

# Research on the strategies of promoting the development of teachers' professional ability through intelligent training

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**Abstract.** With the CPC Central Committee and The State Council attaching great importance to teaching and research work and the introduction of relevant policy documents on the use of new technologies to innovate teaching and research work methods, the form of teachers' teaching and research has undergone earth-shaking changes. The new generation of intelligent technology promotes the new development of teaching and research, and the teaching and research work in the field of basic education across the country has tried to explore the new form of teachers' teaching and research work in the network environment, and the intelligent research and training platform has emerged. The strategy study case of promoting the development of teachers' professional ability by intelligent training is selected from the third batch of "Intelligent training platform application pilot work school" - Guiyang Qinghua Middle School. The eighth grade Chinese team (11 teachers) of the school took "The skill of killing cattle" as an example to carry out research and training activities, explaining its application and practice process -- using the platform to carry out data tracking of the whole process of preparation, grinding, evaluation, discussion, practice and thinking of lessons, helping teachers to promote the progress of teaching and research activities from "Internet" to "informatization" and then to "intelligence". Provide reference for achieving excellent development of professional competence.

**Keywords:** Intelligent training platform Data analysis Strategy research

## 1. Research background

All In recent years, the CPC Central Committee and The State Council have attached great importance to the work of teaching and research, and successively issued relevant documents such as the Guiding Opinions on Promoting the construction of new Education Infrastructure and Building a high-quality Education Support System, the Opinions on Implementing the Excellent Teacher Training Plan 2.0, and the Opinions of the Ministry of Education on Implementing the National Information Technology Application Ability Improvement Project 2.0 for Primary and Secondary School Teachers. It emphasizes the use of new technologies to innovate teachers' teaching and research methods [1]. As an important part of teaching and research work, teachers need to constantly adapt to the changes brought by this technology and improve their professional ability to meet the growing needs of education. However, the traditional research and training methods are often limited by time and space, and it is difficult to meet the needs of teachers' individuation and flexibility. In order to explore the new form of teachers' teaching and research work under the new technology, solve the problems existing in the traditional teaching and research process, and make full use of the advantages of information technology, the "intelligent research platform" represented by precision teaching and research came into being. The intelligent training platform makes use of "data advantage" and "time and space advantage" to provide teachers with more convenient and flexible learning methods, which is conducive to promoting the continuous improvement of teachers' professional ability. Therefore, intelligent training has become a new way to promote the professional development of teachers, and studying how to effectively use intelligent training platform to promote the development of teachers' professional ability has become a hot research field. This study takes Qinghua Middle School in Guiyang, Guizhou Province as a case, takes smart classroom as an opportunity, and puts forward strategies to promote the development of teachers' professional competence through intelligent research and training activities with empirical evidence and accurate data. These strategies aim to help teachers promote the development of

educational informatization in our school from "Internet" to "informatization" and then to "intelligence", so as to solve the long-standing and difficult problems in traditional teaching.

## 2. The intelligent research and training platform helps teachers to accurately teach and research

### 2.1 Content and method of intelligent research and training platform

#### 2.1.1 Construction of intelligent research and training environment

This study is based on the intelligent study platform provided by the Central Audio-Visual Education Center (referred to as the Central Center). Qinghua Middle School in Guiyang, Guizhou Province is equipped with a recording and broadcasting classroom with intelligent analysis function, and the classes are equipped with interactive multimedia teaching equipment with normal recording and broadcasting function to achieve interconnection. The purpose is to provide platform guarantee, technical support and ecological foundation for building a teacher team based on accurate data feedback. Two features of the intelligent research and training platform, "scale rating + AI analysis", are utilized to realize collaborative preparation, grinding, evaluation, practice and lesson thinking, and to help teachers carry out the design and application of "empirical + accurate data" research and training activities<sup>[2]</sup>. The 10 main participants of this study came from Qinghua Middle School in Guiyang, Guizhou Province, among which 2 were teaching and research staff, who organized, guided and demonstrated the whole study activity. One of the teaching and research staff was an assistant to assist the teaching and research staff in completing the study activity. There are also 8 middle school language teachers (study members).

#### 2.1.2 Relying on intelligent research and training platform, improve the quality and efficiency of the classroom

Relying on the intelligent training platform to carry out "empirical + accurate data" training activities can optimize the traditional form of lesson preparation. The process of studying grinding course is reconstituted and iteratively upgraded. Using the platform to carry out collective lesson preparation can realize the whole process of "preparation-research-application" in one stop (as shown in Figure 1), making lesson preparation more accurate and efficient. Relying on the "empirical + accurate data" provided by the platform, teachers are no longer simply limited to the subjective judgment of experience, but are transformed into deep-level accurate data analysis, using data to speak, identifying "true" problems, and finding "true" ways to solve problems.

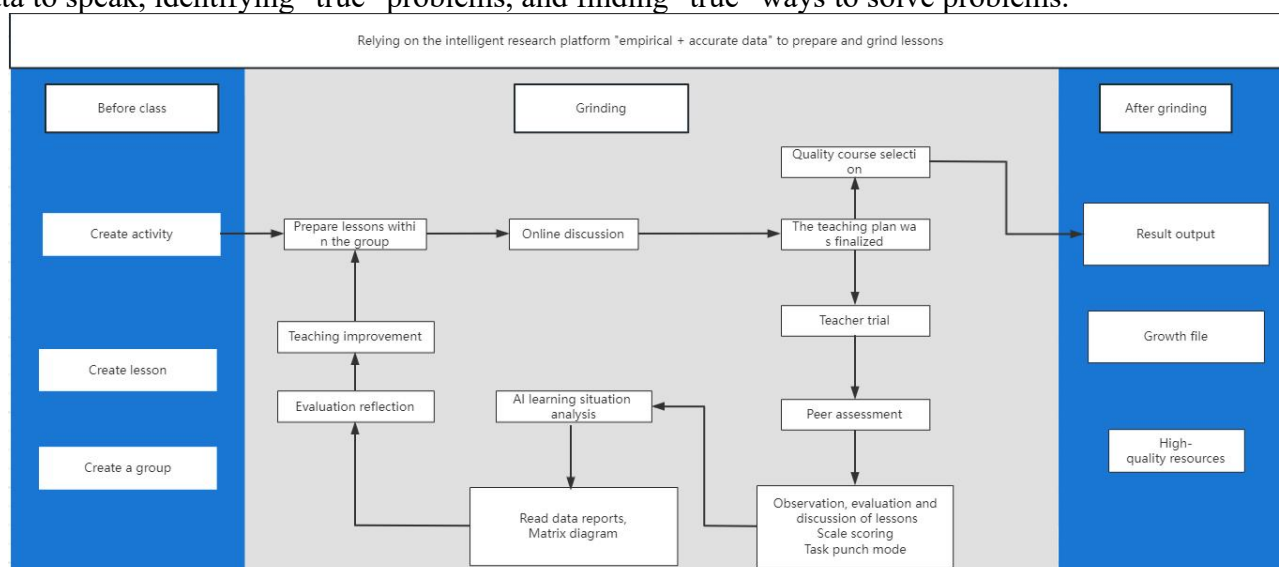


FIG. 1 Flow chart of grinding course

The teachers of the eighth grade Chinese Language team of the Star Sea Lesson Preparation Group took the lesson "Pao Ding Jie Niu" in the first volume of eighth grade as an example, and carried out training activities relying on the "empirical + accurate data" provided by the platform.

First of all, the Chinese lesson preparation Group created the Star Sea lesson preparation group team of eighth grade Chinese teachers on the platform, and each member joined the preparation group. Then, the lesson plans shared after the collective lesson preparation are uploaded to the intelligent research platform of the central library, and the basic teaching and research module in the platform is used to carry out online teaching and research. Since this is a Chinese activity class, the new and old teachers determined a teaching plan with sufficient activity task design from the four teaching plans through online discussion, and uploaded the teaching video related to this teaching plan to the platform.

Based on the excellent teaching plan, one of the classes is selected to have the class in the smart recording room. Video equipment is used to record 9 kinds of teaching behaviors of teachers and students in real time: "inspection, interaction between teachers and students, lecturing, blackboard writing, raising hands, listening to lectures, interaction between students and students, response, reading and writing". Meanwhile, 6 dimensions of learning analysis data are recorded, such as: Through accurate monitoring of data such as "class participation and teaching behavior timing", the platform will make intelligent analysis based on "scale scoring +AI learning situation analysis" and generate a series of data reports (as shown in Figure 2) to provide scientific and accurate supporting basis for subsequent collective lesson planning and teaching.

Finally, based on the quantitative data report generated by the intelligent research and training platform, the process evaluation of teaching and research activities is carried out, and the process evaluation of teaching activities is carried out based on the data to optimize the classroom, so as to give play to the incentive and guiding role of evaluation on the improvement of teachers' professional level. With the data of "intelligent and accurate teaching and research" system, teachers' classroom habits are diagnosed. By judging students' classroom status, it is helpful to choose more appropriate contents and methods to improve and optimize teaching.

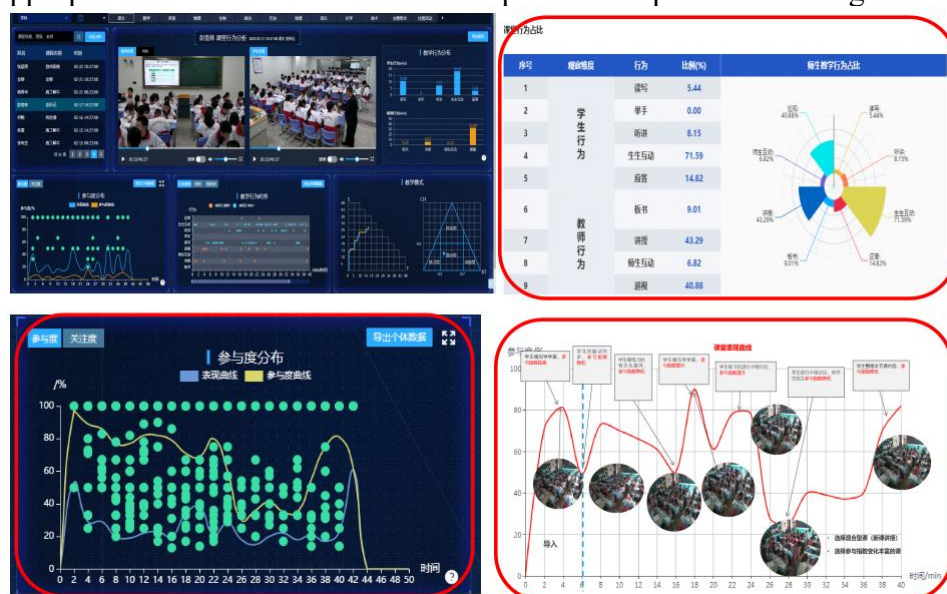


FIG. 2 "Demonstration + data" chart of "Pao Ding Jie Niu"

## 2.2 Intelligent precision teaching and research model, deep reflection to promote long

After the Chinese teaching of "The skill of killing cattle" in the eighth grade group, the teacher analyzed the causes of the problems according to the data and carried out accurate reflection.

### 2.2.1 Behavioral data of teachers and students

(1) Teaching behavior proportion chart. It can make classroom participation more active, and classroom behaviors include 4 kinds of teacher behaviors and 5 kinds of student behaviors. Through automatic collection and intelligent data analysis of classroom behaviors of teachers and students, AI classroom can facilitate teachers to reflect on and analyze teaching design, interactive situation and link setting, and provide practical basis for subsequent classroom improvement. For example, through the data analysis of the teaching behavior ratio chart in Figure 3: the teacher-student interaction accounted for 6.82% and the student-student interaction accounted for 71.59%, it can be inferred that students spent more time in group discussion, but less time in presentation and presentation, that is to say, students' performance tasks were insufficient, so evaluation implementation tended to be insufficient. The proportion of students raising hands is 0.00%, and the proportion of response is 14.82%, indicating that students' initiative and enthusiasm are not high. These data also guide teachers to find the causes of problems based on data analysis.



FIG. 3 The proportion of teaching behavior

(2) S-T curve and Rt-Ch diagram (analysis of classroom teaching behavior and pattern). Quantitative data reflecting the distribution of teaching behavior. The S-T action curve reflects the proportion of teacher's behavior and student's behavior in class, and helps teachers analyze whether there are large lecture segments or students' independent practice behaviors in class. Rt-CH teaching mode analysis, through the data calculation of the proportion of teacher behavior in the classroom, the proportion of student behavior, the conversion rate of teacher and student behavior, and present the judgment results of teaching mode in a visual form. The higher the CH value, the more frequent the communication and interaction between teachers and students. The less interaction there is on the other hand. As shown in Figure 4, students' behavior share is high -- up to 83%, which indicates that the classroom as a whole tends to be a teacher-exercise-type classroom, giving full play to students' main body status, which is consistent with the teaching concept of the new classroom.

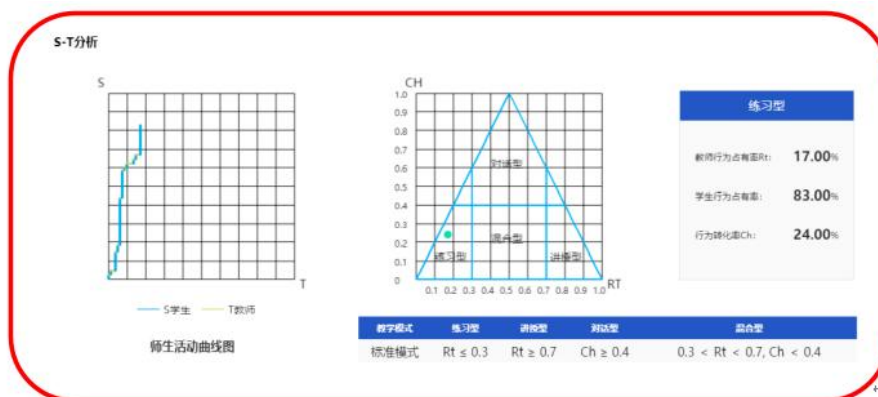


FIG. 4 Classroom teaching behavior and model diagram

### 2.2.2 Classroom participation curve

It mainly refers to the change of students' enthusiasm for participating in classroom activities in a complete class teaching, including participation curve, performance curve and so on. The higher the coordinate value of the curve, the higher the enthusiasm of students to participate in class activities, and the opposite, the lower. As shown in Figure 5, the curve analysis of this lesson shows that the performance curve of students is sometimes high and sometimes low, and most of the time it is stable. The effect of this lesson is not very ideal, students are always in a relatively discrete state, and the interaction rate between teachers and students and students is not high. There are troughs in the curve because during this period, only the teacher is explaining and patrolling, and the students have less time to do the problems, and there is less time for cooperative learning and discussion. Data collection of every student's performance, with the help of AI scale data, teachers can be more objective and accurate classroom improvement, the classroom is really "live" up! Teachers' classroom teaching is more scientific, and students' learning is more effective.

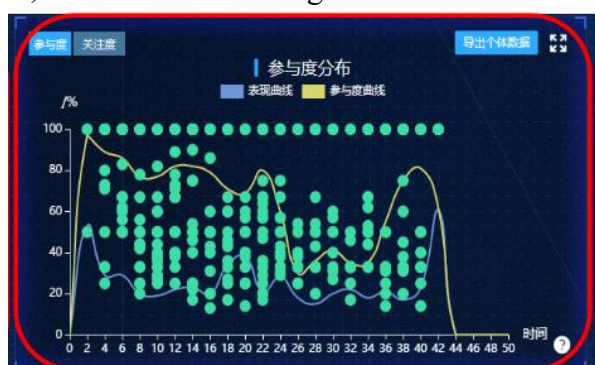


FIG. 5 Classroom participation curve

## 3. Strategies for promoting teachers' professional ability development through intelligent research and training

Through data analysis, it is found that there are shortcomings in the classroom teaching arrangement of teachers, mainly in the interaction between teachers and students, the interaction rate between students and students is not high, and the performance tasks are insufficient, so as to fail to mobilize the initiative and enthusiasm of students. To solve these problems, we can use intelligent research and training methods to help different teachers from different dimensions to accurately find the focus of improving classroom teaching and improve teachers' professionalism.

### 3.1 Wisdom discussion, online preparation, grinding, evaluation of lessons

With the development of artificial intelligence technology and the change of intelligent teaching environment, it is possible for teacher training and further education to achieve automation, normalization and scale. Teachers can use intelligent equipment and platforms for online communication, discussion, lesson grinding, lesson preparation and lesson evaluation [3]. Online grinding course changes the traditional form of grinding course, making teaching research from "generalization" to "precision" [4]. The intelligent research and training platform of Yangguan provides a mode of "multiple rounds of one lesson and repeated follow-up" for grinding classes, setting different time nodes, conducting one round of lesson preparation discussion, two rounds of lesson preparation discussion, classroom discussion and summary, and recording the process of each round, so that coaches and other peers can observe the improvement of the class. Various advanced technologies such as artificial intelligence, big data and Internet of things can be applied to teachers' lesson preparation and class data. Relying on the demonstration of "video + data" provided by the platform, data analysis model is established to cover teachers' teaching, blackboard writing, inspection and interaction between teachers and students, as well as students' raising hands,



listening to lectures, reading and writing, response and interaction between students and students from multiple dimensions. To realize the intelligent assessment of the whole process of classroom teaching and classroom environment, collect and export data reports. According to the participation scatter chart in the data report, the performance curve of teachers and students, etc., precise diagnosis of the situation, specific and effective lesson preparation strategies and methods are proposed to improve the effectiveness of lesson preparation, and promote the transformation from "experience teaching and research" to "precise teaching and research". Let teachers no longer simply limited to the subjective judgment of experience, but to the level of accurate analysis, using data to speak, diagnose the "true" problem, and evaluate the "true" good lesson.

### **3.2 Real-time data analysis and personality assessment**

The form of teachers' teaching research is changing from "experience-oriented traditional teaching research" to "data-driven precision teaching research", and the implementation of data-oriented intelligent precision teaching research is an effective mechanism to promote the professional growth of teachers[5]. The key to accurate teaching and research lies in data, and data is the cornerstone of "accuracy". On the basis of traditional recording and broadcasting, the intelligent research and training platform is equipped with audio and video acquisition equipment and AI analysis host, and artificial intelligence technology is added to record the classroom teaching process, and artificial intelligence technology video is used for normal data collection and analysis. Through the classroom teaching behavior provided by the "intelligent platform" and the teacher ability matrix analysis based on the scale score, the teaching and learning behavior of teachers and students are focused. Data such as teacher-student teaching behavior ratio, class participation curve, S-T analysis model and teaching mode type are used to judge students' classroom status, solve the problem that teaching evaluation in traditional teaching research has heavy subjective color and lacks the support of objective classroom data, make teachers' fuzzy "feeling" clearer, and help young teachers make self-diagnosis. To achieve more effective teaching reflection, and then choose more appropriate content and methods to improve and optimize teaching[6]. Secondly, through the use of evaluation scale, teaching and research activities have a more comprehensive observation and analysis of the classroom, teachers and students, and teachers are more rigorous and accurate in the course evaluation process. More teachers participate in classroom observation and get the average scores, which makes the classroom evaluation of teachers more objective. With intelligent and precise teaching and research as the starting point, the "double reduction" policy will be promoted to the depth.

### **3.3 Innovate new forms of teacher training and implement diversified evaluation**

The professional development of teachers is a process in which teacher research and training is an important link. The development of digital technologies such as artificial intelligence and big data promotes the resources, platforms and tools of teachers' research and training, weakens the limitations of time and space, and innovates diversified forms of research and evaluation. Based on the intelligent network platform and the design concept of "leading by famous teachers, teamwork and harmonious development", various classroom activities of famous teachers are carried out, including expert lectures, lesson evaluation, lesson example exchange, project research, multiple rounds of the same class, special skills display, project action research and reading salon, etc., to improve the efficiency of the study [7]. Under the background of "Internet +", the intellectualization of technical means can help teachers achieve more accurate and efficient teaching research and evaluation means [8]. It is an important starting point for improving the effectiveness of teaching research to achieve accurate evaluation more suitable for teachers' professional development through data[9]. In the intelligent context, during the development of "smart classroom" teaching and research, we make full use of the delivery classroom module and online teaching and research module of the intelligent research and training platform, regularly carry out online recording and broadcasting class discussion activities, and organize relevant teachers to carry out online listening

and class evaluation activities by section and subject. Use intelligent AI analysis system to analyze students' learning state, learning behavior and learning outcomes; Teachers' teaching content and teaching process performance are analyzed. With the aid of AI intelligent analysis system, the intelligent evaluation of classroom teaching and teacher development is gradually carried out. Through real-time data, the process evaluation of teaching and research activities is carried out, the classroom is improved based on evidence, the formative evaluation of teaching activities is carried out, and the incentive and guiding role of evaluation on the improvement of teachers' professional level is played. Through the combination of online and offline, the author innovates the behavior analysis and diagnostic evaluation model of teachers and students, establishes a multiple evaluation system, realizes accurate reflection and improvement of teaching, and improves the regional teaching quality.

#### 4. Summary

The construction of teachers has entered a new era, and teachers' teaching and research are also facing the demand and opportunity of precision. In the new ecology of "Internet + education", digital training platforms and tools are used to help teachers' professional development, and the construction of new teacher professional development strategies has attracted much attention[10]. Make full use of equipment, resources and platforms in intelligent environment to explore teaching problems comprehensively and deeply. By relying on the intelligent research and training platform and in the intelligent classroom teaching environment, this study takes the explicit data and implicit data generated by teachers' teaching, students' learning and teaching interaction as evidence sources for the research on strategies for promoting teachers' professional competence development, and provides effective strategies for improving the quality of teachers' precise teaching and research [11]. It aims to enable every teacher to focus on "innovation and quality improvement", build their own "intelligent precision teaching and research", do a good job of high-quality and personalized education supported by smart environment and big data, and help every teacher grow professionally.

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