

# The Integration and Practice of Information Technology and Physical Education in the Era of Education Informationization 2.0

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**Abstract** - *The literature data method is used to study the integration and development of information technology and physical education in the context of education informationization 2.0. Main conclusions: Education informatization has entered the 2.0 era, intelligent equipment upgrade and research and development provide hardware and technical support; concept upgrade relies on massive data cross-border integration and accurate analysis and effective feedback, data-based thinking drives practice; promotes educational model change and innovation. In practice, there are some problems: educational information resources allocation and supply and demand imbalance, lack of high-quality information teaching resources, lagging development and development, teachers' education thoughts and teaching concepts are backward, teachers' teaching ability and information utilization ability are insufficient. Implementation plan: The government and the education department plan and integrate educational information resources, top-level design and layout ; develop high-quality informational sports education resources ; upgraded the teaching software and hardware to provide teachers with quality training to enhance the concept of information education and application teaching, provide policy support in the evaluation of titles and evaluation.*

**Keywords:** *education informatization; informatization 2.0; informatization teaching; physical education; sports*

## INTRODUCTION

Lei Chaozi, director of the Science and Technology Department of the Ministry of Education, pointed out that before the 19th National Congress, it could be called the education informationization 1.0 era. After three development periods: the start-up period of reform and opening up, the driving development period of the computer Internet wave, and the comprehensive application period of informationization in the 21st century. The education informationization 1.0 era has achieved remarkable results in the teaching environment such as network and multimedia, the construction of online course resources, the use of online learning platforms, educational concepts and innovations in teaching models. The 1.0 era focuses on the construction of “materials and technologies”, and information technology is insufficient in the integration, application, and innovation of teaching models (see Table 1) [1]. Taking physical education as an example,

the application of information technology is limited to the use of equipment for video analysis and auxiliary teaching, relying on the learning resource platform for courseware on-demand, student sports information management, etc., but enriches the student learning path, and does not have information technology. Integrating curriculum objectives, course content, teaching methods and academic evaluation, in order to change the traditional teaching structure and teaching, can't change the safety issues in sports teaching, exercise intensity monitoring, teaching students in accordance with their aptitude, and objective evaluation.

Education Informatization 2.0 refers to the artificial intelligence and machine intelligence technology that is led by intelligence, relying on big data and intelligent algorithms to promote the development and sharing of educational information resources, teaching evaluation methods, human-computer interaction forms, group collaboration and communication methods. Evolving

in the direction of intelligence, supporting and promoting the reform and development of education to meet the people's growing demand for good education.

**Table 1. Comparison of the dimensions of education informatization 1.0 and education informatization 2.0 (Hu Qintai 2018)**

Dimension	Education Informationization 1.0	Education Informationization 2.0
Time span	Before the party's 19th National Congress	A period after the 19th National Congress
Technical contact	Computer and semiconductor technology	Big data and intelligent information technology
Core concept	Application-based convergence development	Innovation development based on integration
Building focus	Construction of concerns	Pay attention to human development
Target task	Digitalization and networking of education and teaching	Intelligentization of education and teaching, reconstruction of educational ecology
Development momentum	Capital investment and technology application	Technological innovation and mechanism innovation
Development Vision	The development of education informationization with Chinese characteristics	International advanced level of education informationization China Wisdom and China Program
Educational reform	Comprehensive promotion, exogenous variables	Support promotion, endogenous variable

The 2.0 era emphasizes the education informationization "supports the development of education modernization, promotes the renewal of educational concepts, model reform, system reconstruction, and makes China's educational informationization development level in the forefront of the world, playing a global leading role, providing China for the development of international education informationization. Wisdom and China program."

The integration of information technology and physical education integrates students' physical fitness test, extracurricular sports activities, and early exercise platform data. It runs through the use of mobile terminal platforms and intelligent wearable systems before, during and after class. The analysis of big data solves the problem of data evaluation in the traditional physical education that cannot accurately monitor exercise intensity (heart rate index), exercise effectiveness, safety guarantee, professional fitness requirements, and objective

pertinence. The application of information technology in the field of physical education will enrich the connotation of informatized physical education and promote the reform of physical education and the improvement of teaching methods.

### OBJECTIVES

On the basis of comparative analysis of the connotation, differences, experience and shortcomings of the education informationization 1.0 and 2.0 era, explore the integration and innovation of education informationization in physical education in the 2.0 era. Integrate student physical fitness test, early exercise, physical examination content and scores, extracurricular physical exercise, sports training and competition data. Integrate wearable equipment and tracking systems, photoelectric sensors, artificial intelligence, and VR reality enhancement technology into physical education, sports training, and competition. Thinking, computing, and analyzing big data generated inside and outside of the classroom. Targeting students' professional training programs, aiming at students and the main body, and carrying out targeted and effective teaching. It solves the problems of sports safety and effectiveness in traditional physical education (heart rate index monitoring exercise intensity), lack of physical education resources, backward teaching method, teacher subjective experience teaching, student individual and professional differences, and teaching and objective evaluation. Promote the innovation of educational information production tools and the renewal of teaching concepts and teaching models.

### METHODOLOGY

This research mainly uses the literature data method, with the theme of "educational informationization", "informational physical education", "digital" and "smart campus". Search and download 90 authoritative core articles in universities and public libraries, China Knowledge Network, Gale Databases. Pay attention to the latest research progress in education informatization and learn the specific practices of information technology in physical education, competitive sports, and building smart campuses. Pay attention to the authoritative websites and colleges of China's educational information research, such as China Education Information Network, Institute of Curriculum and Teaching, East China Normal University, and School of Education and Information Technology of South China Normal University. Actively participate in the exchange,

training and lectures on the theme of "educational information", and understand the latest developments, current affairs policies and research results of educational informatization, and provide theoretical support for research. Using expert interviews, in the form of telephone interviews, 10 experts who have published the paper about education informatization in the authoritative journal, who are from the School of Education and Information Technology of East China Normal University and the School of Education and Information Technology of South China Normal University were invited to consult the problem that integration methods and connotations in education information and sports.

## RESULTS AND DISCUSSION

### **Using intelligent technology and equipment as the medium, big data thinking leads the practice of physical education[2]**

Ren Youqun [2], the authoritative expert system of educational information education in China, pointed out in the paper, in the era of education informatization 2.0, new technologies will be deeply integrated with teaching and learning activities inside and outside the classroom, and the integration and connectivity of resources, platforms, applications and services will help the cultivation of diverse innovative talents. In terms of research, through data science methods, it will support macro-based macro mining and intelligent analysis of small data; Product tools based on artificial intelligence technology will realize accurate identification and acquisition of research data, and realize intelligent analysis and visualization of research results through intelligent pattern recognition and matching.

The information technology revolution brought about the upgrading of production tools and promoted the reform and innovation of educational models.

New technologies promote a new era of new education. Cultivating and enhancing the core literacy and competence of learners' critical thinking, creative thinking, task-solving skills, and interpersonal cooperation capabilities has become the focus of social attention and the focus of global education. Due to the lack of targeted and scientific tools for education and evaluation, the so-called "emphasis" of these abilities often only stays at the level of theory, experience and documentation. Without the help of information technology, large-scale literacy and ability teaching can be said to be difficult. If information technology is still

"alternative" in the era of knowledge teaching, information technology in the era of literacy and ability teaching is a "must have".

Technological advances have provided enough "options" for education: new technologies such as sensors, virtual and augmented reality, 3D printing, video tracking, big data, artificial intelligence, cloud computing, etc., have also provided "new weapons" for literacy and ability teaching. ". Relying on all kinds of smart devices and networks, actively carrying out research and demonstration of smart education innovation, promoting the mode change and ecological reconstruction of education under the support of new technologies will greatly enhance the scientific evaluation of "capabilities" and make accurate teaching come true.

### **Data Thinking Leads the Application of Intelligent Equipment in Physical Education.**

In 2008, the British Education Communication and Technology Agency (BECTA) published a report on the development of education informatization in the UK entitled "Using Technology: Next Generation Learning (2008-2014)", which mentioned the two stages of the development of educational informatization. On the basis of the first stage, infrastructure construction is the main stage, and the second stage is to emphasize the core driving role of the application on the basis of the development of the first stage; and the second stage pays special attention to the "high level skills" and "personalized learning". Support role. On the surface, it seems to be an "upgrade" of technology. In fact, it is an "upgrade" of ideas.

### **Production tool innovation - Intelligent equipment upgrade and Research and development provide hardware and technical support.**

With the popularization of network information technology and the upgrade of multimedia interactive functions, digital technology is widely used in physical education, gradually forming a systematic and practical digital system and technology cluster, which greatly improves the efficiency and quality of physical education. Sweden's Qualisys and the UK's Oxford Metrics Limited developed the photoelectric motion detection analyzer using the MCU500 system and the Vicon system respectively. The infrared camera's photoelectric motion sensor detects the infrared reflection of the marker and then converts it into a current signal that can reflect the spatial position. Finally, the motion trajectory and motion

characteristics are diagnosed. Japan NAC high-frequency video recording system and Germany SIMI Motion 3D video analysis system is a classic of high-frequency video recording and analysis system. The image is collected by high-speed video recorder, and the image is digitally processed to analyze the motion displacement track of the human body [3]. At present, this system is used in the field of physical education, providing scientific basis for sports training monitoring and digital collection of physical education, as well as evaluation and correction of teaching methods and training methods.

The specific practice of physical education, students set the sports goals according to the professional physical quality requirements in the professional training program before the class, Wear heart rate monitoring equipment (chest straps, arm straps and bracelets) with high precision chips from Austrian AMS. The blood flow velocity is accurately measured by the photoelectric sensor, and the data is synchronously transmitted to the system and measured, and the data such as the instantaneous heart rate and calorie consumption, the exercise duration, the maximum heart rate, the average heart rate, the score, and the heart rate interval are formed, and the data can be instantly transmitted to the data. Display the equipment while saving the data in the mobile app personal center. Teachers or coaches can adjust the teaching or training program based on real-time data to ensure safety while maximizing individual athletic performance. The data generated by the classroom and after-school activities during the collection cycle provides an objective reference for student performance evaluation, exercise prescription setting, practice and evaluation.

The physical training management platform can realize the status evaluation of athletes in physical training, real-time monitoring of training quality, key data collection, and training information analysis. The digital physical fitness laboratory uses Omegawave competitive state comprehensive evaluation system, EliteForm explosive force monitoring system, Gymware explosive force test and monitoring system, Firstbeat heart rate monitoring system and other advanced digital physical training equipment to achieve accurate quantitative analysis and evaluation of physical training quality. The US Kinduct player management system provides sports performance and health data analysis services for NFL and NCAA teams. It provides dynamic and convenient collection of athletes' running distance, acceleration, blood

pressure, heart rate, brain waves and other data, preparing for coach training, preventing injuries, provide support for improving player performance [4].

In the national or regional student basketball league, NBA can be used to introduce some wearable equipment sensors and systems to comprehensively analyze the data generated in the players' competitions, and promote the formulation of training and competition strategies. The Sport VU player tracking system including high-speed camera and special software is installed in the stadium. The system consists of multiple high-speed cameras and matching data transmission software. It is the speed, distance, emergency stop, change direction, acceleration, and dynamics between players. Distance, athletes' joint movement patterns, and ball control conditions, such as scoring, rebounding, assists, blocks, steals, mistakes, fouls, etc., are statistically and meticulously analyzed statistically, providing each athlete to break through its limitations and crack Advice on the advantages of others.

**Concept upgrade - relying on the massive data cross-border integration of each platform to accurately analyze and effectively feedback, data-driven thinking drive practice**

Scientific analysis and utilization of the massive data generated is the core and soul of physical education, training and competition. In the aspect of physical education, teachers according to the requirements of body posture, physical fitness, professional ability, etc. in the professional training program of the class students, combined with the data of the students' physical examination files, course elective projects and grades, extracurricular activities, participation projects and achievements, etc. Set teaching goals and individual student learning goals. By setting different teaching contents, wearing the wearable system to collect various data during the cycle, guiding and encouraging students to achieve reasonable goals, and stimulating students, especially the students with weak constitutional potential and interest, to conduct objective evaluation.

In terms of physical training and competition, a number of biological parameters are quickly acquired through non-invasive measurement methods, and real-time comprehensive diagnosis and evaluation of athletes' functional and physical status are made. For example, exercise physiology and biochemistry quantify the internal load of athletes, and control the athlete's functional state and fatigue level. Sports

training and sports biomechanics quantify the external performance of athletes during training. The management of athletes' athletic performance. Real-time feedback is achieved by accurately capturing and capturing athletes' various forms of motion and motion data, and quickly processing and analyzing massive amounts of data through a highly integrated software system. The test results can be used by team members to test and view the results through mobile terminals through cloud storage and big data analysis, and simultaneously manage the physical status data of multiple athletes. It can help to observe the athlete's reaction to the training class, determine the athlete's fatigue level, and make timely adjustments to the training plan to reduce the risk of overtraining and injury [4].

Objective data analysis plays a vital role in enriching team training and game tactics and improving performance. It is no longer that coaches rely on experience to make decisions. Before the 2006 World Cup quarter-final match against Argentina in Argentina, the technical analysis team of the Cologne Sports Academy in Germany under the leadership of Professor Bushman, the day before the game, the two teams were supposed to win the penalty by penalty shootout and use the computer to Argentina 13000. The penalty video records the conclusion of the Argentine team who penalized the penalty and how to shoot the penalty. Through data mining information, team analysis statistics and computer summarization, it is a powerful reference for the German team's penalty strategy and wins in penalty kicks. With the support of the German big data company SAP technology, the German team uses the "Site Match Insights" system to capture the player's various details and position changes through the player's shoes, guards and sensors. Their data, such as their trajectory, scoring rate, and attack range, are transmitted back to the SAPHANA platform in real time. After being processed quickly in the background, the coach can use the tablet to get all the data and videos of the player on the Match Insights interface. Through the collection and analysis of these data, the coach can easily understand the characteristics and advantages and disadvantages of each player, make suggestions and improve the program. The player intuitively understands his strengths and weaknesses through data, adjusts the tactics in time, fills in the gaps, and improves the tactical accuracy. The effectiveness of sex and technology. The era of player talent and coaching experience has gradually drifted away, designing individualized solutions for each player,

allowing traditional football to move toward modern football [5].

### **The integration mode of information technology and physical education**

Information technology is a means, tool and medium, which enriches the connotation and methods of physical education. Ultimately, it must be deeply integrated with physical education to improve the quality and efficiency of education. The purpose of education is to cultivate students' core literacy, including innovative spirit, innovative ability, cooperative spirit and cooperation ability. Utilizing the "Internet + Education" era of big data, cloud computing, Internet of Things, mobile Internet and VR / AR and other artificial intelligence technologies, human-computer interaction and cooperation, teacher-student interaction and cooperation, student interaction and cooperation, and connectivity, anytime, anywhere. That is to say, the learning process is a dynamic process of continuously establishing an external "interpersonal network", an internal and external "knowledge network" and an internal "neural network", and learning is "network formation."

The deep integration mode of information technology and subject teaching: The in-depth integration of teaching mode, namely the meaningful transfer-acceptance mode, the inquiry mode under the guidance of teachers, and the deep integration teaching mode outside the classroom, that is, the research learning mode based on subject inquiry [6]. Meaningful transfer—Acceptance mode is more suitable for well-structured basic disciplines involving complex abstract concepts and principles, such as mathematics, physics, and chemistry. The teacher-led inquiry model and the subject-based inquiry-based learning model are suitable for poorly structured, complex practical problems such as medical diagnosis, construction engineering or other practical problems, and knowledge and skills teaching without the only correct answer. Teachers of all disciplines can choose the above-mentioned in-class and extra-curricular deep integration mode according to the characteristics of the knowledge content of the current teaching department.

In 2007, two chemistry teachers at the Rocky Mountain Park High School in Colorado, USA used the screen recording software to record the PPT presentations and the audio that the teachers explained in real time, and then uploaded them to the network for students to download or play to help the students absent from class and create a flip classroom. teaching

method. Khan Academy's free high-quality instructional video overcomes the important obstacles to implementing the flipping classroom, which reduces the barriers for teachers to enter the flipping classroom. More and more people are beginning to accept this information-based teaching model [7]. The rise of MOOCs (Mu Class) in 2011 has greatly expanded the teaching content and teaching methods of the flipping classroom, and has been enthusiastically sought after by educators in North America and around the world.

**Problems in the integration of information technology and physical education**

RenYouqun and others<sup>[8]</sup> pointed out in his paper that the current situation of educational information technology and physical education development is the problem of old educational concept, backward teaching facilities technology, lack of information teaching resources, teachers' subjective experience teaching, single teaching methods, teachers' informatization teaching ability is scarce and so on.

**Table 2. Conformity comparison between education informationization 1.0 and 2.0**

Dimension	Education Informationization 1.0	Education Informationization 2.0
Technical contact	Computer and semiconductor technology	Big data and intelligent information technology
Core concept	Application-based convergence development	Innovation development based on integration
Building focus	Construction of concerns	Pay attention to human development
Target task	Digitalization and networking of education and teaching	Intelligentization of education and teaching, reconstruction of educational ecology
Development momentum	Capital investment and technology application	Technological innovation and mechanism innovation

Combining the foregoing and Table 2, we can see that the education informationization 2.0 era emphasizes the development of technology contacts, core concepts, construction focus, goals and development motivation, and needs big data thinking

and intelligent information technology support, technological innovation and mechanism innovation. The intelligence of education and teaching; pay more attention to the development of people, and more urgently innovate and reconstruct education on the basis of integration.

**Education information resources allocation supply and demand imbalance, limiting the comprehensive application and development of informational thinking and technology in education**

The government and education departments are the coordinators of informatization education resources. Due to the bottleneck of the government's power and responsibility boundary and the insufficient role of market allocation resources, it has an impact on the standardized supply of educational information products and services.

Lack of top-level design for precise demand, not good at coordinating and integrating existing resources, making it difficult to achieve the supply and demand of educational information. "There are plans and freedoms, there are compulsions and choices, there is just space and space" [9]. Due to the imbalance of regional economic development, there are a series of problems: continuous and long-term education investment in special construction funds, equipment renewal, and update of usage methods. High-quality information-based education resources flow to developed regions, local practice guides underdeveloped regions, local resources and talents are relatively insufficient, and cannot be effectively transformed and replicated, seriously affecting the effect of information-based teaching. Local educational institutions and schools also have the need to emphasize physical products such as various digital resources, hardware devices, system platforms, and teaching resources, ignoring the demand for services such as solutions, consulting, and evaluation of educational information. Resource allocation and supply and demand imbalance will greatly affect the popularity and use of information technology.

**The lack of high-quality information-based teaching resources, the lag of development and development, hampering the richness and innovation of information-based teaching**

At present, schools in various regions of China are basically equipped with information-based teaching equipment. The hardware facilities have basically

reached the teaching requirements, but the quality of teaching resources is scarce, especially in the physical education discipline. Watching video materials (micro video or micro lesson) before class has become a necessary part of flipping classrooms and informatization teaching. This kind of micro-video, which is composed of individual knowledge points and equipped with targeted exercises, needs to integrate the teaching content of the subject with the knowledge system and related system theory. The quality requirements are extremely high, and the demand is also large. The development and update presented challenges. The United States can solve this problem because it has the support of the non-profit Khan Academy and can solve the problem of the development and development of a large number of high-quality teaching resources in various disciplines. China still lacks a charity similar to Khan Academy. At present, it mainly relies on teachers to design and develop independently, and thus faces quite severe challenges.

In September 2013, East China Normal University took the lead in setting up the C20 Mutual Union (60 at the time), which formed a good start for the development, development and sharing of large-scale high-quality teaching resources<sup>[10]</sup>. However, there is still a gap in the physical education discipline. The discipline of physical education is extremely strong, and there are many interdisciplinary subjects, such as sports and sociology, psychology, law, philosophy, physics, chemistry, economics, etc.; it requires a huge knowledge reserve and interactive understanding and application ability to produce high quality. The teaching resources make it easy for students to learn before and after class<sup>[11]</sup>.

### **Teacher education thoughts and teaching concepts are backward, it is difficult to guide educational practice with informational thinking**

Teachers are the overall organizers and coordinators of informatization classroom teaching. They should also be skilled in applying information technology to every aspect of teaching, stimulating students' interest and curiosity, and solving problems or accomplishing tasks as the driving force to continuously explore and study. At present, in the field of physical education, there are differences in teachers' age, subject content knowledge, pedagogical knowledge, technical knowledge, learning ability and ability to accept new things. In this case, teachers are required to comprehensively

consider subject knowledge, teaching methods and technical support according to the actual teaching needs. In the dynamic balance of technology, subject knowledge and teaching methods, the technology is transformed into a solution to the problem of education and teaching. Therefore, the real integration of technology and subject teaching is a new challenge for physical education teachers.

Traditional Chinese teaching focuses on the teacher's classroom monitoring, teaching and the leading role of the teaching process, reflecting the teacher-centered educational thinking. The traditional concept of Western education represented by the United States is "re-learning and light-education", which advocates a student-centered educational ideology. Informatization teaching is based on a hybrid learning approach, and its teaching process includes two parts: online learning before class and face-to-face teaching. The teaching process not only pays attention to students' independent learning and independent inquiry, but also emphasizes the inspiration, help and guidance of teachers. It is necessary to carry out the teaching of these two parts well, and the teachers' educational thoughts and teaching concepts must be changed. First of all, the educational philosophy that teachers should establish is neither "teacher-centered" nor "student-centered", but a hybrid educational idea marked by B-Learning, which is the combination of "dominant-subjective". education doctrine. Secondly, the teaching concept that is in line with the teacher's educational thought must also change at the same time. Establishing the teaching concept advocated by the combination of leading-subject and educational subject, we must absorb the advantages of transmission-acceptance, and absorb the strengths of independent inquiry, so as to form a new teaching concept that meets the needs of flipping classrooms, that is, the teaching theory of Ausubel The teaching concept combined with the meaningful transmission under the guidance of constructivist learning theory and the teacher-led inquiry.

### **Insufficient teachers' teaching ability and informatization application ability make the reform and innovation of education and teaching weak**

The US federal government attaches great importance to the professional development of teachers, and especially supports the use of information technology to carry out teacher competency training. At the policy level, the NETP issued by the US federal

government has made clear requirements for the training of teachers' information technology capabilities. At the action plan level, US federal, state, and school districts have launched action plans for teacher training. The US federal government launched the "Technology Literacy Challenge Fund" program in 1997, the "Future Teacher Application Technology Preparation Program" for pre-service teachers in 1999, and the "Technology Enhancement Education" program in 2002. From the level of teachers' ability standards, the International Institute of Educational Technology (ISTE) attaches great importance to the construction of information technology capabilities of teachers, students and administrators, and has formulated the National Educational Technology Standards [12].

From the perspective of training methods, the theoretical frameworks such as TPACK (integrated technology subject knowledge) have profoundly influenced the training of American primary and secondary school teachers in the information age. TPACK emphasizes that teachers need to have subject knowledge, pedagogy, and technology, and let the three interact in a classroom context [13]. According to a questionnaire survey conducted by the US Federal Ministry of Education's National Data Statistics Center in 2013, 47.4% of the teachers indicated that they have participated in such training. The specific implementation form is to organize teams by subject and explore how to use technology to solve their actual teaching. The problem, or through the way of collaborative research, complete the research on the subject of technology promotion. At present, China's informatization education policy has not yet touched on the improvement of teachers' informationization capabilities. Education systems and schools at all levels have not paid much attention to the cultivation of teachers' information technology, and lack of publicity and promotion and policy support for informatization education.

#### CONCLUSION AND RECOMMENDATION

The research and development and change of information technology have promoted the reform and development of education. It has also entered the era of education informationization 2.0, relying on the network, intelligent technical equipment, and data thinking to guide educational practice. In the process of integration of information technology and physical education, there are problems such as uneven allocation of educational resources and development, lack of

informatization education concepts, insufficient application technology capabilities, and lagging ability training.

First, the government and the education sector conduct "precise poverty alleviation" and top-level design for areas with backward informationization practices, coordinate and integrate existing resources, allocate funds for special construction, equipment renewal and use, redistribution of quality information education resources, and educational information. Mature and developed regions provide strong policy support in talent guidance, consultation, and evaluation. Secondly, brainstorming, convening domestic sports experts, scholars, scientific research institutions, information technology research and development companies, integration of advanced teaching, training or experimental equipment and information technology, set up such as East China Normal University Information Technology Application Research Center, research and development production quality Informational physical education resources. Third, improve the concept of information education and application of teaching, the top design of the government and education departments, provide an educational information policy environment, encourage regional schools and teachers to actively participate in competitions, provide communication and training platforms; reasonable configuration and upgrade information at the school level Educational facilities, in terms of professional title evaluation, evaluation and evaluation, etc., tend to be teachers with outstanding information teaching ability and competition.

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