

# **Innovative Practice of the "3S Teaching Model" Based on Smart Education: A Case Study of the Mobile Communication Course**

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**Abstract:** This study addresses key issues in the teaching of the Mobile Communication course, such as the insufficient use of smart technologies, students' limited learning capabilities, and outdated teaching methods. In response, an innovative "3S Teaching Model" has been developed, integrating the latest trends in smart education. This model revolves around three core elements: smart environment, smart teaching, and smart assessment. Anchored in the principles of Outcome-Based Education (OBE), the model utilizes information technology to create an advanced learning environment, develop student-centered teaching strategies, and implement assessment methods that align with talent cultivation. This approach aims to improve the quality and effectiveness of teaching, with a strong focus on enhancing students' abilities and fostering the growth of "smart" talents. Since its introduction, the 3S model has yielded significant results, including the standardization of course structure, the development of comprehensive course resources, and improved course evaluations and learning outcomes.

**Keywords:** Smart Education; 3S Model; Smart Environment; Smart Teaching; Smart Assessment; Mobile Communication

## **1. Introduction**

Smart education refers to a novel educational model shaped by modern information technologies such as the Internet, the Internet of Things (IoT), cloud computing, and wireless communication. This model is characterized by interconnectedness, intelligence, perceptiveness, and ubiquity[1-3], with innovative teaching methods and approaches at its core[4].

At its essence, smart education centers on the student, leveraging information technology to create and innovate effective teaching models that foster personalized, intelligent, and

experiential learning environments. This approach aims to develop high-quality educational content, establish rational resource allocation mechanisms, and enhance learners' abilities in information application and problem-solving across multiple levels[5-8].

Thus, the crux of smart education lies in comprehensively reshaping the educational landscape through information technology, deeply integrating it into the development of educational resources. This integration promotes the co-creation and sharing of technological, knowledge, and achievement innovations, thereby improving the quality and efficiency of education and teaching. It also propels the historical process of educational reform and development, leading to a harmonious educational information ecosystem[9,10].

In summary, smart education, as a key marker of educational modernization, is an inevitable outcome of the development of an information-driven society and a necessary trend for the future of education. In response, we have actively engaged in research and practice concerning the reform of teaching models under the framework of smart education. By aligning with the features and forms of smart education, we have proactively pursued changes in educational concepts and cultivation methods, aiming to gain a competitive edge in the wave of educational reform and development.

## **2. Challenges in the Original Teaching Approach of the Course**

The course "Mobile Communication" is a core requirement for students majoring in communication engineering. It equips them with a solid theoretical foundation for future work in the research and development of mobile and wireless communication systems while fostering essential practical skills. Despite its importance and distinctive nature, the course

has long been plagued by several persistent teaching challenges.

### 2.1 Insufficient Use of Smart Technologies

Many professional courses in higher education suffer from insufficient digital integration, and "Mobile Communication" is no exception. The course still relies heavily on traditional tools like PowerPoint, failing to harness the full potential of modern technological advancements. As a result, the transformation of education through technology remains limited. Specifically, the course lacks a comprehensive smart learning system and adequate online and offline resources, creating a significant gap between current teaching methods and the potential for deep integration of information technology into the curriculum.

### 2.2 Students' Limited Learning Capabilities

Learning is the top priority for students, and helping them develop strong learning skills is an essential part of education, which requires students to be self-aware, motivated, and focused on both understanding and applying knowledge. However, prior to its recent innovations, the "Mobile Communication" course lacked smart tools for tracking students' learning progress and failed to support individualized, fragmented, and differentiated learning needs. Consequently, it struggled to foster students' growth in learning capabilities. Under a smart education framework, learning processes should encourage self-directed, collaborative, innovative, and adaptive skills, empowering students to monitor, manage, and refine their learning strategies. This approach nurtures critical decision-making abilities, instills good learning habits, and encourages effective use of educational technology.

### 2.3 Outdated Teaching Methods

A teaching model serves as a structured framework for educational activities, guided by pedagogical theories and philosophies. A well-designed model is crucial for developing students with the competencies needed for the modern world. However, the original teaching model for the "Mobile Communication" course did not fully leverage the benefits of digitalization, networking, intelligence, or multimedia technologies. Moreover, it failed to embrace the open, shared, interactive, and collaborative principles central to contemporary education. To modernize this model, it is

necessary to address core elements such as teaching methodologies, content delivery, and support systems. By constructing a scientific and sustainable teaching framework and developing robust online and offline resources, the course can provide students with personalized learning pathways. Simultaneously, educators can utilize data-driven insights to better understand each student's progress, facilitating more informed teaching decisions and advancing higher education reform under the smart education paradigm.

### 3. Innovations in the Course

The goal of this course's innovative practice is to address the challenges in the teaching process by adopting the "3S Teaching Model" (Smart Environment, Smart Teaching, Smart Assessment) under the framework of smart education. By integrating the specific requirements and characteristics of smart education, this model aims to foster the development of intelligent talent. The logical components of the "3S Teaching Model" are illustrated in Figure 1:

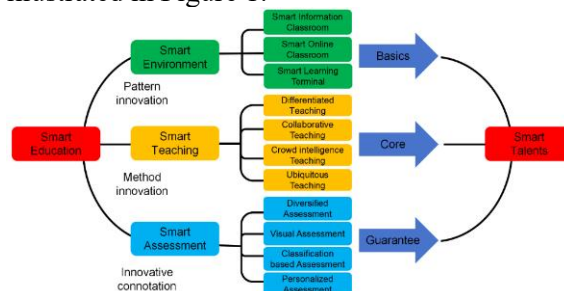


Figure 1. Mind Map of the "3S Teaching Model"

The model comprises three main components:

#### 3.1 Smart Environment: The Foundation of the "3S Teaching Model"

The purpose of constructing a smart environment is to build the necessary software and hardware infrastructure that aligns with the demands of smart education. This includes the development of smart information classrooms, smart online learning platforms, and smart learning terminals.

#### 3.2 Smart Teaching: The Core of the "3S Teaching Model"

The aim of smart teaching is to establish teaching methods that meet the requirements of smart education. It promotes the deep integration of information technology with

subject teaching and facilitates the comprehensive, efficient, and innovative use of these technologies in the design and implementation of teaching and learning activities before, during, and after the course.

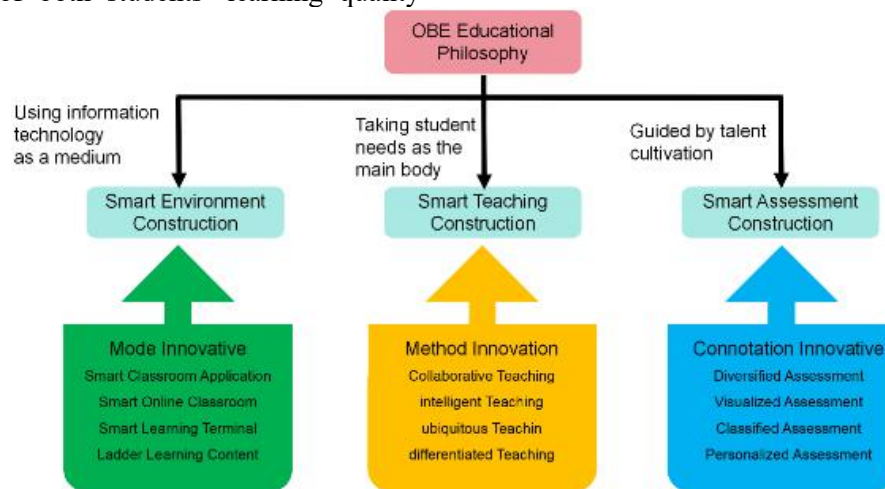
### 3.3 Smart Assessment: The Guarantee of the "3S Teaching Model"

The goal of smart assessment is to create an evaluation system that adheres to the principles of smart education. By leveraging next-generation technologies such as the IoT, cloud computing, mobile communication, and big data, this system enables the scientific assessment of both students' learning quality

and teachers' teaching effectiveness. This intelligent and sustainable assessment framework provides valuable insights that guide further reforms in subject teaching.

### 4. Implementation of Course Innovation

The implementation of course innovation is structured around the three key components of the "3S Teaching Model," guided by the principles of Outcome-Based Education (OBE). This approach focuses on innovating and practicing the model within the framework of smart education. The pathways for implementation are depicted in Figure 2.

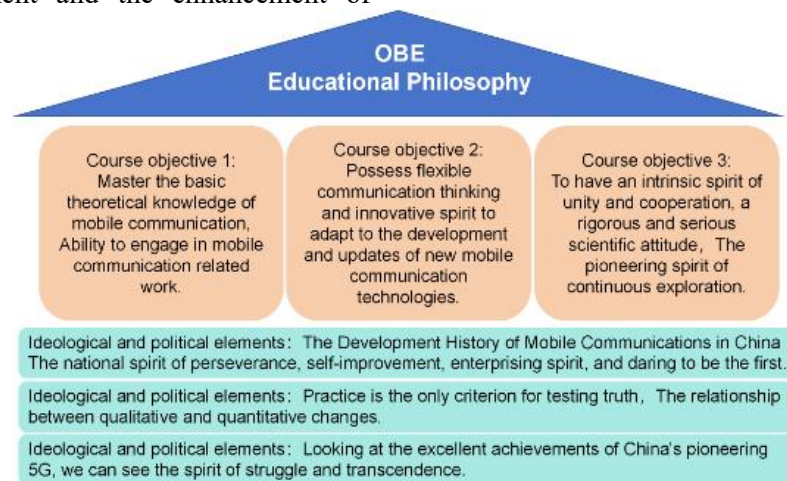


**Figure 2. Implementation Pathways for the "3S Teaching Model"**

### 4.1 Establishing a Strong Foundation with OBE Principles

The OBE educational philosophy serves as the guiding framework for the reform and innovation of the teaching model. The central focus remains aligned with the objectives of talent development and the enhancement of

students' scientific literacy and innovative thinking abilities. Throughout this process, ideological and political elements are seamlessly integrated into the curriculum. Figure 3 illustrates the specific course objectives and how ideological and political elements are incorporated.



**Figure 3. Course Objectives and Layout of Ideological and Political Elements**

#### 4.2 Building a Smart Environment through Information Technology

By leveraging innovation in models, this section aims to implement the relevant components of the "3S Teaching Model" within the context of smart education. Key aspects include the functional applications of smart information classrooms, the organization and formats of smart online classes, the deployment of smart learning terminals, and the incorporation of progressive learning content. The specific distribution of course task point types is shown in Figure 4.

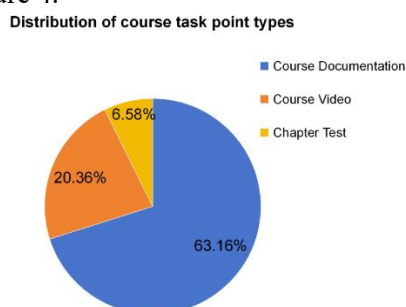


Figure 4. Structure of Progressive Learning Content

#### 4.3 Designing Smart Teaching with a Student-Centered Approach

By focusing on the needs of students, the teaching methods within the "3S Teaching Model" are transformed to reflect smart teaching practices. This includes the exploration and application of collaborative, collective intelligence-based, and ubiquitous teaching strategies. The design of learning phases and the

implementation of appropriate teaching measures ensure that learning is both dynamic and personalized.

#### 4.4 Developing Smart Assessment Aligned with Talent Cultivation

The smart assessment system is designed to support the goals of talent development. Through innovation, this system provides a diversified, visualized, categorized, and personalized evaluation process. The assessment methods are subject to rigorous scientific analysis and evaluation, as outlined in Figure 5.

### 5. Effects of Course Innovation

#### 5.1 Standardized Course Construction

Since the implementation of teaching innovations, the course "Mobile Communication" has developed a complete and organized set of teaching documents, including the syllabus, teaching schedules, lesson plans, and grading records. These materials are archived systematically and comply with established standards. The course textbook is scientifically selected from nationally recognized resources, catering to the needs of applied talent development. The syllabus follows a rigorous development process, effectively supporting the achievement of course objectives, and its execution has proven successful. Additionally, the teaching schedule aligns consistently with the syllabus, ensuring a reasonable and coherent structure.

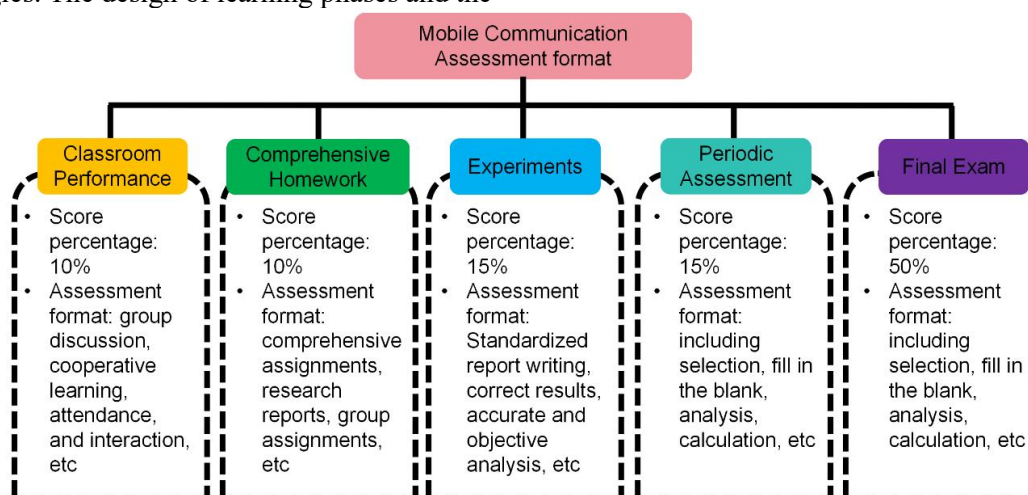


Figure 5. Smart Assessment Structure of the "3S Teaching Model"

#### 5.2 Comprehensive Course Resources

A well-rounded collection of online and offline

teaching materials has been established, continually updated, and available for both in-class and online learning. The course



"Mobile Communication" is hosted on the Chaoxing Fanya platform, offering a sustainable set of online resources, including video lectures, document libraries, assignment repositories, and exam question banks. These resources are accessible on both mobile apps and PC platforms, facilitating ubiquitous learning. Currently, the course boasts abundant teaching resources, which operate smoothly and are widely used. Moreover, the course integrates political and ideological elements, with clearly defined objectives, innovative formats, and a strong focus on guiding students toward core values.

### 5.3 High Course Evaluation

Over the past three years, numerous evaluations have been conducted by school leadership, teaching supervisors, and peer instructors who have attended lectures. The average score from teaching supervisors has consistently been  $\geq 90$  points, while peer evaluations also averaged  $\geq 90$  points. Student evaluations averaged  $\geq 85$  points, indicating good academic performance, high achievement of course objectives, and overall satisfaction with the course.

### 5.4 Significant Course Outcomes

Through theoretical instruction in the classroom and enhanced extracurricular activities, students have actively participated in national competitions such as the "Datang Cup" 5G Competition for University Students and the "Lanqiao Cup" 5G Competition, winning 4 national third prizes and more than 70 provincial third prizes or higher. The teaching team has also been recognized multiple times in various competitions, including the university's micro-course competitions and youth teacher competitions in electronic information disciplines.

### 6. Conclusions

Since the implementation of the innovative "3S Teaching Model" in smart education, guided by the OBE principles, the course has focused on scientific cultivation, smart education, and fostering innovative capabilities. Efforts have been made to enhance the integration of teaching technology, seamlessly connecting theory with practice while continuously updating the curriculum to ensure its relevance and forward-thinking approach. The benefits of

modern educational technology have been fully leveraged to transform traditional teaching methods, resulting in the development of sustainable online and offline teaching resources for the "Mobile Communication" course. Additionally, great emphasis has been placed on diversifying extracurricular activities, creating a platform for students to develop both their practical skills and innovative thinking. This approach extends beyond the classroom, encouraging students to engage in independent learning through hands-on practice in extracurricular settings. As a result, students are more actively involved, gaining substantial practical expertise and achieving remarkable academic and personal growth, which has significantly contributed to the success of the teaching model.

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