communication and interaction between teachers and students, and strengthen the concept of interactive theory.

Table 2.12 (Continued)

Relation / Stage	MIT model	Symbolic interaction theory
Goal	Liven up the learning atmosphere through efficient interaction, create certain situations, and let students interact, explore and discover in the situations to help students understand the knowledge	Use mobile tools to facilitate information exchange, communication, and interaction between individuals, guide students to actively think and discuss problems, inspire everyone to engage in exploration and cooperation, and jointly complete the effective construction of knowledge.

Chapter 3
Research Methodology

This research is divided into 3 phases. Different research methods were applied in each research phase.

Phase 1 corresponds to the completion of the first research objective: To study the current status of mobile interactive teaching (MIT) for college ideological and political courses in Guangxi.

Phase 2 corresponds to the completion of the second research objective: To design a mobile interactive teaching (MIT) model for college ideological and political courses in Guangxi.

Phase 3 corresponds to the completion of the third research objective: To evaluate the mobile interactive teaching (MIT) model for college ideological and political courses in Guangxi.

Phase 1: To study the current status of mobile interactive teaching (MIT) for college ideological and political courses in Guangxi

The first phase consists of four steps, as detailed in the framework diagram below.

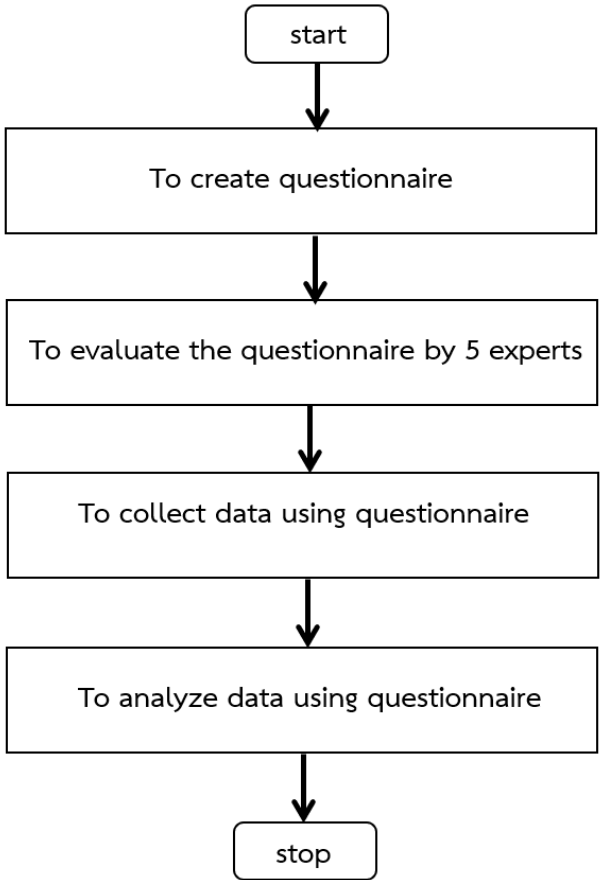

Figure 3.1 Framework diagram of Phase 1

To create questionnaire

Population and sample group: In this step, the population is the teachers engaged in ideological and political education in 8 colleges and universities in Guangxi. The sample group is 120 teachers from 8 colleges and universities in Guangxi.

Sampling method: Convenience sampling was used to deliver questionnaires to the target group through online questionnaire tools (e.g. WJX). This approach increased the validity and purposefulness of the research.

Scoring of the questionnaire: In order to have a comprehensive understanding of the current status of mobile interactive teaching in college ideological and political courses in Guangxi, a questionnaire was designed to cover a variety of aspects, such as demographic information, teachers' attitudes and experiences with mobile interactive teaching software and devices. The questionnaire was scored on a

Likert scale for each question item. Each item is rated on a 5-point scale: 1= Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.

Pilot Testing of the questionnaire: A one-week pilot test of the questionnaire involving 20 teachers was conducted to collect their feedback prior to the formal survey. Based on the feedback, any ambiguity in the questionnaire was modified to ensure that all questions were clear and concise.

Type of questionnaire: The questionnaire contains three scales, which are teachers' attitudes and experiences with mobile interactive teaching software and devices (X), students' attitudes toward mobile learning and technological conditions from the teacher's perspective(M), effectiveness of teaching practices and students interaction (Y). The questions inside these three scales are multiple choice, with 13, 12, and 11 multiple choice questions, respectively.

To evaluate the questionnaire by 5 experts

Invitation of experts: 5 experts were invited to conduct a comprehensive assessment of the designed questionnaire. These experts were required to fulfill the following conditions.

- Have more than 10 years of experience in teaching ideological and political courses in colleges and universities, and are familiar with how to integrate mobile interactive technology into the teaching of ideological and political courses;

- Have a master's degree or above and a title of associate professor or above.

Evaluation Criteria: In evaluating the questionnaire, the Index of Consistency (IOC) was used as an evaluation criterion. The question items in the questionnaire were retained only if the IOC reached 0.6 or more. Each expert rated each question item. Each question item was rated on a 3-point scale: -1 = disagree, 0 = neutral, and 1 = agree.

To collect data using the questionnaire

(1) Data acquisition

Eligible teachers were invited to participate in the survey and encouraged to fill out the questionnaire by posting electronic links to the questionnaire in the WeChat and QQ groups of ideology and politics teachers. To increase the participation rate, the anonymity of the survey and the confidentiality of the data were particularly emphasized before teachers were invited to fill in the

questionnaire, and it was made clear that the results of the survey would be used to improve the quality of teaching.

In order to incentivize teachers to participate in the questionnaire, a small amount of e-cash is offered as a reward for participating teachers. Upon completion of the questionnaire, the reward will be transferred directly into the participants' WeChat wallets.

(2) Response rate analysis

142 questionnaires were actually recovered through the online questionnaire tool WJX, of which 120 were valid questionnaires, with an effective rate of 84.5%.

(3) Time and method of questionnaire distribution

Time: The questionnaire was administered from January 19, 2024 to March 16, 2024. This time period was chosen to facilitate teachers to have more time to participate in filling out the questionnaire at the end of the semester.

Method: The distribution and collection of questionnaires were done through online questionnaire tools (e.g., WJX).

(4) Data cleaning

Before data analysis, the completeness of the questionnaires was first checked to eliminate questionnaires that took too short a time to fill out (e.g., less than 2 minutes) as well as questionnaires that were answered extremely casually. A total of 22 incomplete questionnaires were eliminated, resulting in 120 valid questionnaires.

To analyze data using the questionnaire

The data collected were analyzed using data statistics software, which included the following items:

(1) Descriptive statistical analysis: Using percentage descriptive statistics, the questionnaire data were basically described and summarized in order to understand the current situation and distribution of teachers in mobile interactive teaching.

(2) Reliability and validity analysis: In the reliability analysis, Cronbach **α** reliability coefficient was chosen to examine the reliability of the three scales of this questionnaire. In validity analysis, exploratory factor analysis was used to assess the dimensionality division of the three scales of the questionnaire.

(3) Analysis of differences: In this step, all types (Gender, Title, Years of teaching experience, and Type of College) were compared in terms of differences in

X, M, and Y. X: Teachers' attitudes and experiences with mobile interactive teaching software and devices (independent variable). M: Students' attitudes toward mobile learning and technological conditions from the teacher's perspective (moderator variable). Y: Effectiveness of teaching practices and student interaction (dependent variable).

(4) Analysis of Influencing Factors

Multiple linear regression was chosen to analyze the effect of X on Y.

(5) Moderation analysis

Moderation regression analysis was chosen to validate the theoretical relationship between the three variables (X, M, Y).

Phase 2: To design a mobile interactive teaching (MIT) model for college ideological and political courses in Guangxi.

The second research phase is broadly divided into 3 steps, as shown in the figure below.

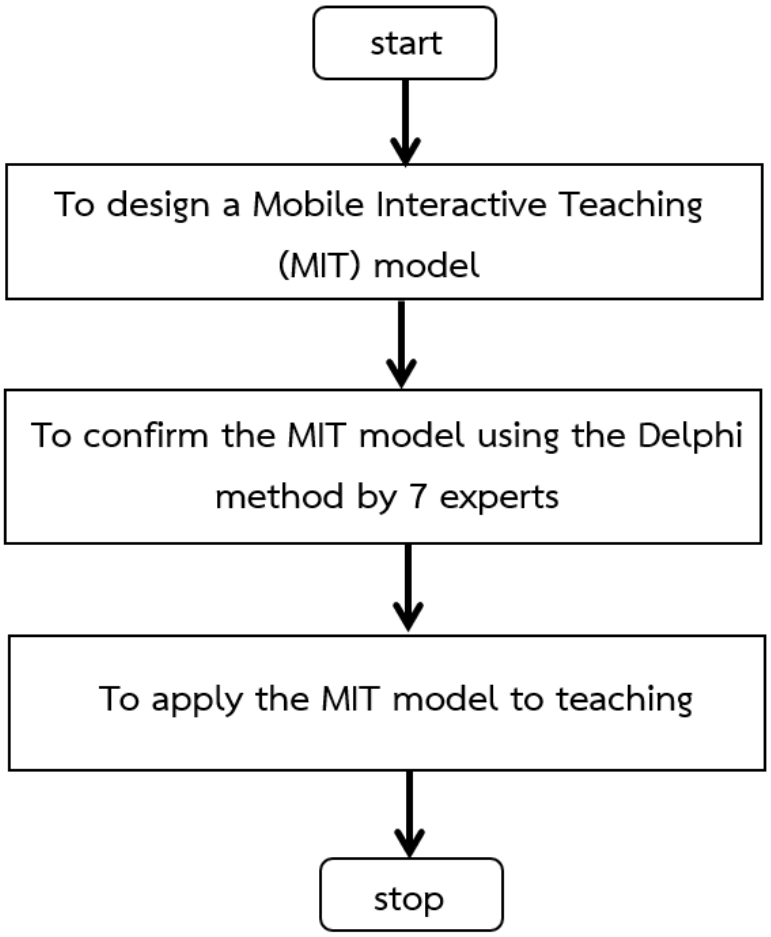

Figure 3.2 Framework diagram of phase 2

To design a Mobile Interactive Teaching (MIT) model

Around the results of the first research phase, combined with the literature on mobile interactive teaching and model construction, this study refines the first-level and second-level elements of the mobile interactive teaching model. The elements and description of the various levels of the mobile interactive teaching model are shown in the table below.

Table 3.1 Elements and description of the various levels of MIT model

First-level element	Second-level element	Description
Technical Support	Mobile Terminal Technology	Tablets, smartphones and other devices to support learning anytime, anywhere
	Wireless Communication Technology	Provide stable network connectivity to support interaction and resource access
	Mobile Application Software	Super star learning app, etc., provide platforms for teaching and learning
Learning Environment	Contextual Learning	Provide authentic or simulated learning situations to enhance the learning experience
	Collaborative Learning	Promote interaction among students through group discussions and project collaboration
	Personalized Learning	Customize learning content and pathways based on students' needs
Instructional Design	Pre-class Preparation	Teachers release study materials in advance and students preview them independently
	Classroom Interaction	To use a mobile app for real-time interactions, such as asking questions or taking tests
	Post-class Extension	Using the mobile app students engage in self-directed inquiry learning and group discussions.
Teaching Resources	Multimedia Resources	Video, audio, graphics and other formats
	Online Courses	MOOC and other online course resources
	Digital Learning Materials	Provides a wealth of learning materials and references, also including multimedia resources
Evaluation Feedback	Student Self-Assessment	Students self-assess their learning through the learning platform
	Peer Assessment	Students evaluate each other and provide feedback
	Teacher Evaluation	Teachers use the platform for personalized instruction and feedback

To confirm the MIT model using the Delphi method by 7 experts

After initially identifying the elements of the mobile interactive teaching model, two rounds of an anonymous survey of experts were conducted using the Delphi method in order to further revise and refine these elements.

Invitation of experts: 7 experts with the following conditions were invited to participate in the solicitation of opinions on the questionnaire and the scoring of the questionnaire. (1) Have more than 10 years of experience in teaching ideological and political courses in colleges and universities, and are familiar with how to integrate mobile interactive technology into the teaching of ideological and political courses. (2) Have a master's degree or above and a title of associate professor or above.

Methodology of questionnaire design and scoring: a Likert scale was used and experts were asked to rate the importance of primary and secondary indicators on a scale of 1 to 5. For data analysis, indicators with a mean value of more than 3 and a coefficient of variation of less than 0.25 were retained, while others were excluded. If opinions were not harmonized after the first round of questionnaires, a second round of questionnaires was conducted until agreement was reached.

Questionnaire survey process: After the first round of questionnaires was distributed, data were collected and analyzed to refine the indicator system. A second round of questionnaires was then administered, and data were again collected and analyzed until the final evaluation indicator system was determined.

Data Analysis: (1) Expert Positivity Coefficient is measured by the questionnaire response rate, reflecting the level of concern experts have towards the consultation. (2) Expert Opinion Concentration is represented by the arithmetic mean. (3) Expert Coordination Degree is evaluated through the Coefficient of Variation (CV) and Coordination Coefficient (W). CV is used to measure the consistency of the ratings, while W is used to assess the coordination level among experts. A larger W value indicates a higher degree of coordination, and when the P-value is less than 0.05, the expert ratings exhibit significant consistency.

Modification and establishment of the model: After the first round of expert consultation on the Delphi method, the model's primary and secondary indicators were changed accordingly, as detailed in the table below.

Table 3.2 Results after the first round of expert consultation

First-level element	Second-level element	Description
Technical Support	Mobile Terminal Technology	Tablets, smartphones and other devices to support learning anytime, anywhere
	Wireless Communication Technology	Provide stable network connectivity to support interaction and resource access
	Mobile Application Software	Super star learning app, etc., provide platforms for teaching and learning
Learning Methods	Contextual Learning	Provide authentic or simulated learning situations to enhance the learning experience
	Collaborative Learning	Promote interaction among students through group discussions and project collaboration
Instructional Design	Pre-class Preparation	Teachers release study materials in advance and students preview them independently. The use of mobile app for learning needs analysis, such as learning situation analysis, can also be used for instructional design, such as the design of interactive methods, the design of personalized learning paths, and the design of course content modularization.
	Classroom Interaction	To use a mobile app for real-time interactions, such as asking questions, taking tests, project collaboration and research, real-time communication and feedback, online interactive discussions, mobile polling.
	Post-class Extension	Using mobile APP, students can conduct independent inquiry learning and group discussion, as well as provide feedback on teaching and learning, construct learning communities, expand resource links, and display learning outcomes.

Table 3.2 (Continued)

First-level element	Second-level element	Description
Teaching Resources	Online Courses	MOOC and other online course resources
	Digital Learning Materials	Provides a wealth of learning materials and references, also including multimedia resources
Evaluation Feedback	Student Self-Assessment	Students self-assess their learning through the learning platform
	Peer Assessment	Students evaluate each other and provide feedback
	Teacher Evaluation	Teachers use the platform for personalized instruction and feedback

After two rounds of Delphi method expert consultation, the first-level and second-level indicators of the model were finalized, which led to the creation of the final mobile interactive teaching model. The model is shown in the figure below.

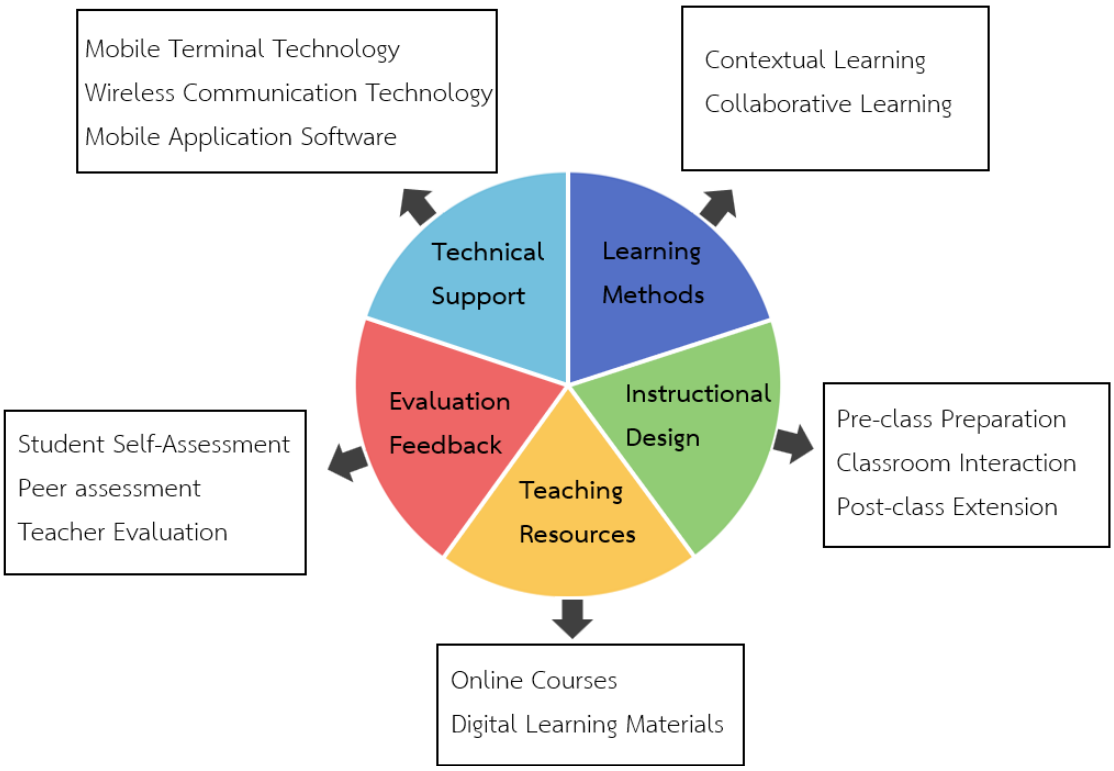

Figure 3.3 MIT model diagram

To apply the MIT model to teaching

In this process, lessons for the "Situation and Policies" (as part of the ideological and political courses) were designed around the constructed mobile interactive teaching model. A total of 5 lessons have been designed, and each lesson has a teaching duration of two periods. The lesson design includes teaching objectives, teaching focus and difficulties, teaching tools and methods, teaching process, post-course assignments, and post-class summary and reflection, etc., all of which are closely integrated with the elements of the mobile interactive teaching model.

Subsequently, I randomly selected 15 teachers of ideology and political courses in N college and instructed them to carry out practice teaching based on these five lessons. The practice teaching began on March 16, 2024, and the teaching cycle lasted approximately one month. Teachers gradually implemented specific teaching activities based on the content of the "Situation and Policies" lessons design in Appendix C5, Appendix C6, Appendix C7, Appendix C8 and Appendix C9.

In this way, I aim to validate the practical application of the mobile interactive teaching model in the ideology and politics courses, and provide valuable feedback and data support for future teaching improvement.

Phase 3: To evaluate the mobile interactive teaching (MIT) model of college ideological and political courses in Guangxi.

The third research phase is broadly divided into 4 steps, as shown in the figure below.

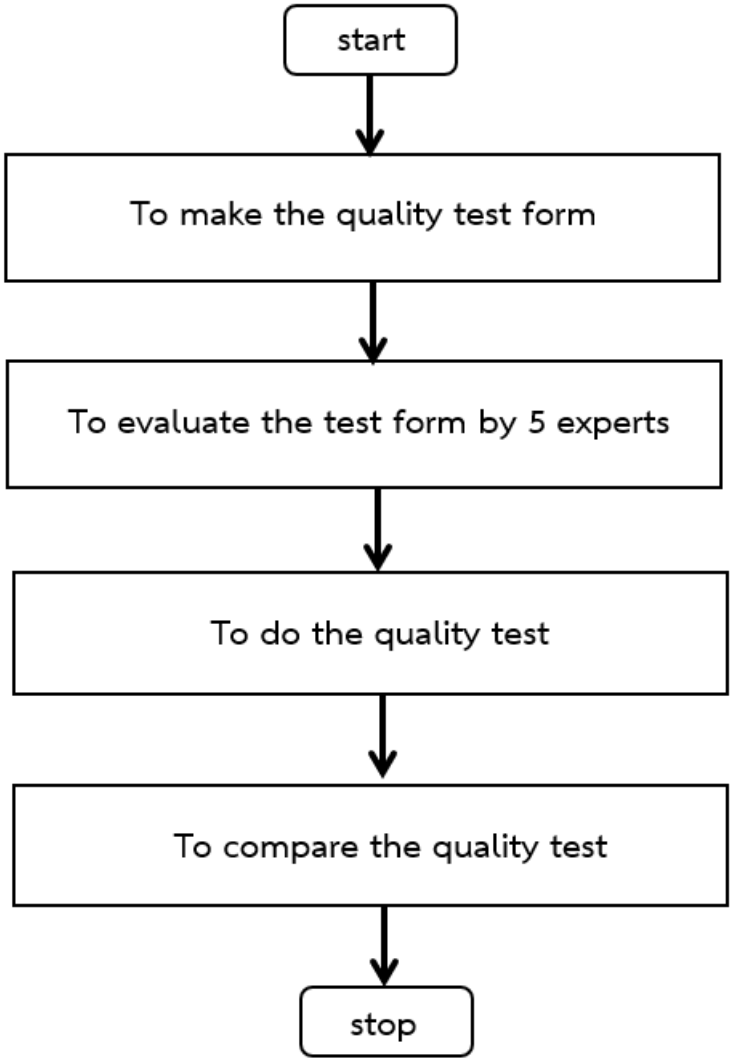

Figure 3.4 Framework diagram of phase 3

To make the quality test form

Quality test form is used to assess the quality of teaching and learning. To ensure the reliability and accuracy of the data, teachers were given uniform instructions and guidance before filling out the test form to ensure that they were clear about the meaning of each question and the scoring criteria.

The quality test form covered 7 dimensions of teaching ideological and political courses in Guangxi universities and colleges, and they were student academic performance, student engagement, level of knowledge acquisition, student satisfaction, Classroom atmosphere, course coverage, and student satisfaction. Several items were set under each dimension. Each item is rated on a 5-point scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree. Details of the quality test form is given in the Appendix C10.

To evaluate the test form by 5 experts

1) Five experts were invited to conduct a comprehensive assessment of the designed test form to determine whether the quality test form can be applied to the assessment of the quality of teaching and learning in the ideology and political courses. These experts are required to fulfill the following requirements:

- Have more than 10 years of experience in teaching ideological and political courses in colleges and universities, and are familiar with how to integrate mobile interactive technology into the teaching of ideological and political courses;

- Have a master's degree or above and a title of associate professor or above.

2) In evaluating the test form, the Index of Consistency (IOC) was used as an evaluation criterion. The question items in the questionnaire were retained only if the IOC reached 0.6 or more. Each expert rated each question item. Each question item was rated on a 3-point scale: -1 = disagree, 0 = neutral, and 1 = agree.

To do the quality test

The population and sample: The teachers who participated in filling out the form were 30 teachers randomly selected from N college and divided into two groups, the experimental group and the comparison group, each of which consisted of 15 people. The 15 teachers in the experimental group were the same group of teachers who applied the mobile interactive teaching model in step 3 of the second research phase for about one month teaching. In contrast, the teachers in the

comparison group did not use the mobile interactive modeling instruction for teaching.

Distribution and Completion of the test form: The test form was distributed to the 30 participating teachers through an online questionnaire to ensure that teachers were able to complete the quality test form at a time and place convenient to them. A paper version is also available for teachers who do not feel comfortable completing the quality test form online

Data confidentiality: Teachers' identifying information was kept strictly confidential throughout the testing process. The results of the test form were used for research purposes only and were not publicly or individually assessed for individual teachers. To further ensure data confidentiality, the test form was anonymized prior to statistical analysis.

To compare the quality test

Data collection and processing: all collected test forms, both online and in paper format, were numbered and organized after collection. The data entry process was double-checked to prevent entry errors and to ensure that all data accurately reflected teachers' true ratings.

Data analysis: After all teachers had completed the quality form, the quality results of the experimental and comparison groups were entered into separate data sheets. Thereafter, the results were summarized and compared through statistical analysis software. The specific method of statistical analysis is to use independent samples t-test to verify the differences between the two groups of teachers' quality of teaching in each dimension.

Chapter 4
Results of Analysis

There were different research methods at each phase of the study, and each corresponded to a different data analysis. The following is a specific statement of the data analysis based on the three research phases.

Phase 1: To study the current status of mobile interactive teaching (MIT) for college ideological and political courses in Guangxi

In the first research phase, there are two steps in which the results of the analysis need to be presented, as described below.

1. Results of analysis for the step of "To evaluate the questionnaire by 5 experts"

Five experts were invited to evaluate the questionnaire. In evaluating the questionnaire, the Index of Consistency (IOC) was used as an evaluation criterion. The results of the evaluation are presented in the appendix D1.

The results showed that none of the items in the questionnaire had an IOC score of less than 0.6, thus proving the validity of the questionnaire.

2. Results of analysis for the step of "To analyze data using the questionnaire"

Using convenience sampling techniques, 120 teachers engaged in ideological and political education from 8 universities in Guangxi were selected to understand the problems and coping strategies of mobile interactive teaching through questionnaire surveys. The specific data analysis is as follows:

The situation of questionnaire data recovery

The online survey was conducted mainly by using WJX. Questionnaires were distributed online to teachers teaching ideological and political courses in 8 colleges and universities in Guangxi. The actual number of questionnaires collected was 142, and the total number of valid questionnaires was 120, with an effective recovery rate of 84.5%.

Basic information status of the sample

120 valid questionnaires were collected and the basic information status of these 120 teachers is as follows:

Table 4.1 Sample distribution

	Type	Number of persons	Percentage
Gender	Male	44	36.7
	Female	76	63.3
Title	No title	27	22.5
	Assistant teachers	11	9.2
	Lecturer	30	25.0
	Associate Professor	37	30.8
	Professor	15	12.5
Years of teaching experience	Less than 1 year	11	9.2
	1 to 3 years	28	23.3
	3 to 5 years	15	12.5
	5 to 10 years	13	10.8
	More than 10 years	53	44.2
Type of college	First-tier Undergraduate university	13	10.8
	Second-tier Undergraduate College	71	59.2
	Vocational College	36	30.0

From the above table, it can be seen that in terms of gender, the percentage of females is 63.3%, which is more than that of males, which is 36.7%; in terms of title, the highest percentage is associate professors, which amounts to 30.8%, followed by 25% of teachers with the title of lecturer, and the lowest percentage is assistant teachers, which amounts to 9.2%. In terms of years of teaching experience, 44.2% of teachers had more than 10 years of teaching experience and 9.2% had less than one year of teaching experience. In terms of the type of college and university they work in, 59.2% of the teachers are from second-tier colleges, and the smallest percentage of teachers is from first-tier universities, which is 10.8%.

Reliability and validity tests

1. Reliability analysis

In this step, Cronbach's alpha reliability coefficient was selected to test three scales of this questionnaire: Teachers' attitudes and experiences with mobile interactive teaching software and devices (independent variable, abbreviated as X); Students' attitudes toward mobile learning and technological conditions from the teachers' perspective (moderator variable, abbreviated as M); and Effectiveness of teaching practices and student interaction (dependent variable, abbreviated as Y).

In general, when the Cronbach Alpha reliability factor is higher than 0.9, the scale reliability is regarded as excellent; when the reliability factor is between 0.8 and 0.9, the reliability is regarded as good; when the reliability factor is between 0.7 and 0.8, the confidence is regarded as acceptable; if the reliability factor is less than 0,7, a revision of the scale is deemed necessary. The results of the reliability for the three scales of this questionnaire are as follows:

Table 4.2 Reliability analysis

Scale	Cronbach Alpha	Number of questions
Teachers' attitudes and experiences with mobile interactive teaching software and devices (X)	0.952	13
Students' attitudes toward mobile learning and technological conditions from the teacher's perspective (M)	0.955	12
Effectiveness of Teaching Practices and Students Interaction (Y)	0.951	11

2. Validity analysis

2.1 Validity test of "Teachers' attitudes and experiences with mobile interactive teaching software and devices (X)" scale

After performing KMO and Bartlett's Test of Sphericity on the X scale, the results show that the KMO value is 0.924 (greater than 0.6), and the p-value of the Bartlett's Test of Sphericity is less than 0.05. This shows that the data of the X scale is suitable for exploratory factor analysis. The specific analysis is as follows.

Table 4.3 Results of exploratory factor analysis for the scale "Teachers' attitudes and experiences with mobile interactive teaching software and devices(X)"

Items	Dimension	
	1	2
Teachers' attitudes and experiences with mobile interactive teaching software and devices 3	0.853	
Teachers' attitudes and experiences with mobile interactive teaching software and devices 5	0.837	
Teachers' attitudes and experiences with mobile interactive teaching software and devices 6	0.834	
Teachers' attitudes and experiences with mobile interactive teaching software and devices 4	0.824	
Teachers' attitudes and experiences with mobile interactive teaching software and devices 2	0.777	
Teachers' attitudes and experiences with mobile interactive teaching software and devices 13	0.728	
Teachers' attitudes and experiences with mobile interactive teaching software and devices 7	0.726	
Teachers' attitudes and experiences with mobile interactive teaching software and devices 1	0.693	
Teachers' attitudes and experiences with mobile interactive teaching software and devices 10		0.870
Teachers' attitudes and experiences with mobile interactive teaching software and devices 9		0.841
Teachers' attitudes and experiences with mobile interactive teaching software and devices 8		0.824
Teachers' attitudes and experiences with mobile interactive teaching software and devices 12		0.820
Teachers' attitudes and experiences with mobile interactive teaching software and devices 11		0.816
Eigenvalue	**8.343**	**1.556**
Variance contribution ratio	**41.916%**	**34.228%**
Cumulative variance contribution ratio	**76.144%**	

The analysis results show that two main factors were extracted from 13 reliable items. These two factors can explain 76.144% of the information in the total scale, exceeding the 60% benchmark, indicating that the factors extracted this time performed well in effectively explaining the X scale. Further analysis shows that items Q1-Q7 and Q13 belong to factor 1, which can be named “teachers' familiarity and experience with mobile interactive technology”; items Q8-Q12 belong to factor 2, which can be named “teachers' acceptance of mobile interactive pedagogy”.

2.2 Validity Test of the Scale of "Students' attitudes toward mobile learning and technological conditions from the teacher's perspective(M)”

After performing KMO and Bartlett's Test of Sphericity on the M scale, the results show that the KMO value is 0.947 (greater than 0.6), and the p-value of the Bartlett's Test of Sphericity is less than 0.05. This shows that the data of the M scale is suitable for exploratory factor analysis. The specific analysis is as follows.

Table 4.4 Results of exploratory factor analysis of the scale "Students' attitudes toward mobile learning and technological conditions from the teacher's perspective(M)”

Items	Dimension	
	1	2
Students' attitudes toward mobile learning and technological conditions from the teachers’ perspective 12	0.899	
Students' attitudes toward mobile learning and technological conditions from the teachers’ perspective 11	0.846	
Students' attitudes toward mobile learning and technological conditions from the teachers’ perspective 1	0.827	
Students' attitudes toward mobile learning and technological conditions from the teachers’ perspective 9	0.800	
Students' attitudes toward mobile learning and technological conditions from the teachers’ perspective 10	0.792	
Students' attitudes toward mobile learning and technological conditions from the teachers’ perspective 8	0.688	
Students' attitudes toward mobile learning and technological conditions from the teachers’ perspective 5		0.871

Table 4.4 (Continued)

Items	Dimension	
	1	2
Students' attitudes toward mobile learning and technological conditions from the teacher's perspective 4		0.868
Students' attitudes toward mobile learning and technological conditions from the teachers' perspective 3		0.816
Students' attitudes toward mobile learning and technological conditions from the teachers' perspective 2		0.796
Students' attitudes toward mobile learning and technological conditions from the teachers' perspective 6		0.753
Students' attitudes toward mobile learning and technological conditions from the teachers' perspective 7		0.709
Eigenvalue	**8.080**	**1.305**
Variance contribution ratio	**39.107%**	**39.10%**
Cumulative variance contribution ratio	**78.207%**	

The analysis results show that two main factors were extracted from 12 reliable items. These two factors can explain 78.207% of the total scale information, exceeding the 60% benchmark, indicating that the extracted factors performed well in effectively explaining the M scale. Further analysis shows that items Q8-Q12 and Q1 belong to factor 1, which can be named "technical support and environmental conditions of the colleges and universities"; items Q2-Q7 belong to factor 2, which can be named "students' attitudes and adaptability to mobile interactive learning".

2.3 Validity Test of the "Effectiveness of teaching practices and student Interaction (Y)"

After performing KMO and Bartlett's Test of Sphericity on the M scale, the results show that the KMO value is 0.936 (greater than 0.6), and the p-value of the Bartlett's Test of Sphericity is less than 0.05. This shows that the data of the Y scale is suitable for exploratory factor analysis. The specific analysis is as follows.

Table 4.5 Results of exploratory factor analysis of the scale "Effectiveness of Teaching Practices and Student Interaction(Y)"

Items	Dimension 1
Effectiveness of teaching practices and student Interaction 5	0.881
Effectiveness of teaching practices and student Interaction 2	0.845
Effectiveness of teaching practices and student Interaction 3	0.842
Effectiveness of teaching practices and student Interaction 8	0.841
Effectiveness of teaching practices and student Interaction 6	0.833
Effectiveness of teaching practices and student Interaction 10	0.832
Effectiveness of teaching practices and student Interaction 1	0.825
Effectiveness of teaching practices and student Interaction 4	0.804
Effectiveness of teaching practices and student Interaction 7	0.799
Effectiveness of teaching practices and student Interaction 9	0.792
Effectiveness of teaching practices and student Interaction 11	0.723
Eigenvalue	**7.407**
Variance contribution ratio	**67.339%**
Cumulative variance contribution ratio	**67.339%**

The analysis results show that the 11 reliable items can be grouped into one main factor, which can explain 67.339% of the information in the total scale, exceeding the benchmark of 60%, indicating that the factor extracted this time performs well in effectively explaining the Y scale.

Analysis of current situation

Through the data of this questionnaire research, the status quo of mobile interactive teaching in Guangxi teachers' colleges and universities can be obtained as follows.

X1: Teachers' familiarity and experience with mobile interactive technology

X2: Teachers' acceptance of mobile interactive pedagogy

M1: Students' attitudes and adaptability to mobile interactive learning

M2: Technical support and environmental conditions of the colleges and universities

X: Teachers' attitudes and experiences with mobile interactive teaching software and devices

M: Students' attitudes toward mobile learning and technological conditions from the teachers' perspective

Y: Effectiveness of teaching practices and student interaction

Table 4.6 Analysis of the current situation

		N	Minimum value	Maximum value	Mean value	Standard deviation
X	X1	120	1.00	5.00	3.68	0.75
	X2	120	1.00	5.00	4.08	0.72
X		120	1.00	5.00	3.83	0.68
M	M1	120	1.00	5.00	3.89	0.68
	M2	120	1.00	5.00	3.64	0.79
M		120	1.00	5.00	3.77	0.68
Y		120	2.36	5.00	3.95	0.59

It is clear from the above table that: the mean score of X is 3.83, indicating that X is between average and satisfactory.

Next, the mean score of M was 3.77, indicating that M is between average and satisfactory.

Finally, the mean score of Y was 3.95, indicating that Y was between average and satisfactory.

Analysis of Differences

All types (Gender, Title, Years of teaching experience, and Type of college) were compared in terms of differences in X, M, and Y. Except for Years of teaching experience, which is significantly different in X, M, and Y, several others are not significantly different in X, M, and Y.

Gender differences

This section compares teachers of different genders in X, M, and Y. Since gender is divided into two kinds of male and female, independent samples t-test is

selected to compare the differences between male and female, and here are the results:

Table 4.7 Analysis of gender differences

Factor		Male (N=44)	Female (N=76)	t	P
X	X1	3.81±0.78	3.61±0.73	1.456	0.148
	X2	4.11±0.73	4.06±0.72	0.394	0.694
	X	3.93±0.72	3.78±0.66	1.147	0.254
M	M1	3.88±0.75	3.9±0.64	-0.111	0.912
	M	3.74±0.81	3.58±0.78	1.065	0.289
	M	3.81±0.76	3.74±0.64	0.557	0.579
	Y	3.98±0.55	3.94±0.61	0.352	0.725

From the above table it is clear that there is no significant difference in X, M, Y between teachers of different genders. All the p-values are more than 0.05.

2. Differences in title

This section compares the differences in X, Y, M across teacher title. Since the title is divided into five groups, one-way ANOVA is chosen to compare the differences between different titles, and the statistical results are as follows:

Table 4.8 Analysis of differences between job title

Factor		No title	Teacher assistant	Lecturer	Associate Professor	Professor	F	Significance
X	X1	3.89±0.79	3.74±0.56	3.59±0.91	3.64±0.71	3.55±0.59	0.775	0.544
	X2	4.31±0.68	4.29±0.49	4.01±0.95	3.99±0.63	3.83±0.47	1.646	0.168
	X	4.05±0.66	3.95±0.47	3.75±0.89	3.78±0.61	3.66±0.5	1.206	0.312
M	M1	4.04±0.64	4.14±0.52	3.78±0.85	3.86±0.63	3.73±0.56	1.079	0.370
	M2	3.67±0.96	3.76±0.8	3.5±0.88	3.72±0.64	3.59±0.64	0.413	0.799
	M	3.85±0.73	3.95±0.42	3.64±0.84	3.79±0.62	3.66±0.56	0.650	0.628
	Y	4.02±0.61	4.12±0.38	3.94±0.57	3.9±0.62	3.87±0.68	0.459	0.765

From the above table it is clear that there is no significant difference in X, M, Y between the teachers with different titles and all the p-values are more than 0.05.

3. Differences in years of teaching experience

his section compares the differences in X, Y, M across years of teaching experience. Since years of teaching experience is divided into 5, one-way ANOVA is chosen to compare the differences between different years of teaching experience, and here are the results:

Table 4.9 Analysis of differences in years of teaching experience

Factor		Less than 1 year	1 to 3 years	3 to 5 years	5 to 10 years	More than 10 years	F	P
X	X1	4.22±0.72	3.55±0.86	3.58±0.74	3.83±0.91	3.63±0.63	1.880	0.119
	X2	4.56±0.48	4.04±0.95	4.09±0.65	4.42±0.76	3.91±0.56	2.944	0.023
	X	4.35±0.55	3.74±0.83	3.78±0.67	4.05±0.8	3.74±0.54	2.450	0.050
M	M1	4.35±0.55	3.76±0.83	3.98±0.66	4.09±0.64	3.8±0.59	2.213	0.072
	M2	3.88±0.93	3.51±0.98	3.53±0.82	3.88±0.65	3.63±0.66	0.813	0.519
	M	4.11±0.71	3.63±0.84	3.76±0.6	3.99±0.64	3.71±0.61	1.409	0.235
	Y	4.36±0.47	3.88±0.59	3.95±0.41	4.08±0.65	3.88±0.62	1.802	0.133

From the above table, it is clear that there is a significant difference between the teachers of different years of teaching experience in terms of their recognition of mobile interactive pedagogy, P=0.023<0.05, while there is no significant difference in other aspects. The specific differences are shown in the figure below:

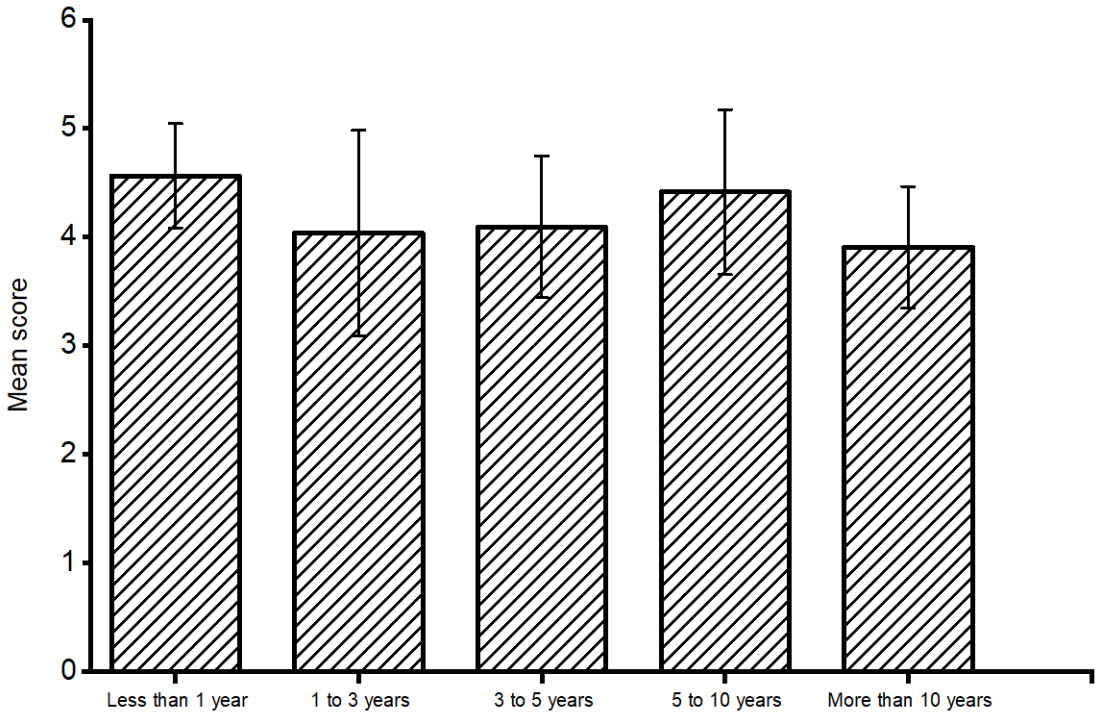

Figure 4.1 Diagram of differences years of teaching experience

4. Differences in type of college

This section compares the differences in the X, M and Y across type of college. Since the type of college is categorized into 3, one-way ANOVA is chosen to compare the differences among the different type of college, and here are the results:

Table 4.10 Analysis of differences in type of college

Factor		First-tier university	Second-tier College	Vocational college	F	Significance
X	X1	3.68±1.2	3.72±0.72	3.61±0.63	0.230	0.795
	X2	3.8±1.25	4.09±0.67	4.15±0.53	1.163	0.316
X		3.73±1.18	3.86±0.64	3.82±0.52	0.212	0.809
M	M1	3.86±1.22	3.92±0.63	3.86±0.51	0.105	0.900
	M2	3.6±1.2	3.66±0.78	3.63±0.64	0.037	0.963
M		3.73±1.19	3.79±0.66	3.74±0.49	0.072	0.930
Y		4.02±0.9	3.93±0.57	3.97±0.5	0.149	0.862

From the above table, it can be clearly seen that there is no significant difference among various type of college in terms of X, M, Y, with P >0.05.

Analysis of Influencing Factors

Since X, Y are all scale data, Therefore, multiple linear regression analysis was chosen to study the effect of X on Y.

Table 4.11 Analysis of Influencing factors

		Unstandardized coefficient		standardized coefficient		
Model		B	Standard error	Beta	t	Significance
(constant)		1.695	0.239		7.082	<0.001
	X1	0.320	0.073	0.410	4.398	<0.001
X	X2	0.265	0.077	0.322	3.455	0.001
	R^2				0.442	
	F				48.156	
	P				<0.001	

Dependent variable: effectiveness of teaching practices and student interactions.

The results of the table show that the model fit is good with a fitted R-square of 0.442. In addition, the regression equation is significant ($F = 48.156$, $p < 0.05$), which means that at least one of the independent variables involved in this study can significantly affect the dependent variable.

Moderation analysis

X affect Y. This influence relationship, however, is not static, and this influence relationship will change because of the changes in M. In other words, M will modulate the relationship between the independent variable(X) and the dependent variable(Y). The theoretical relationship between the three variables is shown below:

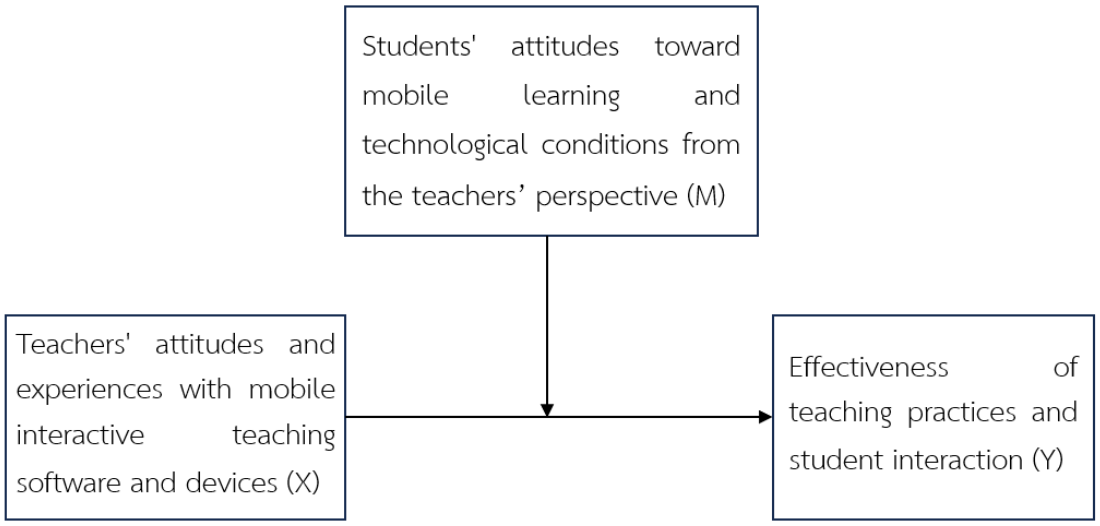

Figure 4.2 Influence relationship

Moderation regression analysis was chosen to validate the above model and the results of the operation are as follows:

Table 4.12 Moderation analysis

Model		Unstandardized coefficient		standardized coefficient	t	P	R2	ΔR2
		B	Standard error	Beta				
Model 1	(Constant)	1.362	0.200		6.793	<.001	0.606	
	X	0.072	0.088	0.083	0.818	0.415		
	M	0.615	0.088	0.713	7.008	<.001		
Model 2	(Constant)	3.702	0.489		7.578	<.001	0.677	0.072
	X	-0.579	0.149	-0.671	-3.883	<.001		
	M	-0.098	0.159	-.114	-0.617	0.539		
	XW	0.192	0.037	1.534	5.159	<.001		

Dependent variable: effectiveness of teaching practices and student interaction

From table above, it can be clearly seen that ΔR2 (Model 2-Model 1) is significant, P < 0.001, implying that, with the addition of the interaction term (X*M), the model fit is significantly improved.

Further, the regression coefficients of the interaction term passed the t-test with a significance level of 0.05, P < 0.001, i.e., the interaction term is significant, which again indicates that M moderates the effect of the independent variable(X) on the dependent variable(Y).

Phase 2: To design a mobile interactive teaching (MIT) model for college ideological and political courses in Guangxi.

In the step "To confirm the MIT model using the Delphi method by 7 experts", two rounds of expert consultation on the Delphi method were experienced, and the content of the questionnaires for the first and second round are shown in Appendix C3 and Appendix C4.

Analysis of the result of the first round of expert consultation

Analysis of the results of the first-level indicator consultation

The first round of questionnaires was collected and the data were summarized and analyzed. The results of analysis are shown in following table.

Table 4.13 Results of the first round of expert consultation on first-level indicators

First-level Indicator	Standard Deviation	Mean	Coefficient of Variation
Technical Support	0.79	3.57	0.22
Learning Environment	0.38	2.86	0.13
Instructional Design	0.69	3.86	0.18
Teaching Resources	0.76	3.71	0.20
Evaluation Feedback	0.49	3.71	0.13

In this step, the first-level indicator "Learning Environment" is eliminated and replaced with "learning method".

Analysis of the results of the second-level indicator consultation

There was a total of 15 second-level indicators in the first round of expert consultation, as shown in the table below:

Table 4.14 Results of the first round of expert consultation on second-level indicators

First-level Indicator	Standard Deviation	Mean	Coefficient of Variation
Mobile Terminal Technology	0.49	4.29	0.11
Wireless Communication Technology	0.58	4.00	0.14
Mobile Application Software	0.58	4.00	0.14
Contextual Learning	0.82	4.00	0.20
Collaborative Learning	0.69	4.14	0.17
Personalized Learning	0.49	2.71	0.18
Pre-class Preparation	0.49	4.29	0.11
Classroom Interaction	0.38	3.86	0.10
Post-class Extension	0.90	4.14	0.22
Multimedia Resources	0.69	2.86	0.24
Online Courses	0.69	4.14	0.17
Digital Learning Materials	0.38	4.14	0.09
Student Self-Assessment	0.58	4.00	0.14
Peer Assessment	0.90	4.14	0.22
Teacher Evaluation	0.49	4.29	0.11

Based on the table above, the following conclusions can be drawn:

(1) The average score for the second-level indicator "Personalized Learning" is 2.71, which does not meet the set standard. Therefore, it needs to be removed from the second-level indicators.

(2) Since the average score for the second-level indicator "Multimedia Resources" is 2.86, which does not meet the set standard, it should be removed.

(3) Experts suggested in the first-round questionnaire that the descriptions of the second-level indicators "Mobile Application Software," "Classroom Interaction," and "Post-class Extension" should be supplemented with more detailed content.

Analysis of the results of the second round of expert consultation

Analysis of the results of the first-level indicator consultation

After collecting the second round of questionnaires, the data were again summarized and analyzed, and the results of their analysis are shown in following table.

Table 4.15 Results of the second round of expert consultation on first-level indicators

First-level Indicator	Standard Deviation	Mean	Coefficient of Variation
Technical Support	0.00	5.00	0.00
Learning Methods	0.76	4.29	0.18
Instructional Design	0.38	4.86	0.08
Teaching Resources	0.38	4.86	0.08
Evaluation Feedback	0.38	4.14	0.09

As can be seen from the table above, the first-level indicators for the second round of expert consultation all meet the requirements of a mean value greater than 3 and a coefficient of variation less than 0.25. At this point, the first-level indicators have been finalized.

Analysis of the result of the second-level indicator consultation

After the first round of indicator optimization, the number of second-level indicators was adjusted from 15 to 13, as summarized below:

Table 4.16 Results of the second round of expert consultation on second-level indicators

First-level Indicator	Standard Deviation	Mean	Coefficient of Variation
Mobile Terminal Technology	0.49	4.29	0.11
Wireless Communication Technology	0.00	5.00	0.00
Mobile Application Software	0.38	4.86	0.08
Contextual Learning	0.38	4.14	0.09
Collaborative Learning	0.49	4.29	0.11
Pre-class Preparation	0.49	4.71	0.10
Classroom Interaction	0.38	4.86	0.08
Post-class Extension	0.38	4.14	0.09
Online Courses	0.00	5.00	0.00
Digital Learning Materials	0.53	4.43	0.12
Student Self-Assessment	0.38	4.86	0.08
Peer Assessment	0.38	4.86	0.08
Teacher Evaluation	0.49	4.29	0.11

As can be seen from the table above, the second-level indicators for the second round of expert consultation all meet the requirements of a mean value greater than 3 and a coefficient of variation less than 0.25. At this point, the secondary indicators have been finalized.

After two rounds of Delphi method expert consultation, the first-level and second-level indicators of the model were finalized, which led to the creation of the final mobile interactive teaching model. The model is shown in the figure below.

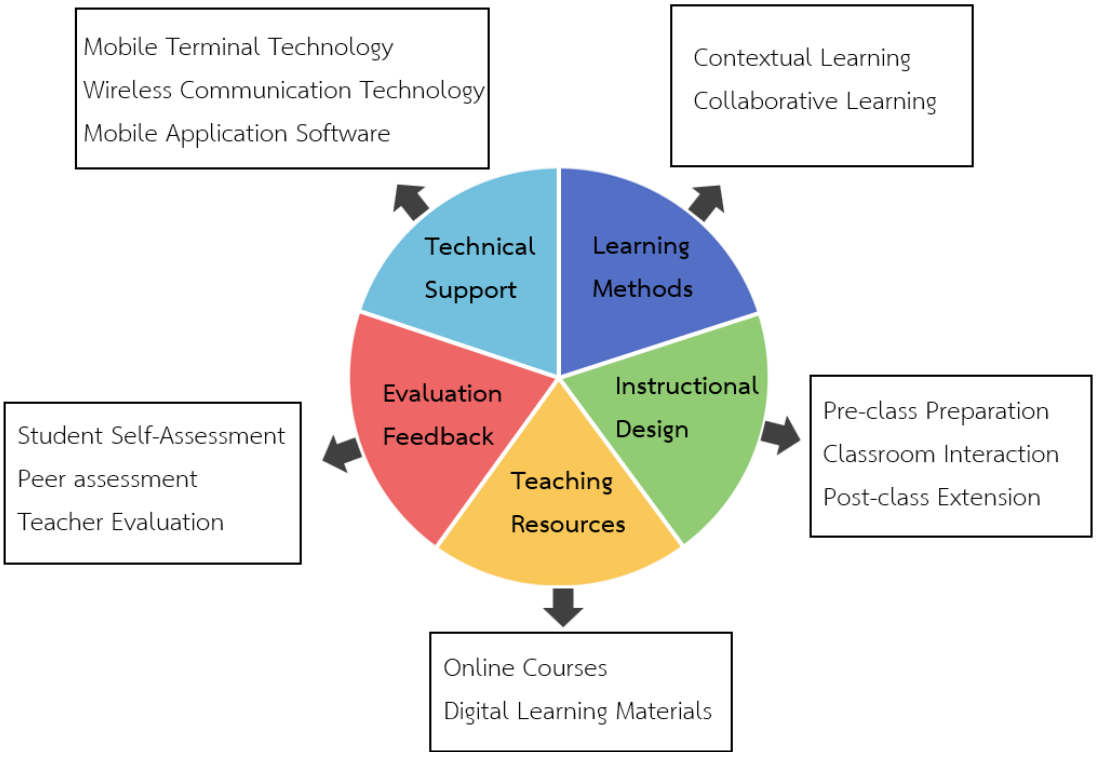

Figure 4.3 MIT model diagram (same as in Chapter 3)

Phase 3: To evaluate the mobile interactive teaching (MIT) model for college ideological and political courses in Guangxi.

In the first and fourth step of this research phase, different results of analysis were produced, respectively. Details are shown below.

1. Results of analysis for the step of "To evaluate the test form by 5 experts"

Five experts were invited to evaluate the quality test form. In evaluating the form, the Index of Consistency (IOC) was used as an evaluation criterion. The results of the evaluation are presented in the appendix D2.

The results showed that none of the items in the teaching quality test form had an IOC score of less than 0.6, thus proving the validity of the test form.

2. Results of analysis for the step of "To compare the quality test"

The quality test results of the 15 teachers who used the mobile interactive teaching model and the 15 teachers who did not use the model were entered into

separate data sheets. Thereafter, the results were then summarized and compared through the statistical analysis software. The specific statistics are as follows.

Table 4.17 Basic information of the two groups of teachers

Type		Number of persons	Percentage
Gender	Male	15	50.00
	Female	15	50.00
Title	No title	6	20.0
	Assistant teachers	5	16.7
	Lecturer	5	16.7
	Associate Professor	7	23.3
	Professor	7	23.3
Years of teaching experience	Less than 1 year	5	16.7
	1 to 3 years	5	16.7
	3 to 5 years	6	20.0
	5 to 10 years	7	23.3
	More than 10 years	7	23.3
Whether or not the MIT model of instruction is utilized	Yes	15	50.00
	No	15	50.00

From the above table, it can be seen that the percentage of females and males are 50% each. In terms of title, professor and associate professor have the highest percentage, both at 23.3%. In terms of years of teaching experience, there are relatively more teachers with 5 to 10 years and more than 10 years, both accounting for 23.3%. In terms of whether or not to adopt the MIT mode, 50% of the teachers chose yes and 50% of the teachers chose no.

As explained in the study above, 15 teachers in the experimental group taught using the MIT model while 15 teaching in the comparison group did not teach using the MIT model. The experimental group was compared with the comparison group on 7 teaching dimensions in the table below.

Table 4.18 Analysis of the differences in teaching quality between two teacher groups

t-test the results of the analysis				
Whether or not MIT was taught (mean ± standard deviation)				
	Yes (n=15)	**No (n=15)**	**t**	**p**
Student academic performance	4.26±0.22	4.03±0.23	2.841	0.008
Student engagement	4.52±0.18	3.75±0.28	8.900	0.00*
Level of knowledge acquisition	4.45±0.27	4.10±0.41	2.761	0.10
Student satisfaction	4.37±0.35	3.98±0.24	3.484	0.02
Classroom atmosphere	4.53±0.16	3.73±0.22	11.359	0.00**
Course coverage	4.35±0.16	4.15±0.30	2.309	0.031
Student self-confidence	4.33±0.18	4.28±0.16	2.443	0.21

** $p<0.05$ ** $p<0.01$*

The result shows the experimental group's performance on each teaching dimensions increased significantly:

“Student academic performance" increased from approximately 4.03 to about 4.27.

“Student Engagement” rose from approximately 3.75 to about 4.52.

“Level of knowledge acquisition” went up from approximately 4.10 to about 4.45.

“Student Satisfaction” moved from approximately 3.98 to about 4.37.

“Classroom Atmosphere” improved from approximately 3.73 to about 4.53.

“Course Coverage” advanced from approximately 4.15 to about 4.35.

“Student Self-confidence” increased from approximately 4.28 to about 4.43.

Thus, it can be proved that the teaching model can effectively improve the quality of teaching.

Chapter 5
Discussion Conclusion and Recommendations

The aim of the present study is exploring the mobile interactive teaching mode of ideological and political courses in Guangxi universities, the study is divided into three stages: 1) To study the current status of the mobile interactive teaching for college ideological and political courses in Guangxi. 2) To design a mobile interactive teaching (MIT) model for college ideological and political courses in Guangxi. 3) To evaluate the mobile interactive teaching (MIT) model for college ideological and political courses in Guangxi. The details are as follows.

Conclusion

The systematic three-phase study led to the following important conclusions.

1) In phase 1 of this study, through a questionnaire survey of 120 teachers engaged in ideological and political education in 8 universities in Guangxi, it concluded that the mean score of X, M, Y are 3.83, 3.77, 3.95, respectively, which mean X, M, Y are all between average and satisfactory.

The results show that the application of mobile interactive teaching in ideological and political courses is relatively limited at present, and the students and teachers engaged in ideological and political education in Guangxi have insufficient knowledge of the mobile interactive teaching mode, and the practical operation ability needs to be improved. At the same time, it also shows that at the present stage, the teaching mode of ideological and political courses in colleges and universities is still dominated by traditional teaching, and there is still a lot of room for improvement in the promotion and application of mobile interactive teaching.

2) In the second phase of the study, a mobile interactive teaching model was constructed on basis of literature analysis, and the final model was determined through two rounds of Delphi method expert consultation. Subsequently, five lessons were designed around the model and 15 ideological and political teachers from randomly selected N college were invited to apply the model for a month teaching practice.

3) In phase 3 of this study, 15 teachers in the experimental group taught using the MIT model while 15 teachers in the comparison group did not teach using the MIT model. The experimental group's performance on each teaching dimensions increased significantly: “Student academic performance" increased from approximately 4.03 to about 4.27. “Student engagement” rose from approximately 3.75 to about 4.52. “Level of knowledge acquisition” went up from approximately 4.1 to about 4.45. “Student satisfaction” moved from approximately 3.98 to about 4.37. “Classroom atmosphere” improved from approximately 3.73 to about 4.53. “Course coverage” advanced from approximately 4.15 to about 4.35. “Student self-confidence” increased from approximately 4.28 to about 4.43. Thus, it can be proved that the teaching model can effectively improve the quality of teaching.

Discussion

1. Effectiveness of the practical application of the mobile interactive teaching model (MIT)

(1) In the practical application of MIT model, the effective implementation of mobile interactive teaching is realized through apps such as Rain Classroom and Xuetangx. Before Class, teachers can accurately acquire students' needs through demand analysis and teaching design, and design suitable interactive methods and personalized learning paths. During Class, real-time interaction and feedback mechanisms are used to enhance classroom interactivity and participation. After class, students' learning effects and interests are continuously enhanced through online tests and community interaction. (2) Teachers and students feedback that the application of MIT mode makes the classroom more interactive, students' motivation and participation in learning are obviously improved, and the learning effect is also significantly enhanced.

2. Feedback from expert evaluation and practical Application

(1) During the design of the MIT model, seven experts were invited to conduct Delphi expert consultation on the model. After only two rounds of consultation, the final version of the model was determined. The results showed that the model design was scientific and reasonable, and in line with the basic principles of constructivist learning theory and symbolic interaction theory. Experts

believe that the MIT model can effectively improve students' learning initiative and teaching effectiveness.

(2) In the feedback of practical application, teachers generally believe that the model improves teaching efficiency, and students also report that this teaching model is more interesting and productive.

3. Limitations of the Study and Future Prospects

(1) Although this study has achieved some results, there are still some limitations. First, the sample size was small and the scope of the study was limited. Second, the study period was short and the long-term effects could not be observed comprehensively. Future studies can expand the sample size and scope to further verify the generalizability and promotion value of the MIT model.

(2) In the future, more innovative applications of the mobile interactive teaching model can be explored, such as the potential of virtual reality (VR), augmented reality (AR) and other technologies in the teaching of ideological and political courses.

Recommendations

Implications

1. Higher education administration department

(1) Higher education administration department should encourage and support the promotion and application of mobile interactive teaching mode in ideological and political courses. Through policy support and resource investment, they should enhance teachers' informatization teaching ability and improve classroom interactivity and student participation.

(2) Higher education administration department should formulate corresponding training programs to help teachers master the skills of using mobile interactive teaching tools and platforms to enhance teaching effectiveness.

2. Teachers

(1) Teachers should actively learn and apply mobile interactive teaching tools and platforms to improve their own informatization teaching ability. Through continuous practice, they should explore suitable teaching methods to improve classroom interactivity and student participation.

(2) During the teaching process, teachers should pay attention to students' feedback, and constantly adjust and optimize the teaching design according to the actual situation to ensure that the teaching effect is maximized.

Future Researches

1. Expanding the sample and scope of the study

Future research can expand the sample size and scope to cover more types of colleges and programs to further validate the universality and promotion value of the MIT model.

2. Explore more innovative applications

Explore more innovative applications of the mobile interactive teaching (MIT) model, such as the potential of Virtual Reality (VR), Augmented Reality (AR) and other technologies in the teaching of ideological and political courses.

3. Conduct a longitudinal study

Conduct a long-cycle longitudinal study to observe the long-term impact of the mobile interactive teaching model on students' learning effectiveness and ideological and political quality. Evaluate the model's sustained effects and room for improvement through years of follow-up surveys.

With the above conclusions and recommendations, this study hopes to provide reference for the teaching reform and innovation of ideological and political courses in Guangxi universities and colleges, and to promote the high-quality development of ideological and political education.

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Appendices

Appendix A

List of Specialists and Letters of Specialists Invitation for IOC Verification

List of experts evaluating the "Questionnaire on the status of mobile interactive teaching for ideological and political courses in Guangxi colleges and universities"

1. Professor, PhD, Rong Zhiyi, Guangxi Minzu University, Education expert
2. Professor, Master, Qin Hong, Guangxi Medical University, Experts in ideological and political education
3. Professor, Master, Li Caipeng, Guangxi Transport Vocational and Technical College, Experts in ideological and political education
4. Professor, Master, Yan Chun'e, Guangxi Vocational Normal University, Education expert
5. Professor, Master, Li Pu, Guangxi Electrical Polytechnic Institute, Education expert

List of experts in the Delphi consultation that evaluated the MIT model

1. Professor, PhD, Rong Zhiyi, Guangxi Minzu University, Education expert
2. Professor, Master, Qin Hong, Guangxi Medical University, Experts in ideological and political education
3. Professor, Master, Li Caipeng, Guangxi Transport Vocational and Technical College, Experts in ideological and political education
4. Professor, Master, Yan Chun'e, Guangxi Vocational Normal University, Education expert
5. Professor, Master, Li Pu, Guangxi Electrical Polytechnic Institute, Education expert
6. Professor, Master, Li Qiaoqiao, Nanning College for Vocational Technology, Experts in ideological and political education
7. Associate professor, Master, Yuan Dedong, Nanning College for Vocational Technology, Experts in ideological and political education

List of experts evaluating the teaching quality test form

1. Professor, PhD, Rong Zhiyi, Guangxi Minzu University, Education expert
2. Professor, Master, Qin Hong, Guangxi Medical University, Experts in ideological and political education
3. Professor, Master, Li Caipeng, Guangxi Transport Vocational and Technical College, Experts in ideological and political education
4. Professor, Master, Yan Chun'e, Guangxi Vocational Normal University, Education expert
5. Professor, Master, Li Qiaoqiao, Nanning College for Vocational Technology, Experts in ideological and political education

Appendix B

Official Letter

Ref.No. MHESI 0643.14/ 1140

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

9 May 2024

Subject: Invitation to validate research instrument

Dear Professor Rong Zhiyi Guangxi Minzu University

Mr. Gao Liebo is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Mobile Interactive Teaching Model of College Ideological and Political Courses in Guangxi"

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

Assistant Professor Akaranun Asvarutpokin
(Vice Dean of Graduate School for Dean of Graduate School)

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Tel.+662-473-7000
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Ref.No. MHESI 0643.14/ 1141

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

9 May 2024

Subject: Invitation to validate research instrument

Dear Professor Qin Hong Guangxi Medical University

Mr. Gao Liebo is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Mobile Interactive Teaching Model of College Ideological and Political Courses in Guangxi"

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

Assistant Professor Akaranun Asvarutpokin
(Vice Dean of Graduate School for Dean of Graduate School)

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Ref.No. MHESI 0643.14/ 1142

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

9 May 2024

Subject: Invitation to validate research instrument

Dear Professor Li Caipeng Guangxi Transport Vocational And Technical College

Mr. Gao Liebo is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Mobile Interactive Teaching Model of College Ideological and Political Courses in Guangxi"

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

Assistant Professor Akaranun Asvarutpokin
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Ref.No. MHESI 0643.14/ 1143

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

9 May 2024

Subject: Invitation to validate research instrument

Dear Professor Yan Chune Guangxi Vocational Normal University

Mr. Gao Liebo is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Mobile Interactive Teaching Model of College Ideological and Political Courses in Guangxi"

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

Assistant Professor Akaranun Asvarutpokin
(Vice Dean of Graduate School for Dean of Graduate School)

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Ref.No. MHESI 0643.14/ 1144

Bansomdejchaopraya Rajabhat University
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Thonburi Bangkok 10600

9 May 2024

Subject: Invitation to validate research instrument

Dear Professor Li Pu Guangxi Electrical Polytechnic Institute

Mr. Gao Liebo is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Mobile Interactive Teaching Model of College Ideological and Political Courses in Guangxi"

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

Assistant Professor Akaranun Asvarutpokin
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Ref.No. MHESI 0643.14/ 1145

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

9 May 2024

Subject: Invitation to validate research instrument

Dear Associate professor Yuan Dedong Nanning College For Vocational technology

Mr. Gao Liebo is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Mobile Interactive Teaching Model of College Ideological and Political Courses in Guangxi"

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

Assistant Professor Akaranun Asvarutpokin
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Ref.No. MHESI 0643.14/ 1146

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

9 May 2024

Subject: Invitation to validate research instrument

Dear Associate professor Li Qiaoqiao Nanning College For Vocational technology

Mr. Gao Liebo is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Mobile Interactive Teaching Model of College Ideological and Political Courses in Guangxi"

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

Assistant Professor Akaranun Asvarutpokin
(Vice Dean of Graduate School for Dean of Graduate School)

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Appendix C

Research Instrument

Appendix C1: Questionnaire on the status of mobile interactive teaching for ideological and political courses in Guangxi colleges and universities

This questionnaire aims to understand the current situation of mobile interactive teaching in ideological and political theory courses in universities in Guangxi. Your sincere answers will be an important help to our research. This questionnaire is expected to take 5-8 minutes. Please choose according to the actual situation. The information in this questionnaire will be kept confidential and used only for academic research, so please feel free to fill it out!

Part 1: General information of the respondents.

Instructions: Please write a mark ✓ in O that corresponds to the actual situation about yourself.

Questions
1. Gender O Male O Female
2. Title O (1) No title O (2) Assistant teachers O (3) Lecturer O (4) Associate Professor O (5) Professor
3. Year of teaching experience O (1) Less than 1 year O (2) 1 to 3 years O (3) 3 to 5 years O (4) 5 to 10 years O (5) More than 10 years
4. Type of College O (1) First-tier Undergraduate university O (2) Second-tier Undergraduate College O (3) Vocational College

Part 2: Specific questionnaire content

Please rate each question item according to your situation using the Likert scale below. Each item is rated on a 5-point scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree. Please write ✓ in the space corresponding to each item. Only one rating can be selected for each question item.

X: Teachers' attitudes and experiences with mobile interactive teaching software and devices	1	2	3	4	5
1. I can proficiently use mobile teaching software and devices such as smartphones, tablets, and teaching APPs (e.g., Rain Classroom, Xuetangx, MOOC).					
2. I am familiar with various mobile teaching tools, including classroom management software and interactive APPs.					
3. I can quickly resolve technical problems when using mobile devices and software.					
4. I regularly attend mobile technology-related trainings to improve my technology skills.					
5. I know the latest research and educational practices on utilizing mobile devices for interactive teaching and learning.					
6. I include mobile interactive elements in my course design and evaluate the perception of these elements.					
7. I have ideas for innovative mobile interactive pedagogies and have experimented with new teaching methods.					
8. I think mobile interactive teaching methods can enhance students' interest in learning.					
9. The mobile interactive teaching method helps improve my teaching effectiveness.					

X: Teachers' attitudes and experiences with mobile interactive teaching software and devices	1	2	3	4	5
10. I am willing to promote and apply the mobile interactive teaching method.					
11. I believe that mobile interactive teaching methods can enhance students' critical thinking skills.					
12. I believe mobile interactive teaching can promote student cooperation and communication.					
13. I spent enough time designing and preparing the mobile interactive instructional design.					

M: Students' attitudes toward mobile learning and technological conditions from the teacher's perspective	1	2	3	4	5
1. My college provides students with adequate technical support and resources for mobile interactive instruction.					
2. Students generally have a positive attitude towards using mobile interactive technology in their learning.					
3. Students can adapt to new mobile learning tools and platforms quickly.					
4. Course content is designed to facilitate learning and discussion via mobile devices and software.					
5. Course design that meets the characteristics of mobile learning can help students better absorb knowledge.					
6. Mobile interactive instruction has positive results for course content of varying difficulty.					

M: Students' attitudes toward mobile learning and technological conditions from the teacher's perspective	1	2	3	4	5
7. I have participated in or heard of other teachers' successes with mobile interactive teaching.					
8. College provides sufficient network bandwidth and hardware and software facilities to support mobile interactive teaching.					
9. Teaching resources can be updated in time to meet the needs of mobile interactive teaching.					
10. The school's technical support team can resolve technical problems encountered in teaching and learning effectively.					
11. The college provides teachers with adequate training to effectively utilize technology resources for teaching and learning.					
12. The network environment of our college can stably support large-scale mobile interactive teaching activities.					

Y: Effectiveness of teaching practices and student interaction	1	2	3	4	5
1. There has been a significant increase in student engagement in the classroom since adopting the mobile interactive teaching model.					
2. Students are willing to share questions and feedback with me in real-time via mobile software and devices.					
3. Students are utilizing their mobile devices more for group work and discussion.					

Y: Effectiveness of teaching practices and student interaction	1	2	3	4	5
4. The motivation that students demonstrate in mobile interactive instruction can extend to learning activities outside the classroom.					
5. Mobile interactive pedagogy helps students understand and master the course.					
6. Mobile interactive pedagogy facilitates the improvement of students' achievement and academic performance.					
7. Students' performance on exams and assessments improved when they used mobile devices for learning.					
8. Students are better able to express their views and opinions when using mobile devices.					
9. Students are more likely to ask and answer questions in a mobile interactive environment.					
10. I can keep track of students' learning through their mobile device use					
11. I set up online quizzes or forums for students to participate in discussions via their mobile devices.					

I know that your time is precious, but every opinion you provide will be of great value to this study. I sincerely thank you for your participation and look forward to your valuable opinions that can help us jointly promote the development of the teaching of ideological and political theory courses in Guangxi's colleges and universities. If you have any questions in the process of filling out the questionnaire or want to know more information, please feel free to contact me by e-mail. The e-mail address is 1815678682@qq.com. I promise to keep any of your personal information strictly confidential. Thank you for your assistance and support.

Appendix C2: Table of experts' evaluation of "Questionnaire on the status of mobile interactive teaching for ideological and political courses in Guangxi colleges and universities"

I designed a questionnaire to understand better the current situation of mobile interactive teaching for ideological and political courses in Guangxi universities and colleges. All the questions in the following table are from the questions in the questionnaire. It is sincerely hoped that your professional evaluation will ensure the questionnaire's scientificity, validity, and relevance.

Part 1: General information of the respondents.

Instructions: Please write a mark ✓ in O corresponds to the actual situation about yourself.

Questions
1. Gender O Male O Female
2. Title O (1) No title O (2) Assistant teachers O (3) Lecturer O (4) Associate Professor O (5) Professor
3. Year of teaching experience O (1) Less than 1 year O (2) 1 to 3 years O (3) 3 to 5 years O (4) 5 to 10 years O (5) More than 10 years
4. Type of College O (1) First-tier Undergraduate university O (2) Second-tier Undergraduate College O (3) Vocational College

Part 2: Table of experts' evaluation of "Questionnaire on the status of mobile interactive teaching for ideological and political courses in Guangxi colleges and universities"

Instructions: Please rate each question item. Each item is rated on a 3-point scale: -1 = Disagree, 0 = Neutral, 1 = Agree. Please write ✓ in the space corresponding to each item. Only one rating can be selected for each item.

X: Teachers' attitudes and experiences with mobile interactive teaching software and devices	For experts		
	-1	0	1
1. I can proficiently use mobile teaching software and devices such as smartphones, tablets, and teaching APPs (e.g., Rain Classroom, Xuetangx, MOOC).			
2. I am familiar with various mobile teaching tools, including classroom management software and interactive APPs.			
3. I can quickly resolve technical problems when using mobile devices and software.			
4. I regularly attend mobile technology-related trainings to improve my technology skills.			
5. I know the latest research and educational practices on utilizing mobile devices for interactive teaching and learning.			
6. I include mobile interactive elements in my course design and evaluate the perception of these elements.			
7. I have ideas for innovative mobile interactive pedagogies and have experimented with new teaching methods.			
8. I think mobile interactive teaching methods can enhance students' interest in learning.			
9. The mobile interactive teaching method helps improve my teaching effectiveness.			
10. I am willing to promote and apply the mobile interactive teaching method.			

X: Teachers' attitudes and experiences with mobile interactive teaching software and devices	For experts		
	-1	0	1
11. I believe that mobile interactive teaching methods can enhance students' critical thinking skills.			
12. I believe mobile interactive teaching can promote student cooperation and communication.			
13. I spent enough time designing and preparing the mobile interactive instructional design.			

M: Students' attitudes toward mobile learning and technological conditions from the teacher's perspective	For experts		
	-1	0	+1
1. My college provides students with adequate technical support and resources for mobile interactive instruction.			
2. Students generally have a positive attitude towards using mobile interactive technology in their learning.			
3. Students can adapt to new mobile learning tools and platforms quickly.			
4. Course content is designed to facilitate learning and discussion via mobile devices and software.			
5. Course design that meets the characteristics of mobile learning can help students better absorb knowledge.			
6. Mobile interactive instruction has positive results for course content of varying difficulty.			
7. I have participated in or heard of other teachers' successes with mobile interactive teaching.			
8. College provides sufficient network bandwidth and hardware and software facilities to support mobile interactive teaching.			

M: Students' attitudes toward mobile learning and technological conditions from the teacher's perspective	For experts		
	-1	0	+1
9. Teaching resources can be updated in time to meet the needs of mobile interactive teaching.			
10. The school's technical support team can resolve technical problems encountered in teaching and learning effectively.			
11. The college provides teachers with adequate training to effectively utilize technology resources for teaching and learning.			
12. The network environment of our college can stably support large-scale mobile interactive teaching activities.			

Y: Effectiveness of teaching practices and student interaction	For experts		
	-1	0	+1
1. There has been a significant increase in student engagement in the classroom since adopting the mobile interactive teaching model.			
2. Students are willing to share questions and feedback with me in real-time via mobile software and devices.			
3. Students are utilizing their mobile devices more for group work and discussion.			
4. The motivation that students demonstrate in mobile interactive instruction can extend to learning activities outside the classroom.			
5. Mobile interactive pedagogy helps students understand and master the course.			
6. Mobile interactive pedagogy facilitates the improvement of students' achievement and academic performance.			
7. Students' performance on exams and assessments improved when they used mobile devices for learning.			

Y: Effectiveness of teaching practices and student interaction	For experts		
	-1	0	+1
8. Students are better able to express their views and opinions when using mobile devices.			
9. Students are more likely to ask and answer questions in a mobile interactive environment.			
10. I can keep track of students' learning through their mobile device use			
11. I set up online quizzes or forums for students to participate in discussions via their mobile devices.			

Appendix C3: First round of the Delphi method expert questionnaire

Thank you for participating in this expert consultation. The purpose of this consultation is to identify the elements of the mobile interactive teaching model, and I would appreciate your valuable suggestions and comments. I promise that the results of this consultation will be used for academic research only.

Part 1: General information of the respondents.

Instructions: Please write a mark ✓ in O corresponding to the actual situation about yourself.

Questions
1. Gender O Male O Female
2. Title O (1) No title O (2) Assistant teachers O (3) Lecturer O (4) Associate Professor O (5) Professor
3. Year of teaching experience O (1) Less than 1 year O (2) 1 to 3 years O (3) 3 to 5 years O (4) 5 to 10 years O (5) More than 10 years
4. Type of College O (1) First-tier Undergraduate university O (2) Second-tier Undergraduate College O (3) Vocational College

Part 2: Expert consultation on the elements of the mobile interactive teaching model

Please rate the indicators at each level listed below and suggest modifications. The scoring for this consultation ranges from 1 to 5 points, 1=very unimportant, 2=unimportant, 3=average, 4=important, 5=very important. Please mark a "√" in the box that corresponds to your opinion.

1. First-level elements of the mobile interactive teaching model

First-level elements	1	2	3	4	5	Suggestion
Technical Support						
Learning Environment						
Instructional Design						
Teaching Resources						
Evaluation Feedback						

2. Second-level elements of the mobile interactive teaching model

First-level elements	**Second-level elements**	**Description**	**1**	**2**	**3**	**4**	**5**	**Suggestion**
Technical Support	Mobile Terminal Technology	Tablets, smartphones and other devices to support learning anytime, anywhere						
	Wireless Communication Technology	Provide stable network connectivity to support interaction and resource access						
	Mobile Application Software	“Super star learning” app**,** etc., provide platforms for teaching and learning						
	Contextual Learning	Provide authentic or simulated learning situations to enhance the learning experience						

First-level elements	Second-level elements	Description	1	2	3	4	5	Suggestion
Learning Environment	Collaborative Learning	Promote interaction among students through group discussions and project collaboration						
	Personalized Learning	Customize learning content and pathways based on students' needs						
Instructional Design	Pre-class Preparation	Teachers release study materials in advance and students preview them independently						
	Classroom Interaction	To use a mobile app for real-time interactions, such as asking questions or taking tests						
	Post-class Extension	Using the mobile app students engage in self-directed inquiry learning and group discussions.						
Teaching Resources	Multimedia Resources	Video, audio, graphics and other formats						
	Online Courses	MOOC, SPOC and other online course resources						
	Digital Learning Materials	Provides a wealth of learning materials and references, also including multimedia resources						
Evaluation Feedback	Student Self-Assessment	Students self-assess their learning through the learning platform						
	Peer Assessment	Students evaluate each other and provide feedback						
	Teacher Evaluation	Teachers use the platform for personalized instruction and feedback						

Appendix C4: Second round of the Delphi method expert questionnaire

Thank you for participating in this expert consultation. The purpose of this consultation is to identify the elements of the mobile interactive teaching model, and I would appreciate your valuable suggestions and comments. I promise that the results of this consultation will be used for academic research only.

Part 1: General information of the respondents.

Instructions: Please write a mark ✓ in O corresponding to the actual situation about yourself.

Questions
1. Gender O Male O Female
2. Title O (1) No title O (2) Assistant teachers O (3) Lecturer O (4) Associate Professor O (5) Professor
3. Year of teaching experience O (1) Less than 1 year O (2) 1 to 3 years O (3) 3 to 5 years O (4) 5 to 10 years O (5) More than 10 years
4. Type of College O (1) First-tier Undergraduate university O (2) Second-tier Undergraduate College O (3) Vocational College

Part 2: Expert consultation on the elements of the mobile interactive teaching model

Please rate the indicators at each level listed below and suggest modifications. The scoring for this consultation ranges from 1 to 5 points, 1=very unimportant, 2=unimportant, 3=average, 4=important, 5=very important. Please mark a "√" in the box that corresponds to your opinion.

1. First-level elements of the mobile interactive teaching model

First-level elements	1	2	3	4	5	Suggestion
Technical Support						
Learning Methods						
Instructional Design						
Teaching Resources						
Evaluation Feedback						

2. Second-level elements of the mobile interactive teaching model

First-level elements	**Second-level elements**	**Description**	**1**	**2**	**3**	**4**	**5**	**Suggestion**
Technical Support	Mobile Terminal Technology	Tablets, smartphones and other devices to support learning anytime, anywhere						
	Wireless Communication Technology	Provide stable network connectivity to support interaction and resource access						
	Mobile Application Software	“Super star learning” app, etc., provide platforms for teaching and learning						
Learning	Contextual Learning	Provide authentic or simulated learning situations to enhance the learning						

First-level elements	Second-level elements	Description	1	2	3	4	5	Suggestion
Methods		experience						
	Collaborative Learning	Promote interaction among students through group discussions and project collaboration						
Instructional Design	Pre-class Preparation	Teachers release study materials in advance and students preview them independently. The use of mobile app for learning needs analysis, such as learning situation analysis, can also be used for instructional design, such as the design of interactive methods, the design of personalized learning paths, and the design of course content modularization.						
	Classroom Interaction	To use a mobile app for real-time interactions, such as asking questions, taking tests, project collaboration and research, real-time communication and feedback, online interactive discussions, mobile polling.						
	Post-class Extension	Using mobile APP, students can conduct independent inquiry learning and group discussion, as well as provide feedback on teaching and learning, construct learning communities, expand resource links, and display						

First-level elements	Second-level elements	Description	1	2	3	4	5	Suggestion
		learning outcomes.						
Teaching Resources	Online Courses	MOOC, SPOC and other online course resources						
	Digital Learning Materials	Provides a wealth of learning materials and references, also including multimedia resources						
Evaluation Feedback	Student Self-Assessment	Students self-assess their learning through the learning platform						
	Peer Assessment	Students evaluate each other and provide feedback						
	Teacher Evaluation	Teachers use the platform for personalized instruction and feedback						

Appendix C5: Lesson one for "Situation and Policies"

Lesson Title: The Belt and Road Initiative for Joint Development

Lecture Type: Theoretical lectures, mobile interactive teaching model lectures, Case-based teaching, Group discussion, Blended teaching model, etc.

Student groups being taught: Business English major, freshmen students

Duration: Two periods

Teaching Objectives

(1) Understand the core content and significance of the Belt and Road Initiative.

(2) To analyze the impact of the Belt and Road Initiative on international cooperation and global development.

(3) To enhance students' global vision and awareness of international cooperation through interactive discussions.

Teaching Focus and Difficulties

Focus: To understand the core content and significance of the Belt and Road.

Difficulties: Analyzing the global impact and complexity of the Belt and Road Initiative.

Teaching Tools and Methods

Mobile interactive software: Xuetangx and Rain Classroom apps, etc.

Hardware: Computers, cell phones or tablets, etc.

Teaching process

1. Preparation before class.

(1) Release learning materials: Teachers release diversified learning materials on the platform of Xuetangx, including videos, academic literature and interviews related to "Belt and Road", so as to let students study in advance. At the same time, teachers design some open questions for students to think about, and ask students to make short speeches in the discussion forum of Xuetangx platform to share their preliminary views before class.

(2) Pre-quizzes: Teachers post prep quizzes related to “the Belt and Road” through Rain Classroom, which include explanations of key terms, understanding of core concepts, and review of video content. This is to ensure that students have an initial grasp of the basic content and to provide a foundation for class discussion.

2. Classroom Interaction.

(1) Lecture and real-time interaction: The teacher explains the background and content of the Belt and Road Initiative through PPT, and at the same time asks questions in the Rain Classroom in real time, and students answer them online.

(2) Classroom group discussion: The practical impact of the Belt and Road Initiative on international cooperation and global development. Use Rain Classroom to conduct classroom group discussions. Specific questions for discussion may include how the Belt and Road Initiative affects the economy, society, culture, etc.

(3) Feedback: Each group of students report through Rain Classroom, including the main points of discussion, differences and consensus reached. The teacher can comment on each group's report, encourage students to think deeply and make suggestions for improvement.

3. After-class extension.

Encourage students to build a learning community on the Xuetangx platform to deepen their learning by sharing learning resources related to " the Belt and Road", asking questions and answering each other's questions. Teachers can participate regularly to provide guidance and feedback.

Post-class assignments

Complete a 2,000-word essay discussing the impact of the Belt and Road Initiative on China's relations with other countries and make recommendations.

Post-lesson summary and reflection

Teachers will post a summary and reflection of the lesson on the Xuetangx platform, pointing out students' highlights and shortcomings in the class and suggesting directions for improvement in subsequent lessons. Students can also be asked to submit personal reflections on what they have learned and what they need to improve.

Appendix C6: Lesson two for "Situation and Policies"

Lesson Title: Promoting the building of a community of human destiny

Lecture Type: Theoretical lectures, mobile interactive teaching model lectures, Case-based teaching, Group discussion, Blended teaching model, etc.

Student groups being taught: Marketing major, sophomore students

Duration: Two periods

Teaching Objective:

(1) To understand the core idea and global significance of the community of human destiny.

(2) Discuss the challenges and paths of building a community of human destiny.

(3) Enhance students' awareness of global governance through interactive discussion.

Teaching Focus and Difficulties

Focus: To understand and elaborate the concept of the community of human destiny and its connotation.

Difficulties: Explore the realistic path to realize the community of human destiny.

Teaching means and methods

Mobile interactive software: Xuetangx and Rain Classroom apps, etc.

Hardware: Computers, cell phones or tablets, etc.

Teaching process

1. Pre-class preparation

(1) Resource release: Release relevant literature and videos about the community of human destiny on the platform of Xuetangx, and students will study on their own. (2) Personalized design: According to students' learning background, teachers design personalized learning content on the platform, such as recommended reading and video explanation.

2. Classroom Interaction

(1) Check-in and Quiz: Use Rain Classroom to sign in and take quizzes.

(2) Interaction design: When the teacher explains the core ideas and connotations of the "Community of Human Destiny", students can answer and discuss in real time through the questioning function in Rain Classroom.

(3) Collaborative learning: Organize group discussions to explore how to promote the building of a community of human destiny and present them through the Rain Classroom.

(4) Dynamic assessment: Teachers can make real-time comments on students' discussion process through Rain Classroom, and provide instant guidance or supplement according to students' discussion results.

3. After-class extension

(1) Resource links: Students can continue to expand their reading on the Xuetangx platform, and teachers can recommend in-depth articles related to the course or analysis reports on international events on the platform.

(2) Learning community: Students join the learning community on the platform to exchange views with classmates or other learners around the world, and discuss the path to realize the "Community of Human Destiny".

(3) Learning achievement presentation: Students can present their learning achievements on the Xuetangx platform in the form of graphics, audio and video, and invite other students or teachers to comment on them.

Post-class assignments

Students submit a 1500-word analysis article, and the teacher will correct it and provide detailed feedback through the Xuetangx platform.

Post-lesson summary and reflection

The teacher summarizes the discussion results of this lesson through the Rain Classroom or Xuetangx platform and collects students' feedback by using the questionnaire function of the platform. Based on the students' feedback, the teacher will reflect on the design of the lesson, especially the effectiveness of mobile interactive teaching, and put forward proposals for improvement.

Appendix C7: Lesson three for "Situation and Policies"

Lesson Title: Establishing a correct outlook on employment and career choice for college students

Lecture type: Theoretical lectures, mobile interactive teaching model lectures, Case-based teaching, Group discussion, Blended teaching model, etc.

Student groups being taught: Elementary Education majors, sophomore students

Duration: Two periods

Teaching Objective

(1) To help students establish a positive employment mindset and a correct outlook on career choice.

(2) Provide information on job market trends and career paths.

(3) Enhance students' ability to prepare for employment through interaction and case study.

Teaching Focus and Difficulties

Focus: To establish a correct outlook on employment and career choice.

Difficulties: How to cope with the complex and changing employment environment.

Teaching Tools and Methods

Mobile interactive software: Xuetangx and Rain Classroom apps, etc.

Hardware: Computers, cell phones or tablets, etc.

Teaching process

1. Pre-course preparation.

(1) Learning demand analysis: Through the Xuetangx platform, a questionnaire on the current employment market trends is released to collect

students' understanding and confusion about the concepts of employment and career choice, and to understand students' needs.

(2) Learning Context Design: Real cases and related reports on the complex employment environment are posted on Xuetangx to guide students to feel the challenges in reality before learning.

(3) Interactive content design: Teachers upload an introductory video on Xuetangx explaining the basic concepts of employment and career choices, and encourage students to ask questions in the comment section below the video.

2. Classroom interaction:

(1) Teacher explanation and interaction: Teachers will share the classroom materials through Rain Classroom, explaining in depth the importance of the concepts of employment and career choice, and analyzing them in the light of the current employment situation. Students will be guided to discuss the impact of different employment concepts through case studies and use the real-time interactive function of Rain Classroom to vote or answer questions online.

(2) Group Discussion: Students will discuss "strategies for coping with complex employment environment" in groups and submit the results of the discussion in the Rain Classroom.

3. After-class extension:

Community interaction: Teachers regularly post discussion topics on Xuetangx, where students can exchange ideas and provide feedback to each other.

Demonstration of learning outcomes: Teachers will display the excellent employment plan on the platform for the whole class to refer to and learn from.

Post-class assignments

Write an employment plan covering personal career goals, path choices and action plans.

Post-class summary and reflection

Teachers summarize students' performance in the course, reflect on the actual effectiveness of teaching career perspective, and adjust future course design.

Appendix C8: Lesson four for "Situation and Policies"

Lesson Title: Climate Change Issues, Advancing Global Climate Governance

Lecture type: Theoretical lectures, mobile interactive teaching model lectures, Case-based teaching, Group discussion, Blended teaching model, etc.

Student groups being taught: Freshmen students majoring in preschool education

Duration: Two periods

Teaching Objectives

(1) Understand the scientific basis and global impacts of climate change.

(2) Analyze the current situation and challenges of global climate governance.

(3) Enhance students' awareness of environmental protection and global governance through discussion.

Teaching Focus and Difficulties

Focus: To understand the causes and impacts of climate change.

Difficulties: Analyze the complexity and challenges of global climate governance.

Teaching Tools and Methods

Mobile interactive software: Xuetangx and Rain Classroom apps, etc.

Hardware: Computers, cell phones or tablets, etc.

Teaching process

1. Pre-course preparation

(1) Learning demand analysis: release a questionnaire through the Xuetangx platform to understand students' level of awareness and concerns about climate change, providing data support for the subsequent teaching design.

(2) Learning context design: Publish authoritative scientific reports on

climate change and related policy documents on Xuetangx to guide students to perceive the seriousness of climate change in advance.

(3) Interactive content: Teachers upload a video introduction on climate change in advance and set up a discussion forum on the Xuetangx platform to encourage students to ask questions or express their preliminary views before learning.

2.Classroom interaction

(1) Teacher's explanation and interaction: Teachers share the courseware through Rain Classroom and explain in detail the scientific basis of climate change and its global impact. Utilize the real-time interactive function to set up a Q&A session to test students' understanding. Analyze the current global climate events and answer online polls or questions through Rain Classroom to enhance students' participation.

(2) Group Discussion: Students discuss "effective strategies for global climate governance" in groups and submit group discussion reports on Rain Classroom. The teacher will review the strategies submitted by the groups in real time and make comments in the classroom to encourage interaction and feedback among students.

3.After-class extension

(1) Learning community: Teachers post new discussion topics on Xuetangx, and students can exchange their views on global climate governance and evaluate each other in the learning community.

(2) Achievement display: Teachers' excellent reports will be displayed on the platform for other students' reference and learning to further deepen their understanding of climate governance.

Post-class assignments

Submit a 2000-word paper discussing the current situation and future direction of global climate governance.

Post-class summarization and reflection

Teachers reflect on the actual effect of climate change teaching and adjust the content of subsequent courses to ensure students' deep understanding of global climate governance.

Appendix C9: Lesson five for "Situation and Policies"

Lesson Title: Ecological civilization construction and protection of the natural environment

Types of lectures: Theoretical lectures, mobile interactive teaching model lectures, Case-based teaching, Group discussion, Blended teaching model, etc.

Student groups being taught: Fine Arts majors, sophomores

Duration: Two periods

Teaching Objectives

(1) Understand the connotation and importance of ecological civilization construction.

(2) Explore the concrete application and practice of the concept of green development.

(3) Enhance students' awareness and action of environmental protection.

Teaching Focus and Difficulties

Focus: Connotation and practice of ecological civilization construction.

Difficulties: Practical application of the concept of green development.

Teaching Tools and Methods

Mobile interactive software: Xuetangx and Rain Classroom apps, etc.

Hardware: Computers, cell phones or tablets, etc.

Teaching process

1. Pre-course preparation

(1) Learning demand analysis: release a questionnaire on the Xuetangx to understand the students' initial understanding of the concept of ecological civilization and green development and their concerns, so as to provide a basis for the subsequent teaching design.

(2) Learning context design: Publish core literature and practical cases on

ecological civilization and green development on the Xuetangx to guide students to perceive the importance and practical application of these concepts in advance.

(3) Interactive content: Teachers will post an introductory video on Xuetangx to introduce the basics of ecological civilization, and encourage students to ask questions or express their views below the video to form a preliminary interaction.

2.Classroom interaction

(1) Teacher explanation and interaction: Teachers will share the courseware through Rain Classroom, explaining in detail the connotation of ecological civilization construction and its practice in China, and analyzing the specific application of the green development concept. Using the real-time interactive function of Rain Classroom, the teacher sets up questions related to the construction of ecological civilization and guides the students to participate in the discussion through online voting or answering questions to test their understanding.

(2) Group Discussion and Presentation: Students will discuss in groups "how to practice the concept of green development in their personal lives" and submit discussion reports on Rain Classroom. Each group of students will present the results of their discussion through the Rain Classroom. The teacher will give immediate feedback based on the content of the presentation and encourage other students to participate in the comments and discussion.

3. After-class extension:

(1) Personalized Learning path: Students choose projects related to ecological civilization or green development on the Xuetangx platform to conduct in-depth research and write relevant reports, including practical case studies and personal environmental action plans.

(2) Learning community: Teachers regularly post new discussion topics on Xuetangx, such as "challenges and opportunities of ecological civilization", where students can discuss and evaluate each other's work to deepen their understanding of the concept of ecological civilization.

(3) Achievement display: Teachers will display the excellent project research reports on the platform for the whole class to refer to and learn from, and further stimulate students' environmental awareness and action.

Post-class assignments

Submit a 1,500-word article discussing a concrete practical case of ecological civilization building in China.

Post-class summary and reflection

Teachers summarize students' understanding of the concept of ecological civilization, reflect on the effectiveness of teaching green development, and improve the course content.

Appendix C10: Test form for teaching quality of ideological and political courses in Guangxi colleges and universities

This test form aims to assess the teaching quality of ideological and political courses in Guangxi universities. Your sincere answers will be an important help to our research. This questionnaire is expected to take 5-8 minutes. Please choose according to the actual situation. The information in this questionnaire will be kept confidential and used only for academic research, so please feel free to fill it out.

Part 1: General information of the respondents.

Instructions: Please write a mark ✓ in O corresponding to the actual situation about yourself.

Questions
1. Gender O Male O Female
2. Title O (1) No title O (2) Assistant teachers O (3) Lecturer O (4) Associate Professor O (5) Professor
3. Year of teaching experience O (1) Less than 1 year O (2) 1 to 3 years O (3) 3 to 5 years O (4) 5 to 10 years O (5) More than 10 years
4. Whether the MIT model was used O Yes O No

Part 2: Teaching Quality Test Form

The following scale covers different dimensions of teaching ideological and political courses in Guangxi universities and colleges. Please use the Likert scale below to rate each question item according to your situation. Each item is rated on a 5-point scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree. Please write ✓ in the space corresponding to each question item. Only one rating can be selected for each question item.

I. Student academic performance	1	2	3	4	5
1. Students' performance on the final exam accurately reflects their level of understanding of course content.					
2. Students show a high degree of correlation between daily class participation and performance on assignments.					
3. Students demonstrate competence in the course at the expected level.					
4. Students demonstrate interest and motivation for deeper learning in class.					

II. Student engagement	1	2	3	4	5
1. Students are highly motivated during class questions and in group discussions.					
2. Students think deeply in discussions and can offer insightful insights.					
3. Students collaborate to a high degree during group activities.					
4. Students reflect learning growth or new insights through class discussions.					

III. Level of knowledge acquisition	1	2	3	4	5
1. Students have a strong understanding of the key concepts of the course.					
2. Students can apply their knowledge to solve problems.					
3. Students demonstrate a deep understanding of the key concepts of the course during class discussions or oral presentations.					
4. Students ask questions and provide feedback during the course, demonstrating deep insight and understanding of what they are learning.					

IV. Student satisfaction	1	2	3	4	5
1. Students' satisfaction with the curriculum is high.					
2. Students' satisfaction with the teaching methods is at the expected level.					
3. Students are highly satisfied with the online resources and auxiliary learning tools (e.g. video teaching materials, interactive platforms, etc.) provided in this course.					
4. Students' evaluation of the overall experience of this course is high regarding the course content, teaching methods, the degree of interaction, and the knowledge and skills gained.					

V. Classroom atmosphere	1	2	3	4	5
1. The classroom is dynamic and positively interactive.					
2. Students are willing to share personal views and experiences.					
3. There is positive student interaction and discussion in the classroom.					
4. Students rate the classroom climate positively.					

VI. Course coverage	1	2	3	4	5
1. Instruction covers all core content in the course syllabus.					
2. Students can grasp all key concepts of the course.					
3. The course content contributed to students' overall understanding of the relevant areas of knowledge.					
4. Students are satisfied with the depth and breadth of content covered in the course.					

VII. Student self-confidence	1	2	3	4	5
1. Student demonstrates a high level of self-confidence in specific topics or skills.					
2. Students demonstrate confidence and initiative in academic performance.					
3. Students can express personal views and opinions with confidence.					
4. Students are willing to accept and respond to academic challenges.					

Appendix C11: Evaluation of "Test form for teaching quality of ideological and political courses in Guangxi colleges and universities"

To assess the effectiveness of implementing the mobile interactive teaching model of ideological and political courses in Guangxi universities, as well as the comparison with the traditional teaching mode, I designed a teaching quality test form. All the questions in the following table are from the questions of the quality test form. It is sincerely hoped that your professional evaluation will ensure the scientificity, effectiveness, and relevance of the teaching quality test form.

Part 1: General information of the respondents.

Instructions: Please write a mark ✓ in O corresponding to the actual situation about yourself.

Questions
1. Gender O Male O Female
2. Title O (1) No title O (2) Assistant teachers O (3) Lecturer O (4) Associate Professor O (5) Professor
3. Year of teaching experience O (1) Less than 1 year O (2) 1 to 3 years O (3) 3 to 5 years O (4) 5 to 10 years O (5) More than 10 years
4. Whether the MIT model was used O Yes O No

Part 2: Evaluation of "Test form for teaching quality of ideological and political courses in Guangxi colleges and universities"

Instructions: Please rate each question item. Each item is rated on a 3-point scale: -1 = Disagree, 0 = Neutral, 1 = Agree. Please write ✓ in the space corresponding to each question item. Only one rating can be selected for each item.

I. Student academic performance	For experts		
	-1	0	1
1. Students' performance on the final exam accurately reflects their level of understanding of course content.			
2. Students show a high degree of correlation between daily class participation and performance on assignments.			
3. Students demonstrate competence in the course at the expected level.			
4. Students demonstrate interest and motivation for deeper learning in class.			

II. Student engagement	For experts		
	-1	0	1
1. Students are highly motivated during class questions and in group discussions.			
2. Students think deeply in discussions and can offer insightful insights.			
3. Students collaborate to a high degree during group activities.			
4. Students reflect on learning growth or new insights through class discussions.			

III. Level of knowledge acquisition	For experts		
	-1	0	1
1. Students have a strong understanding of the key concepts of the course.			
2. Students can apply their knowledge to solve problems.			
3. Students demonstrate a deep understanding of the key concepts of the course during class discussions or oral presentations.			
4. Students ask questions and provide feedback during the course, demonstrating deep insight and understanding of what they are learning.			

IV. Student satisfaction	For experts		
	-1	0	1
1. Students’ satisfaction with the curriculum is high.			
2. Students' satisfaction with the teaching methods is at the expected level.			
3. Students are highly satisfied with the online resources and auxiliary learning tools (e.g. video teaching materials, interactive platforms, etc.) provided in this course.			
4. Students' evaluation of the overall experience of this course is high regarding the course content, teaching methods, the degree of interaction, and the knowledge and skills gained.			

V. Classroom atmosphere	For experts		
	-1	0	1
1. The classroom is dynamic and positively interactive.			
2. Students are willing to share personal views and experiences.			
3. There is positive student interaction and discussion in the classroom.			
4. Students rate the classroom climate positively.			

VI. Course coverage	For experts		
	-1	0	1
1. Instruction covers all core content in the course syllabus.			
2. Students can grasp all key concepts of the course.			
3. The course content contributed to students' overall understanding of the relevant areas of knowledge.			
4. Students are satisfied with the depth and breadth of content covered in the course.			

VII. Student self-confidence	For experts		
	-1	0	1
1. Student demonstrates a high level of self-confidence in specific topics or skills.			
2. Students demonstrate confidence and initiative in academic performance.			
3. Students can express personal views and opinions with confidence.			
4. Students are willing to accept and respond to academic challenges.			

Appendix D

The Results of the Quality Analysis of Research Instruments

Appendix D1: The results of experts' evaluation of "Questionnaire on the status of mobile interactive teaching for ideological and political courses in Guangxi colleges and universities"

E1, E2, E3, E4, and E5 in this table represent the assessment of each topic by five experts. Each expert rated the topic based on its relevance to the measurement objective. The scoring scale is 1: the topic is highly relevant to the measurement objective; 0: the topic is moderately relevant to the measurement objective; -1: the topic is not relevant to the measurement objective.

X: Teachers' attitudes and experiences with mobile interactive teaching software and devices	**Expert opinion**					
	E1	E2	E3	E4	E5	IOC
1. I can proficiently use mobile teaching software and devices such as smartphones, tablets, and teaching APPs (e.g., Rain Classroom, Xuetangx, MOOC).	1	1	0	0	1	0.6
2. I am familiar with various mobile teaching tools, including classroom management software and interactive APPs.	1	0	1	0	1	0.6
3. I can quickly resolve technical problems when using mobile devices and software.	1	1	1	0	1	0.8
4. I regularly attend mobile technology-related trainings to improve my technology skills.	1	1	0	0	1	0.6
5. I know the latest research and educational practices on utilizing mobile devices for interactive teaching and learning.	1	0	1	0	1	0.6
6. I include mobile interactive elements in my course design and evaluate the perception of these elements.	0	1	1	0	1	0.6
7. I have ideas for innovative mobile interactive pedagogies and have experimented with new teaching methods.	1	1	1	0	1	0.8
8. I think mobile interactive teaching methods can enhance students' interest in learning.	1	1	1	0	1	0.8

X: Teachers' attitudes and experiences with mobile interactive teaching software and devices	Expert opinion					
	E1	E2	E3	E4	E5	IOC
9. The mobile interactive teaching method helps improve my teaching effectiveness.	1	1	1	0	0	0.6
10. I am willing to promote and apply the mobile interactive teaching method.	1	1	0	1	1	0.8
11. I believe that mobile interactive teaching methods can enhance students' critical thinking skills.	1	1	1	1	1	1
12. I believe mobile interactive teaching can promote student cooperation and communication.	1	0	1	1	1	0.8
13. I spent enough time designing and preparing the mobile interactive instructional design.	0	1	1	1	1	0.8

M: Students' attitudes toward mobile learning and technological conditions from the teacher's perspective	Expert opinion					
	E1	E2	E3	E4	E5	IOC
1. My college provides students with adequate technical support and resources for mobile interactive instruction.	1	0	1	1	1	0.8
2. Students generally have a positive attitude towards using mobile interactive technology in their learning.	1	1	0	1	0	0.6
3. Students can adapt to new mobile learning tools and platforms quickly.	1	0	1	1	1	0.8
4. Course content is designed to facilitate learning and discussion via mobile devices and software.	1	1	1	1	1	1
5. Course design that meets the characteristics of mobile learning can help students better absorb knowledge.	1	0	1	1	1	0.8

M: Students' attitudes toward mobile learning and technological conditions from the teacher's perspective	**Expert opinion**					
	E1	E2	E3	E4	E5	IOC
6. Mobile interactive instruction has positive results for course content of varying difficulty.	1	1	1	1	1	1
7. I have participated in or heard of other teachers' successes with mobile interactive teaching.	1	1	0	1	1	0.8
8. College provides sufficient network bandwidth and hardware and software facilities to support mobile interactive teaching.	1	1	1	1	1	1
9. Teaching resources can be updated in time to meet the needs of mobile interactive teaching.	1	0	0	1	1	0.6
10. The school's technical support team can resolve technical problems encountered in teaching and learning effectively.	1	1	1	1	1	1
11. The college provides teachers with adequate training to effectively utilize technology resources for teaching and learning.	1	1	0	1	1	0.8
12. The network environment of our college can stably support large-scale mobile interactive teaching activities.	1	1	0	1	1	0.8

Y: Effectiveness of teaching practices and student interaction	**Expert opinion**					
	E1	E2	E3	E4	E5	IOC
1. There has been a significant increase in student engagement in the classroom since adopting the mobile interactive teaching model.	1	1	1	1	1	1
2. Students are willing to share questions and feedback with me in real-time via mobile software and	1	0	0	1	1	0.6

Y: Effectiveness of teaching practices and student interaction	Expert opinion					
	E1	E2	E3	E4	E5	IOC
devices.						
3. Students are utilizing their mobile devices more for group work and discussion.	1	0	1	1	1	0.8
4. The motivation that students demonstrate in mobile interactive instruction can extend to learning activities outside the classroom.	1	1	0	1	1	0.8
5. Mobile interactive pedagogy helps students understand and master the course.	0	0	1	1	1	0.6
6. Mobile interactive pedagogy facilitates the improvement of students' achievement and academic performance.	1	1	1	1	1	1
7. Students' performance on exams and assessments improved when they used mobile devices for learning.	1	0	1	1	1	0.8
8. Students are better able to express their views and opinions when using mobile devices.	1	0	1	1	1	0.8
9. Students are more likely to ask and answer questions in a mobile interactive environment.	1	1	1	1	1	1
10. I can keep track of students' learning through their mobile device use	1	1	0	1	1	0.8
11. I set up online quizzes or forums for students to participate in discussions via their mobile devices.	1	0	1	1	1	0.8

Appendix D2: The results of the evaluation of "Test form for teaching quality of ideological and political courses in Guangxi colleges and universities"

E1, E2, E3, E4, and E5 in this table represent the assessment of each topic by five experts. Each expert rated the topic based on its relevance to the measurement objective. The scoring scale is 1: the topic is highly relevant to the measurement objective; 0: the topic is moderately relevant to the measurement objective; -1: the topic is not relevant to the measurement objective.

I. Student academic performance	Expert opinion					
	E1	E2	E3	E4	E5	IOC
1. Students' performance on the final exam accurately reflects their level of understanding of course content.	1	1	0	1	1	0.8
2. Students show a high degree of correlation between daily class participation and performance on assignments.	1	0	0	1	1	0.6
3. Students demonstrate competence in the course at the expected level.	1	1	1	1	1	1
4. Students demonstrate interest and motivation for deeper learning in class.	1	1	-1	1	1	0.6

II. Student engagement	Expert opinion					
	E1	E2	E3	E4	E5	IOC
1. Students are highly motivated during class questions and in group discussions.	1	1	1	1	1	1
2. Students think deeply in discussions and can offer insightful insights.	1	1	0	1	1	0.8
3. Students collaborate to a high degree during group activities.	1	0	0	1	1	0.6
4. Students reflect on learning growth or new insights through class discussions.	1	1	-1	1	1	0.6

III. Level of knowledge acquisition	Expert opinion					
	E1	E2	E3	E4	E5	IOC
1. Students have a strong understanding of the key concepts of the course.	1	1	0	1	1	0.8
2. Students can apply their knowledge to solve problems.	1	1	1	1	1	1
3. Students demonstrate a deep understanding of the key concepts of the course during class discussions or oral presentations.	0	1	0	1	1	0.6
4. Students ask questions and provide feedback during the course, demonstrating deep insight and understanding of what they are learning.	1	0	1	1	1	0.8

IV. Student satisfaction	Expert opinion					
	E1	E2	E3	E4	E5	IOC
1. Student satisfaction with the curriculum is high.	1	1	0	1	1	0.8
2. Students' satisfaction with the teaching methods is at the expected level.	1	1	1	1	1	1
3. Students are highly satisfied with the online resources and auxiliary learning tools (e.g. video teaching materials, interactive platforms, etc.) provided in this course.	1	1	0	1	0	0.6
4. Students' evaluation of the overall experience of this course is high regarding the course content, teaching methods, the degree of interaction, and the knowledge and skills gained.	1	1	0	1	1	0.8

V. Classroom atmosphere	Expert opinion					
	E1	E2	E3	E4	E5	IOC
1. The classroom is dynamic and positively interactive.	0	1	1	1	1	0.8
2. Students are willing to share personal views and experiences.	1	-1	1	1	1	0.6
3. There is positive student interaction and discussion in the classroom.	1	1	0	1	1	0.8
4. Students rate the classroom climate positively.	1	1	1	1	1	1

VI. Course coverage	Expert opinion					
	E1	E2	E3	E4	E5	IOC
1. Instruction covers all core content in the course syllabus.	1	1	0	1	1	0.8
2. Students can grasp all key concepts of the course.	1	1	0	1	1	0.8
3. The course content contributed to students' overall understanding of the relevant areas of knowledge.	1	1	1	1	1	1
4. Students are satisfied with the depth and breadth of content covered in the course.	0	1	0	1	1	0.6

VII. Student self-confidence	Expert opinion					
	E1	E2	E3	E4	E5	IOC
1. Student demonstrates a high level of self-confidence in specific topics or skills.	1	0	0	1	1	0.6
2. Students demonstrate confidence and initiative in academic performance.	1	0	1	1	1	0.8
3. Students can express personal views and opinions with confidence.	0	1	1	1	1	0.8
4. Students are willing to accept and respond to academic challenges.	1	1	1	0	1	0.8

Appendix E

Certificate of English

BANSOMDEJCHAOPRAYA
RAJABHAT UNIVERSITY

This is to certify that

Mr. Gao Liebo

Achieved BSRU English Proficiency Test (BSRU-TEP) level

C2

Given on 22nd August 2021

(Assistant Professor Dr Kulsirin Aphiratvoradej)

Director

Appendix F

The Document for Acceptance Research

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LETTER OF ACCEPTANCE

Dear author/s: Gao Liebo , Prapai Sridama , Piyanan Issarawit , Kanakorn Sawangcharoen

It's a great pleasure to inform you that, after the peer review process, your article, 'Mobile Interactive Teaching Model of College Ideological and Political Courses in Guangxi" has been accepted and considered for publication in the **Pakistan Journal of Life and Social Sciences**.

The article will be Published in **Volume 22, 2024**.

Please make sure to pay the publication fee within five business days. If you have any further questions, please do not hesitate to contact us.

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