Wisdom Classroom Construction with the Core Literacy as the Goal

Taking Physics as an Example

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Abstract—**Core literacy and wisdom classroom are the two major themes facing basic education today. It is of great significance to explore the deep fusion of the two in teaching practice. This paper creatively proposes a smart classroom teaching model with core literacy as the goal, and proposes a teaching design model based on this model.**

Keywords—core literacy; wisdom classroom; fusion mode

I. INTRODUCTION

The ninth round of curriculum reform based on the development of Chinese students' core literacy is in full swing, and China's basic education reform is being transferred to deep water. "Core Literacy" and "Wisdom Classroom" point to the educational goals and support systems in basic education respectively. Under the background of the current international of domestic emphasis on the development of students' core literacy, how to explore the effective ways of deep integration of core literacy and wisdom classroom in the practice level of education and teaching is an important symbol of the success of the ninth basic education reform. This paper combines the "core literacy" education concept with the "wisdom classroom" organically, and proposes a wisdom classroom teaching model with a certain promotion significance and a core literacy as shown in "Fig. 1".
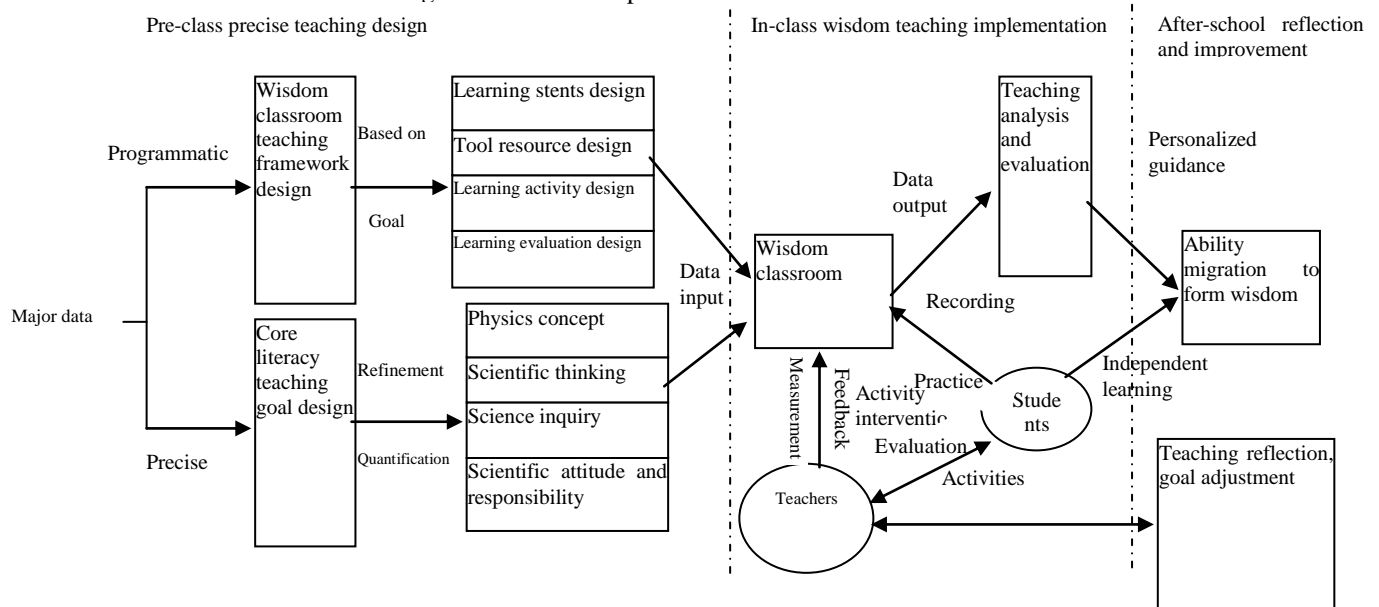

Fig. 1. The further integrated teaching mode of core literacy and wisdom classroom.

II. WISDOM CLASSROOM TEACHING MODE WITH CORE LITERACY AS THE GOAL

The wisdom classroom teaching mode is divided into three modules: pre-class precision teaching design, intelligent teaching implementation in class, and individualized training after class according to the order of teaching.

A. Pre-class Precise Teaching Design

1) Core literacy teaching goal design: Teaching design begins with the analysis of teaching content and the basis of students to establish teaching objectives. Defining teaching objectives is not only the logical starting point for implementing teaching, but also an important basis for testing teaching effects. In the smart classroom education environment oriented to core literacy, the establishment of teaching objectives should avoid the extremes of experience-based fuzzy goals and technology-based data-only theory, but adopt the "precise teaching goal" combined of "quantitative" and "qualitative". Under the traditional teaching mode, the teaching goal is more concerned with the ability to grasp the "physical concept" and "scientific thinking" of selection, and due to the lack of data support, the establishment of teaching objectives mainly depends on teachers' understanding of students and the statistics of the answers situation of students, the expressions of these two kinds of teaching objectives that should be quantified and expressed in the actual teaching design are often vague; and "the necessary "capable of adapting to the needs of lifelong development and social development" [1] "scientific inquiry" and "Scientific Attitudes and Responsibilities" are either unclear or in the form of teaching objectives. In the wisdom classroom teaching environment, teachers can obtain the continuous visualization data of student learning. When designing the target, the core literacy dimensions are combined with the "pre-class teaching goal". The "pre-class teaching goal" emphasizes more quantitative components in the target expression of physical concepts and scientific thinking, and more qualitative expressions of scientific inquiry and scientific attitudes and responsibilities.

2) Wisdom classroom teaching framework design: What core literacy to cultivate, what teaching strategies should be adopted, and which teaching resources should be selected? The wisdom classrooms that are targeted by core literacy need to be considered. This requires a programmatic core literacy teaching process framework, that is, core literacy teaching conduct process and rules through wisdom classrooms. Traditional classroom teaching is a one-dimensional linear communication between teachers and students through paper-and-pencil and dialogue. The effectiveness of evaluation and feedback is severely hindered. There are two insurmountable obstacles in the evaluation of students' learning process and the selection of generative teaching strategies: First, the students are sampled (with individual students' questions and answers) instead of the class as a whole, and the objective statistics of the students' practice results are replaced by the teacher's subjective feelings and experience. The former usually leads to the

teacher's partiality, while the latter is likely to cause serious difficulties. The wisdom classroom transforms the one-dimensional linear model into a closed-loop interactive communication model between "teacher-technical platform-student" as shown in "Fig. 2". It is multi-dimensional and selective, immediacy and interactivity, generation and development, fandom and time and space breakthrough, wisdom and creativity, virtuality and authenticity, fun and advanced, visibility and friendliness, and research and innovation, the two obstacles of traditional classroom can be completely eliminated, making the traditional teaching framework based on static and presupposition into a dynamic, generative and highly interactive classroom teaching framework. Due to the above characteristics of the technology platform, especially the breakthrough characteristics of time and space, the classroom form has been developed to the "ubiquitous education" mode where anyone can learn any content at anytime and anywhere, and the meaning of the class is greatly extended. Therefore, the design of the wisdom classroom teaching framework should consider the three teaching processes of "ubiquitous classroom" before, during and after class. This paper refers to the constructivist-based teaching design model [2] and the STEM interdisciplinary project design model [3]. In the smart classroom teaching framework design, four columns of learning bracket design, tool resource design, learning activity design, and learning evaluation design are set.
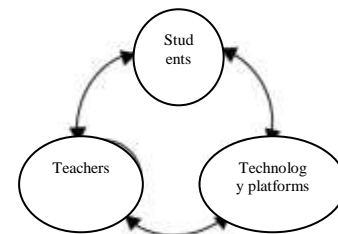

Fig. 2.   The teacher-student- technology platform exchange mode.

a) Learning stents design: Stents teaching is a new "constructivist" teaching model based on Vygotsky's "recent development zone" theory. It is a pointer to the problems that students may encounter during the learning process. With the support of bearing, coupling, etc., teachers gradually transfer the task of management and learning from the teacher to the student himself, and finally remove the stent. In the stents teaching, the teacher as the representative of the culture controls, manages, helps and guides the various teaching links, enabling the students to master, construct and internalize the procedural skills and metacognitive ability that enable them to engage in higher cognitive activities. Typical stents include: situational stents, setting contexts to help enter learning; problem-based stents, creating problem situations, triggering thinking; experimental stents, demonstration experiments, student experiments, home experiments, etc.; knowledge-based stents, mainly to provide framework of evaluation and production new experience and information; procedural stents, refer to the order of doing

things; strategic stents, refer to the means and strategies used to achieve different teaching effects under different teaching conditions; example stents, refer to typical cases and examples; training-type stents, refer to strengthening students' cognitive understanding through instruction and practice, and improving students' learning ability. [4]

b) Tool resource design: Wisdom classroom is a personalized, intelligent and digital classroom learning environment built with the support of information technology. The use of information technology tools and the integration and sharing of global educational resources are the prominent features of wisdom classrooms. The choice of information technology tools includes hardware tools such as artificial intelligence, virtual reality, augmented reality, internet of things, wearable devices, mobile terminals, etc., as well as such as graphing calculators, geometric drawing boards, mind maps, electronic textbooks, and various question bank systems, dedicated software tools or network resources that support the teaching of the subject, such as teaching dynamic data and educational management information. Adhering to the concept of "open sharing" of smart education, schools or individuals can achieve seamless integration and barrier-free circulation of quality educational resources worldwide through introduction, purchase, exchange or self-built, [5] such as MOOCs, Net Ease Open Course, Khan Academy Open Course, Personalized Question Bank, Teacher Self-built Micro Video, Multimedia Courseware, etc. Of course, Wisdom classrooms are upwardly compatible with traditional classrooms and do not exclude traditional tools and resources that are conducive to student learning.

c) Learning activity design: Classroom teaching is a series of teaching activities. According to the constructivist learning theory, cognition and learning take place in the task completion or problem solving process of each activity. The integration model advocates more design project-based activities, problem-solving-based activities, real-life experiential activities, and other teaching activities such as student-oriented, teacher-led, and technology platforms. In terms of time span, attention should be paid to the design of teaching activities, including pre-class, in-class and after-class hours. Pre-school activities such as teachers release micro-courses, courseware, texts, pictures and other teaching resources, students prepare, discuss and share, etc. in-class activities such as subject introduction, collaborative inquiry, display and sharing, real-time evaluation and feedback, introductory and commentary, etc.; after-class activities such as personalized practice, exchange and sharing.

d) Learning evaluation design: If the teaching goal is both the starting point and the destination of a class, the teaching-study –evaluation is the professional practice based on the goal. [6] There must be evaluation in teaching. Good teaching evaluation is conducive to helping students to generate interest in learning, improve self-efficacy, stimulate learning motivation, and objectively recognize themselves, so as to achieve the purpose of "evaluating and promoting learning". Teachers should pay attention to the evaluation content when designing teaching content.

According to the evaluation method, the teaching evaluation is divided into formative evaluation and summary evaluation. According to the evaluation function, it is divided into instrumental evaluation and diagnostic evaluation. According to the evaluation nature, it is divided into quantitative evaluation and qualitative evaluation. According to the evaluation subject, it is divided into student self-evaluation and companion mutual evaluation and teacher evaluation. In order to promote the development of students' core literacy, in the fusion mode teaching, emphasis is placed on the use of formative and diagnostic evaluations that are consistent with the teaching-study-evaluation consistency. The quantitative evaluation of generativity in the classroom is made possible by the information technology such as the internet of things, cloud computing, and major data in the "wisdom classroom". It provides "precision" for teachers to grasp the learning effect of students and the selection of teaching strategies (immediate, accurate) guidance. Since the object of education is the person with subjective initiative development, the achievement of high-order thinking ability such as analysis, evaluation, creation, meta-cognition must be combined with qualitative evaluation method; from the perspective of the evaluation subject, the fusion model suggests a combination of multiple evaluation methods.

B. In-class Teaching Implementation

The ability of creative thinking is definitely not to learn the transformation of knowledge into ability, but the students themselves will discover, conceive and integrate. [7] The integration model is dedicated to creating a learning environment through the technology platform, and truly promotes students to actively construct learning. Based on the design of the teaching objectives and the design of the teaching framework before the class, the teaching implementation is based on the students as the learning center, the core literacy as the goal, the teaching activities as the clues, the wisdom classroom as the technical support, and the teacher as the scholar to promote the wisdom classroom. Due to the many characteristics of the closed-loop interactive communication mode of the wisdom classroom, teachers can achieve teaching activities such as accurate measurement, accurate evaluation, precise intervention, accurate prediction, personalized push, real-time feedback, and real-life situation simulation. As shown in Table I, teachers, technology platforms, and students have different roles and roles in the teaching implementation process.

TABLE I. THE ROLE OF TEACHERS, TECHNOLOGY PLATFORMS, AND STUDENTS IN THE IMPLEMENTATION OF TEACHING

Teachers	Technology Platform	Students
Organization, guidance, guidance, management, evaluation, explanation, etc.	Data collection, data mining, visual analysis, personalized content push, learning effect prediction and evaluation, measurement, feedback, recording learning behavior, providing learning resources, assisting teaching decision-making, knowledge classification, teaching management and service, educational information management, teaching analysis and evaluation, etc.	Teamwork, self-learning, active construction, discovery and induction, comprehensive application, discussion, sharing, etc.

C. Reflection and Improvement after Class

In traditional teaching, the teacher arranges assignments for all students. Different students have different learning situations, and there will inevitably be a large number of ineffective or inefficient repetitive labor. Although there are also schools and teachers trying to teach at different levels, it is usually only possible to categorize students into several levels. It is difficult to grasp and take into account the individual differences of each student in a timely manner, and it is easy to cause students' psychological imbalance. Based on the teaching analysis and evaluation in the fusion mode, the platform automatically pushes personalized review materials and learning resources for students. Students can learn independently on the platform after class, independently complete personalized assignments or cooperate to complete group tasks, and communicate, discuss, share, summarize reflections, submit assignments, feedback questions, etc. on the platform with teachers or classmates. At the same time, teachers use personalized structured data to conduct personalized counseling, targeted teaching, and directional data push, and to carry out teaching reflection, technical improvement and improvement of teaching methods and the development of the next teaching plan.

III. WISDOM CLASSROOM TEACHING DESIGN MODE WITH CORE LITERACY AS THE GOAL

Based on the construction of wisdom classrooms with core literacy as the goal, the author designed a wisdom classroom teaching design model with core literacy as the goal shown in "Table II".

TABLE II. WISDOM CLASSROOM TEACHING DESIGN MODE WITH CORE LITERACY AS THE GOAL

Course title:				
Core literacy teaching objectives	Physical concept: …			
	Scientific thinking: …			
	Scientific inquiry: …			
	Scientific attitude and responsibility: …			
Wisdom classroom teaching framework	Learning stents	Tool resource	Learning activities	Learning evaluation
	…	…	…	….
Teaching process	Relationship and design intent between students, teacher and technology platform			
Activitie 1 Activitie 2 … Activitie n	Teachers<——> Technology platform Students<——> Technology platform … Teachers<——> Students			

IV. CONCLUSION

"Core Literacy" and "Smart Classroom" are the two major themes of basic education today. It is of far-reaching significance to explore the deep integration of the two in the teaching practice level. The exploration and reform of educational concepts and educational technologies are always in the present, the core literacy reflects the demands of the times for educational products, and the wisdom classroom is the inevitable result of the development of social science and technology. In the near future, it will become classroom normality the same as multimedia technology. However, we should also see that due to various reasons such as education policy, evaluation system, educational resources, technological development, population size, mindset, and educational continuity, there is still a larger distance gap between first-line teaching practice and upper-level educational theoretical framework. Although high-tech products such as artificial intelligence have been widely used in various fields of society, they are still in the early stage of the development of wisdom teaching in the field of education. In short, we can be optimistic about the success of the new round of curriculum reform, but we must also be prepared to overcome difficulties and meet the challenges. To achieve the deep integration of "core literacy" and "wisdom classroom" is a long way to go and it could not be lack of the active participation of the majority of frontline teachers.

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