

Research Article

A Forward-Looking Study on the In-Depth Development Planning of Information Technology into Teacher Education

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Teacher professional education development is actually another type of development that crosses over into a category of teacher training development that encompasses two other types of teacher training—one of which is formal and the other is informal teacher training. The other approach to teacher professional development is quite different from the professional development of professional education. The focus of the professional development of teachers is a dynamic process of development in which teachers take the initiative, actively, and consciously pursue the direction of professional development of teachers. Therefore, how to observe and study the direction of teachers' professional development from the perspective of teachers is an urgent problem that needs to be studied and solved. The professional development of teachers should be combined with their own social and teaching lives. In addition, information technology should be integrated into teachers' daily teaching life, so that it can be used as a tool to support teachers' professional development. Information technology has gradually become a tool and a means that teachers cannot do without in their teaching lives, so it is important to study and think about it from various aspects, such as the teaching process and teachers' growth experiences, and to continuously study teachers' professional development. Therefore, it is necessary to study how information technology can be used well by teachers and used by teachers to become a useful tool in teachers' educational and teaching work from various aspects. This paper first argues that the main goal of teachers' professional development is to gradually grow into expert teachers, while the main content of teachers' professional development is to understand practical knowledge, and the specific tool used by teachers in teaching is the application of social software support that can support teachers' professional development (Romanowski and Alkhateeb, 2022). This paper envisages that information technology can be integrated into the entire teaching environment and the teaching process of teachers, as a tool and a means to make the content of teachers' teaching more concise and clear. Through the use of information technology and other tools, teachers can gradually identify what they need to improve and add to their teaching process, lay the foundation for their future development, and pave the way to become better teachers with a clearer plan for their future development.

1. Introduction

On April 6, 2017, four national departments, including the Ministry of Education and the National Development and Reform Commission, released a new plan, the “Plan for Universal Access to High School Education (2017-2020)” (hereinafter referred to as “the Plan”). The Plan proposes that by 2020, our country will achieve universal access to senior secondary education; it proposes that by 2020, all provinces in the country will have a gross enrollment rate of more than 90 percent in senior secondary education. And through the

unified planning and layout of educational resources, we can effectively promote the quality and balanced development of regional education, thus giving a strong impetus to the modernization of regional education. Hardware support is in place, and the software must also follow. The important goal of education reform and development is to improve the quality of education is a strategic goal to achieve now and in the very long term. To improve the quality of education, in the national education development, “Thirteenth Five-Year Plan” outline has been highlighted [1, 2]. This is an important deployment made by the party at the strategic height of building a

moderately prosperous society in all aspects. The rise and fall of the country's fortunes are tied to education; education is a major plan, teacher-oriented. This saying has been passed down since ancient times, so we can see that only with good teachers, students will receive a good education; only with good teachers, schools can do a good education to the satisfaction of the people; only with good teachers, in order to better promote the development of students. And can greatly improve the quality of education is the fundamental to the good development of teachers' own professional. That is, to improve the quality of education must improve the level of professional development of the teaching force. Since the professional development of teachers was proposed in the 1960s, people have become more and more concerned about the quality of teachers themselves and after years of theoretical research and practice to explore the professional development of teachers themselves [3]. In the 1980s, teacher professional development has become an important issue of common concern for educational researchers in many countries around the world, and it has gradually become a more important research hotspot worldwide. In China, it has also been clearly proposed to strengthen the construction of the teaching force, and in the "National Medium and Long-term Education Reform and Development Plan (2010-2020)," it is clearly proposed to gradually strengthen the construction of the domestic teaching force, which includes the construction of a high-quality teaching force, constantly improving the teachers' development. This includes building a high-quality teaching force, improving the professionalism of teachers, gradually improving the status and treatment of teachers, and improving the management system of teachers. It is also clearly stated in the outline that the qualifications of teachers should be more strictly managed, the moral character of teachers should be improved, the professional competence of teachers should be improved, the structure of teachers should be more reasonable, and the teaching staff should be energetically specialized with high quality. We also continue to improve the training system of teacher education, do a good job of teacher education training planning, and constantly optimize the teachers and improve the professional level and teaching ability of teachers in the team structure [4]. Along with the upgrading of the teaching force in the traditional sense, the professional development of teachers has not been able to keep up with the development requirements of the new situation. In the original teaching environment, it was easy for teachers to neglect their own values and to ignore the deeper aspects of their professional development, such as the meaning of self-actualization, which could cause teachers to lose themselves in passive development, while neglecting the role of teachers' professional development in promoting themselves was not conducive to long-term sustainable professional development [5]. In the current educational environment, this situation has been changed—a new view of professional development that emphasizes the importance of teachers themselves in the process of professional development and their own personal development and the realization of their own values has been gradually introduced to people. This emphasis on the self-worth of teachers is a manifestation of the "teacher," and it is believed that teachers' active participation in teaching activities is an

essential condition for their professional development [6]. Teacher-centered professional development, on the other hand, focuses on teacher development to provide quality in education and teaching, and on the other hand, it is the basis for the overall development of students. Teacher-centered professional development emphasizes the improvement of teachers' internal structures and the realization of their own self-worth. This requires not only the teachers' own efforts but also the support of the relevant teaching departments. Since school is not only a place for teachers to teach and educate but also a place for teachers to achieve professional growth and happiness, schools need to build a set of effective management models to help teachers feel the value and meaning of professional development and educational work in their educational practice, experience the creativity of education in their daily work, and gain achievement and happiness in their own development. Only when teachers find their own professional development path and become more and more interested in education, can we effectively promote the promotion of teachers' titles and the selection and development of backbone and cultivate teachers' ability to teach in high-quality classrooms, thus improving the construction of school teachers and the quality of school operation, and promoting the sustainable development of schools [7].

In the context of the new era, China's basic education development goal from "basic balance" to "quality balance," regional teaching and research to lead and drive the professional development of teachers in the region, which is of great educational significance to improve the overall level of the teaching force and improve the efficient development of local education. The traditional regional teaching and research focus on subject teaching and research, relying on experience, the research perspective is not macro, the research process is not transparent enough, a single perspective leads to the inability to form a systematic teaching research and is responsible for teaching and research management and guidance of the teaching, and research office is subordinate to the education administration, its management with certain administrative responsibilities, teaching and research managers in the exercise of power is quite strong administrative color.

It is the consensus of the government, society, experts, and scholars that teacher education must be innovative [8]. The need to improve the professionalism of teachers in the future, the need to further adopt a science education strategy, and the future trend of teacher development are strategic requirements for the professional development of the teaching profession. In recent years, many scholars have made a lot of thoughts and researches on the professionalization of the teaching profession, the improvement of teachers' professionalism and the improvement of teachers' quality, and the structural knowledge of teachers' teaching. We can see that the development of professionalization of the teaching profession is the trend, and the problem we are facing now is how to improve the professionalization of teachers. In the 21st century, China has gradually entered the world of the Internet, and the importance of information technology can be imagined, and it is obvious that it is the main trend of the development of the world and the development of the country and society [9]. The level of informationization has gradually become an

important indicator to measure the level of modernization of a country and its comprehensive national power. One of the major strategic measures to promote the integration of national economic construction and information society development in China is to actively promote the development of information society in China as a whole, to continuously improve the overall scientific and technological information literacy of our people, and to gradually cultivate high-quality information technology construction personnel, which is also a basic strategy for the development of information society construction as a modern country. The teacher education informatization project is also a major basic force to promote the development and progress of China's education informatization, from which we can find that the teacher education informatization project is actually not only both a major component of China's education informatization project but also the mainstay of the development of China's teacher education informatization project [10]. The current campus informatization construction has begun to cause the thought, education, concept, content, and methods of teachers and students in all schools. As you can imagine, if you want to achieve the continuous development of information technology in schools, training students' level of information technology, the establishment of a high-quality information technology teacher team is urgent and of the utmost importance. In the current situation, there are major problems in the process of training teachers, mainly in teacher training colleges, such as the weakness of information infrastructure and information technology resources. It can be seen that modern information technology and educational technology are not fully popular in school teaching and education, and they are not widely used in teacher education, which is difficult to adapt to the development of modern teaching.

The development of teaching and research requires innovation to ensure the professional development of teachers to keep pace with the times. The in-depth application of information technology in the field of education has brought about a great impact on the transformation of education and teaching, and regional teaching and research supported by information technology is a new requirement for reform and development and will be the new norm for teaching and research in the new era [11]. Especially in the special period of the nationwide outbreak of the epidemic at the beginning of 2020, teaching and research supported by information technology brings convenience and effectiveness to the teaching and learning work of primary and secondary schools in that period. According to the author's literature survey, although there are few studies on the integration of information technology and regional teaching and research and certain research results have been achieved, there is still a need for further research on the specific strategies of macromanagement, operational guidance, and microimplementation of regional teaching and research supported by information technology. The purpose of this study is to explore new mechanisms and models for regional teaching and research, to improve efficiency and effectiveness, to drive the professional development of teachers and the upgrading of the teaching force in the region, and to promote the quality improvement and connotation development of regional education. Information technology is an important opportunity to promote the development of teaching and

research and enhance the professional level of teachers. Information technology has entered the whole process of teachers' teaching and research and has begun to play an important role, especially in the special time of "school closure" at the beginning of 2020, when information technology-supported teaching and research plays an important role in the normal operation of education and teaching work [12]. How to face the new opportunities and challenges of teachers' teaching and research in the new era and situation requires researchers to continuously strengthen the exploration of new models and new paths for the integration of regional teaching and research with information technology. It is worth paying attention to the fact that in the research process, neither purely "only technology" nor isolated "do teaching and research." In the future, while technology is constantly changing, how to maintain innovative thinking to promote the integration of information technology and regional teaching and research development and application and how to make the effective implementation of regional teaching and research under the support of information technology and sustainable implementation, still need more and more in-depth theoretical and practical research.

2. Review of Domestic and International Literature

Due to the urgent needs of the current national education development and reform, the content of the new curriculum reform has become more and more extensive [13]. The modern computer technology is also a relatively new educational technology tool, which is gradually entering the society and school education, and has started to be one of the main tools for teachers to teach in the classroom and a major means to assist students to learn knowledge independently. In the course of the development of education, modern education technology, especially information technology, is being used more and more widely in the modern education process, and it is necessary to adapt to the development of education in the modern education process. It is necessary to create a solid foundation for the realization and change of the teaching methods of modern education technology. Since the 20th century, the development of teacher professionalism has become an important basis for improving the quality of education and teaching, and many countries have made the improvement of teachers' professionalism and the strengthening of the teacher education team an important breakthrough direction for improving education and teaching [14]. The British educationalists have put forward six requirements for the standard of teacher professionalism. The educator Stenhouse put forward the famous three ways of teachers' professional self-development. The teacher's own continuous learning to observe and analyze other teachers' teaching experiences, and finally, the testing of existing theories in the teaching process. The concept of teacher professionalism was explicitly introduced in American education, and it was believed that the basis for improving the quality of teaching was to establish the status of professionalism in teaching and to measure this professionalism clearly and establish clear criteria for measuring it. The emergence of professional development schools in the United States in the 20th century is considered to have

provided a great innovation in the direction of professional training and development for teachers. In recent years, some experts and educational scholars in China have also conducted systematic research on theoretical and practical aspects of classroom professional development. Professor Gu Lengjia has developed the “Action Education Research” program, which focuses on research on learning content, school-based teaching and research, school-based training, and lesson examples. Professor Ye Lan believes that teachers’ professionalism should be improved from the following aspects: improving teachers’ professional philosophy, improving teachers’ professional knowledge structure, and improving teachers’ professional competence structure. The Textbook Institute of the Capital Normal University, on the other hand, has drawn on some international examples of teacher education reform, especially the practice of teacher professional development schools in the United States, to explore a new approach to teacher professional development and set up a teacher education development school in Beijing [15]. The above content of this dissertation, therefore, systematically discusses the incorporation of information technology into teacher education and explores the impact of information education on the in-depth development planning of teacher education.

3. Research Methodology

3.1. Research Methodology. Firstly, through literature review and synthesis, we gain an in-depth understanding of the current situation of regional teaching and research under the support of information technology [16]. On the basis of identifying the research subjects, we analyze the current situation of the research subjects through questionnaires, in-depth interviews, and fieldwork, summarize experiences, analyze problems, draw on advanced experiences and practices, and propose improvement strategies for regional teaching and research under the support of information technology on this basis. The specific technical route is shown in Figure 1.

3.2. Research Content. This study takes District X as the main research object to understand the current implementation situation of regional teaching and research supported by information technology in District X, summarizes experiences, analyzes problems, and investigates improvement strategies for the integration application of information technology and regional teaching and research in the region under the guidance of relevant pedagogical and management theories and for different dimensions of research and analysis [17]. This paper will analyze and explore the following three parts.

Firstly, through the study of a large amount of literature to understand the current situation of research on regional teaching and research supported by information technology, we will analyze the impact on teachers’ professional development from the perspective of “teaching,” and the impact on teaching quality from the perspective of “learning” [18]. The first level is to analyze the impact on teachers’ professional development from the perspective of “teaching” and the second level is to analyze the impact on teaching quality improvement from the perspective of “learning” and to summarize the theoretical methods of integrating information technology into regional

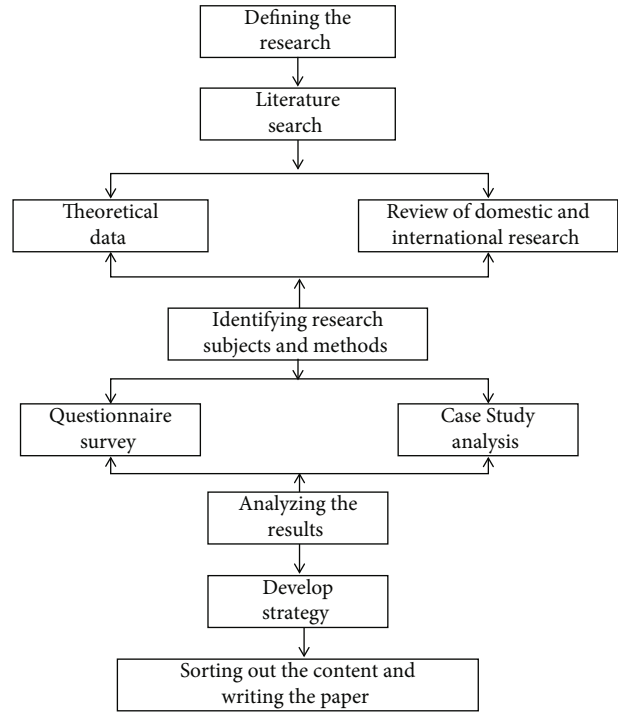


FIGURE 1: Specific technical route.

teaching and research through theoretical research on information technology and regional teaching and research.

Second, through an in-depth investigation of the “Internet +teaching and research platform” in District X, field surveys and interviews with educational administration departments, business guidance departments, and schools and teachers in District X, we understand the practice of integrating information technology and regional teaching and research in District X and analyze its experiences and problems, dissect its types, forms, and activities. We analyzed their experiences and problems; analyzed their types, forms, and activities; and constructed an effective mechanism for regional teaching and research supported by information technology [19].

Finally, we will comprehensively study and analyze the actual cases of integration of information technology and regional teaching and research, explore the effective methods of integration of information technology and regional teaching and research, extract the success factors, summarize the experiences and reflect on the problems, and provide some improvement plans or strategies for this study on the basis of case analysis and theoretical guidance.

3.3. Research Methods

3.3.1. Literature Research Method. Through the content analysis, measurement analysis, and reading of relevant literature, we analyze the current situation of research on regional teaching and research in basic education and the role and impact of information technology in it, find the theoretical basis, organize the relevant activity data, and grasp the theoretical and practical situation more comprehensively, so as to clarify the feasibility and necessity of the research and determine the focus and direction of the research.

3.3.2. Research Method. In this study, a questionnaire survey will be conducted among teachers in the field of basic education in District X. Field interviews will also be conducted with administrators, business instructors, school administrators, and teachers in the field of basic education in District X to systematically understand the situation of teachers in the region with regard to regional teaching and research and the role and influence of information technology on regional teaching and research, so as to provide a clear data basis and reference for the subsequent study.

3.3.3. Case Study Method. This study will be conducted on existing practice cases to provide a final reference strategy for the model and strategy of combining regional teaching and research with information technology.

4. Results and Discussion

Educational teaching research is a feasible path to improve teaching and learning and an effective way to promote teachers' growth. Educational teaching research has an important position in the educational work as it plays the role of regulation, standardization, promotion, and enhancement [20]. Under the wave of the new round of technological reform and industrial revolution, education forms, education connotations, and education modes are facing changes with the brand of the new era, and educational research work should keep up with the times, grasp opportunities, and follow the trend based on the new situation and new tasks. Therefore, in the context of the new era, to carry out regional teaching and research with the support of information technology, to promote the overall professional development of regional teachers, and to promote the improvement of teaching standards in the region are a revolution that is bound to occur in line with the torrent of the times [21]. Based on the profound understanding of the above issues, District X has started to carry out a practical project of regional teaching and research supported by information technology since 2018.

The author conducted formal and informal interviews with administrators of the administrative department of the X District Bureau of Education and Sports, teaching and research administrators, IT administrators, and some school principals, teaching and research leaders, and some teachers at different levels in the district in order to study the practice in X District in depth, and the specific contents of the interviews were divided into administrative administrators, teaching and research personnel, and teachers according to the different interviewees. The specific content of the interviews was divided into three categories according to the interviewees: administrative staff, teaching and research staff, and teachers, mainly focusing on the conceptual thinking, institutional construction, measures, and experience of the project's implementation, and learning about the problems, difficulties, and development directions in the implementation process. In order to gain a deeper understanding of the specifics of the implementation of regional teaching and research in the district, the author conducted a questionnaire survey, which focused on the actual situation, teachers' expectations, and difficulties in

carrying out IT-supported regional teaching and research in the district [22].

When conducting the survey and interviews, based on the principle of diversity, and on the basis of active communication and discussion with the managers of the District Bureau of Education and Sports, seven schools were identified as interviewees, which included four types of schools: elementary schools, junior high schools, nine-year systems, and high schools, and the schools were located in three different regions, including town centers, rural areas, and remote villages. In the interviews, we learned about the development of teaching and research in District X, the origin and development of regional teaching and research with the support of information technology, and the current situation (Figures 2 and 3). During the survey, 400 questionnaires were distributed to teachers in the district, and 396 valid questionnaires were collected [23].

4.1. Planning Concept of Regional Teaching and Research in District X with the Support of Information Technology. It is a systematic project to carry out practical work from a district-wide perspective, which requires planning and guarantee at the macrolevel, as well as good guidance and overall promotion at the mesolevel, and application practice at the microlevel. In operation, different objects at different levels need to work together and pay; in content, it is necessary to consider both the overall work and the actual needs of individuals; in time, it is necessary to have both long-term development plans and short-term implementation initiatives; therefore, the X District Bureau of Education and Sports conceived and planned specific and feasible development goals, development ideas, and development stages.

4.2. Set the Development Goals of Regional Teaching and Research Supported by Information Technology. On the basis of definite development ideas, District X also set clear goals for the development of this work. Only under the guidance of the goals can the development direction and specific steps be more clearly defined [24]. The development goals are as follows:

- (1) Under the guidance of the administrative department of education management, take organizational guarantee as the core, fund guarantee as the basis, and establish and improve the work implementation mechanism as the key to ensure the effective development of the work
- (2) Take the lead of the teaching and research business guidance department to establish the "Internet + Teaching and research platform," with project construction as the first step and activity development as the guarantee, establish the business guidance mechanism to ensure the effective development of work
- (3) With application practice as the guiding ideology and network learning space as the platform, build research and study communities of different disciplines and projects, deepen application effects, establish long-term mechanism, and ensure the normal development of work. The ultimate goal of regional teaching and research supported by information

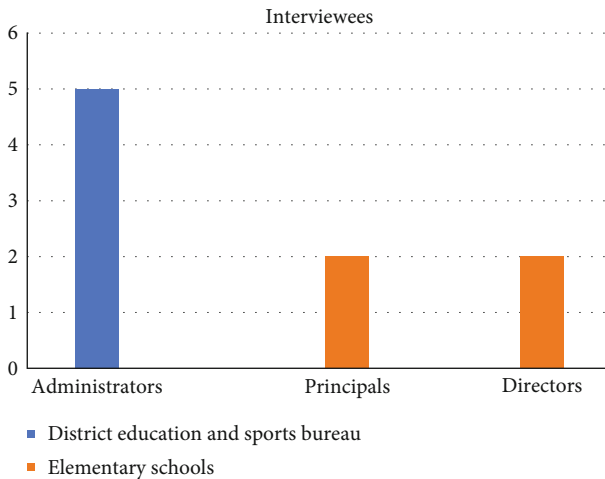


FIGURE 2: Number of interviewees.

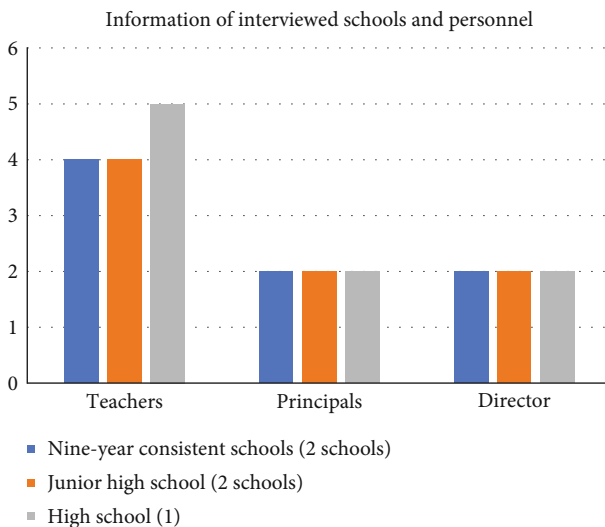


FIGURE 3: Information of interviewed schools and personnel.

technology is to effectively bring professional development and ability improvement of teachers and promote balanced development under the joint promotion of administrative guidance, business guidance, and application practice [25]

4.3. Determine the Development Ideas of Regional Teaching and Research Supported by Information Technology. In traditional areas of the existing research on the basis of how to apply information technology, how to better the information technology in the research into the area, giving play to the role of its application, makes a combination of both good benefit and needs to have a clear development ideas, therefore the development of the area under the information technology to support the research idea, on the basis of many research after the X area. According to the actual situation of education in this area, the development ideas of six specific operations at three levels are determined, as shown in Figure 4 [26].

4.4. Formulate the Development Stages of Regional Teaching and Research Supported by Information Technology. In order to better complete the work tasks and systematically carry out the work, the Education and Sports Bureau of District X formulated specific development stages according to the development ideas and goals of the work [27].

(1) The early exploration stage X area from the bureau set up a working group, the literature, collect data, to discuss work significance, background, and feasibility of writing development planning and implementation plan, to teach department lead, establish the platform based on the research of information technology, training, learning, and using the two joint as the pilot development under the information technology support intercollegiate research, sum up experience. Based on the above work, the preliminary exploration of regional teaching and research supported by information technology is completed, making practical preparations for the subsequent implementation stage

(2) Implementation and application stage

On the basis of the work carried out in the pilot schools, the implementation will be gradually promoted to the whole district. The teaching department organizes teaching and research staff, famous teachers, and backbone teachers as the core force of business guidance and carries out multiple projects and activities for in-depth research and timely summary and sharing by combining online and offline mixed methods [28].

(3) Deepening the popularization stage

On the basis of the existing work, further deepen and summarize, in the level of education administration, strengthen the administrative leadership, do a good job of job security. At the level of business guidance, overall planning and guidance should be given according to the feedback from pilot projects and popular implementation and in combination with projects and activities with more practical benefits. In the application practice level, further explore the practical experience, reflect on the deficiency, and improve the strategy and summarize the long-term mechanism of sustainable application [29].

(4) Innovative development stage

On the basis of the expected results, a scientific and comprehensive summary is carried out to further explore the depth of practice, consider the combination of new technology and new teaching and research theories, and constantly seek new development breakthroughs to improve the theoretical significance and practical benefits of the work.

4.5. Practical Measures of Regional Teaching and Research in Area X Supported by Information Technology. In order to ensure the smooth development of this work, the Education and Sports Bureau of District X insists on doing a good job

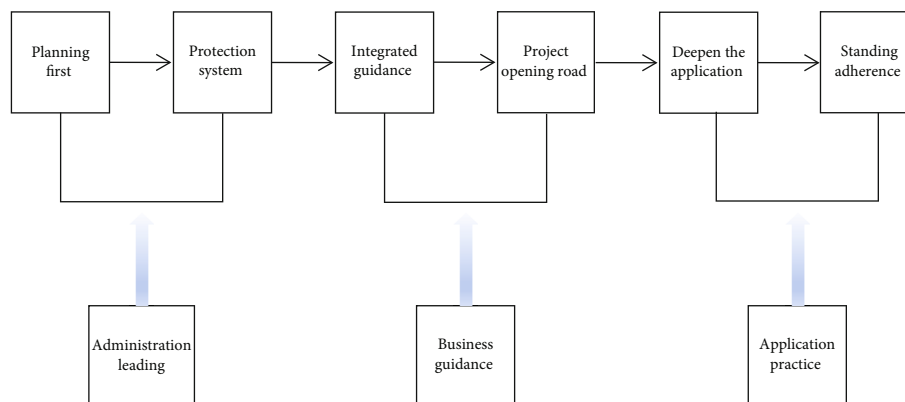


FIGURE 4: Ideas of teacher education development supported by information technology.

in administrative guidance, establishing and improving the work guarantee system and improving management efficiency.

4.5.1. Operation and Promotion Mechanism Optimize Business Guidance and Promote Collaborative Development

(1) *The Teaching Department Has Established a Regional Teaching and Research Platform of “Study cloud + Workshop”.* X area of teaching according to the research department learned that teachers’ needs and their own management and guidance, and technology companies have developed the multifunction such as management, guidance, and application of “Internet +” research platform, the platform to build the two levels of four dimensions of the system platform, the first level from the education management level, and build the application system of two dimensions. In the form of “research cloud,” the whole process of teaching and research management system and the business guidance system combining school-based teaching and research with regional teaching and research are set up. The second level is from the level of teachers [30]. In the form of “workshops,” a platform for teaching and research activities is set up and a digital resource system is cobuilt and shared. The “Internet +” teaching and research platform in ZONE X has a clear structure and comprehensive functions, providing strong information support from the process management of teaching and research activities, interschool business guidance, regional research and training management, teachers’ teaching activities, teaching and research activities, exchange and discussion, and results display, etc. (Figure 5). It provides a service platform for teachers to carry out teaching and research activities within the region, across schools and across disciplines, build and share resources, exchange, and discuss, so as to comprehensively improve the level of regional teaching and research.

(2) *Create a New Teaching and Research Workshop System of “Regional+Central School+Famous Teachers”.* With the help of information technology, District X has created a new teaching and research system of “regional+central school+famous teachers.” First of all, relying on the main school of the joint school as the central school, we have built the “regional+central school+branch” form of mutual aid and collaborative teaching and research under the information

technology environment, changing the traditional offline teaching and research activities, the central school based on information technology, synchronous teaching and research activities within the joint school under the network environment, using synchronous classroom, video conference, project workshops, and other rich forms of teaching and research activities. In addition to effectively preserving resources for teaching and research activities, the center also avoids teachers’ inability to participate in activities due to long distances and time conflicts, which effectively broadens teachers’ participation. In addition, regional teaching and research workshops, school-based workshops, and master teacher workshops have been constructed, respectively, in which regional teaching and research workshops are created by the regional subject teaching and researcher, assisted by regional subject master teachers as administrators, and initiated by the teaching and research office in a task-driven manner in the region for full exchange of subject teachers and full participation in teaching and research activities. School-based workshops are created by the school’s teaching and research staff, assisted by the school’s subject teachers or grade level leaders as administrators, and led by the school’s teaching and research office in a task-driven manner for the whole school’s teachers to participate in collective teaching and research activities. Master Teacher Workshop is a teaching and research activity created freely by regional master teachers to give full play to the advantages of master teachers’ resources and promote the sharing of high-quality educational resources in the region (Figure 6).

(3) *Establishing a Regular Mechanism to Deepen Application Guidance and Lead Effective Growth.* In the process of teachers’ application practice in District X, in order to form a normal application status quo, District X has carried out a number of specific projects in pilot schools to deepen the application, so that the regional teaching and research supported by information technology can achieve its development goals.

(4) *Popularization of Online Learning Spaces.* Each teacher in District X has established his or her own online learning space, where teachers’ teaching resources and expertise can be stored and aggregated. Teachers can store all the resources needed for teaching, including courseware, audio and video, lesson plans,

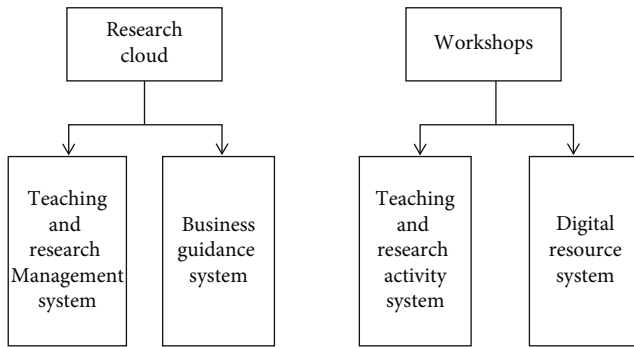


FIGURE 5: "Internet"+teaching and research activities.

and other data effectively, which effectively reflects the whole process of lesson preparation and effectively stores lesson preparation materials. It is also possible to use the recording function in the space to record the whole process of teachers' lessons, to make self-criticism and reflection after the lessons, and to communicate with other teachers on the online learning space, effectively generating, recording and sharing teachers' practical materials before, during and after the lessons.

(5) *Building Various Teacher Training Communities.* In the process of teachers' application, District X has built several teacher training communities on its "Internet+" teaching and research platform, including the training communities based on project workshops and the training communities based on online master teacher workshops.

According to the survey, teachers have generally gained more from the research on promoting teachers' professional development in the context of information technology. According to our sample survey, 27.2% of the teachers thought they were "very rewarding," 54.6% thought they were "more rewarding," 13.9% thought they were "slightly rewarding," and 13.9% thought they were "not rewarding." In addition, 88.7% of the teachers thought that the school-led education model was the most beneficial education model, and 68.3% thought that the group-based education model was the most beneficial education model. It is evident that the school's activities are effective and generally welcomed and affirmed by the teachers (Figure 7).

4.6. Individual Teaching and Research Model Featuring Autonomy. As mentioned above, about 1/3 of the teachers considered the individual teaching and research model featuring autonomy to be the most beneficial one.

4.6.1. Improving Teachers' Theoretical Literacy. The school subscribes to websites such as high school capital, middle school subject network and golden sun resource network for teaching and research groups and lesson planning groups, creating a strong atmosphere for scientific research and learning, and advocating teachers to write reading experiences and carry out online exchange activities with the recommended reading by the research textbook office and teachers' independent reading methods, so that the theoret-

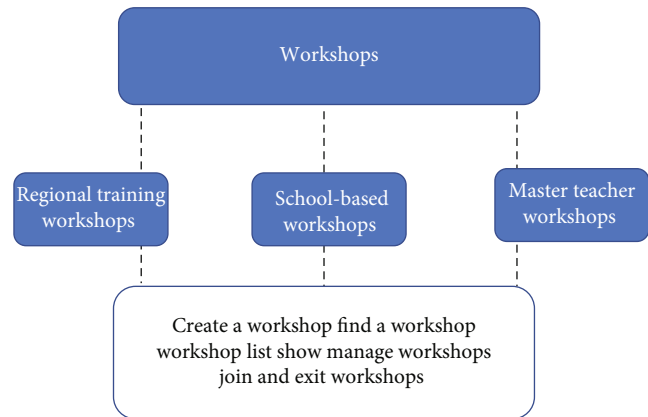


FIGURE 6: Workshop system.

ical knowledge learned online is internalized to improve teachers' professionalism.

4.6.2. Enriched the Teaching Practice of Teachers. We have experienced the system of teachers' postteaching reflection, requiring teachers to share on the Internet to write post-teaching notes and conduct self-reflection, reflecting on whether they have really achieved the transformation of teachers' roles, i.e., whether they have transformed from knowledge imparters into collaborators of students' learning, and facilitators reflecting on whether their teaching process has become an interactive process of codevelopment of student interaction.

4.6.3. Improve the Ability to Teach and Research Schools Adhere to Research-Led Strategies. The teachers are guided to establish the awareness of scientific research on problems and issues of teaching and research growth and results. The teachers are organized to carry out lesson studies around subject teaching competitions, daily teaching, etc., and to reflect and summarize carefully, so that the daily teaching work and teaching and research work and scientific research work are closely integrated to improve the teachers' teaching level and scientific research ability, and good results have been obtained so far.

4.7. Group-Based Teaching and Research Mode. In group-based teaching evaluation, from the survey results, about 2/3 of teachers think that the group-based teaching mode is the most beneficial teaching mode, and its main effects are reflected in the following aspects. In addition to the regular class teacher meetings held at the beginning and the end of the period, the Student Affairs Office also holds regular monthly class teacher meetings, class teacher forums, class teacher festivals, themed class meeting exchange activities, class teacher-apprentice pairing, organizing classroom teachers go out to study, subscribe learning materials for teachers, carry out teaching work reflection classroom teacher work case writing and evaluation, etc., to create a variety of learning and communication channels for young classroom teachers to guide their rapid growth to enhance the classroom management ability of young classroom

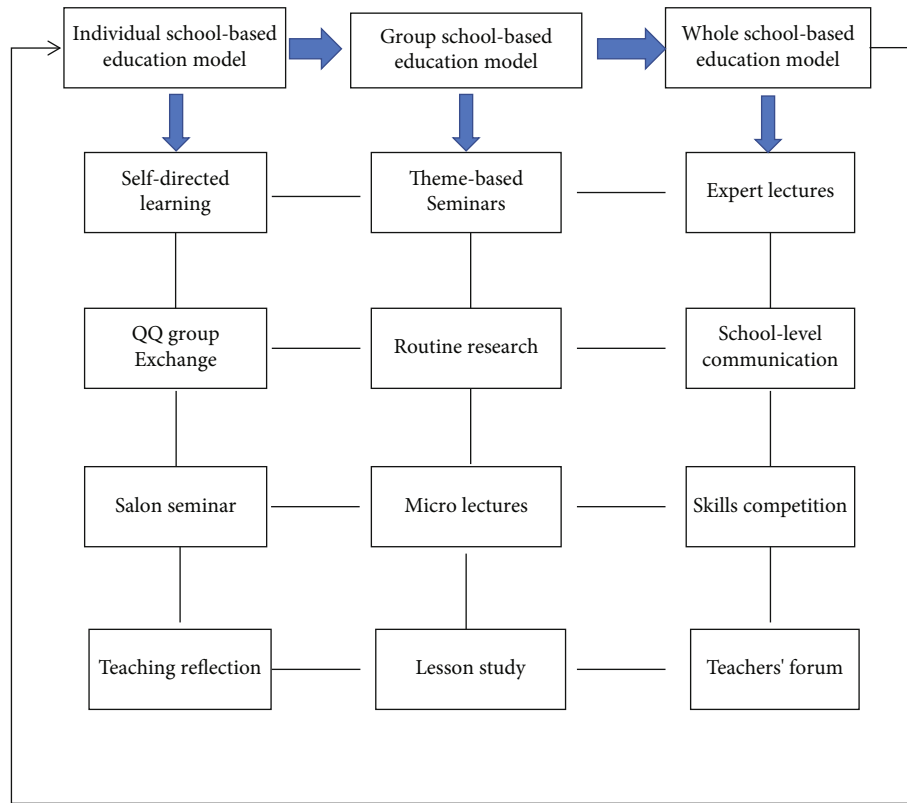


FIGURE 7: Framework of school-based teaching and research model.

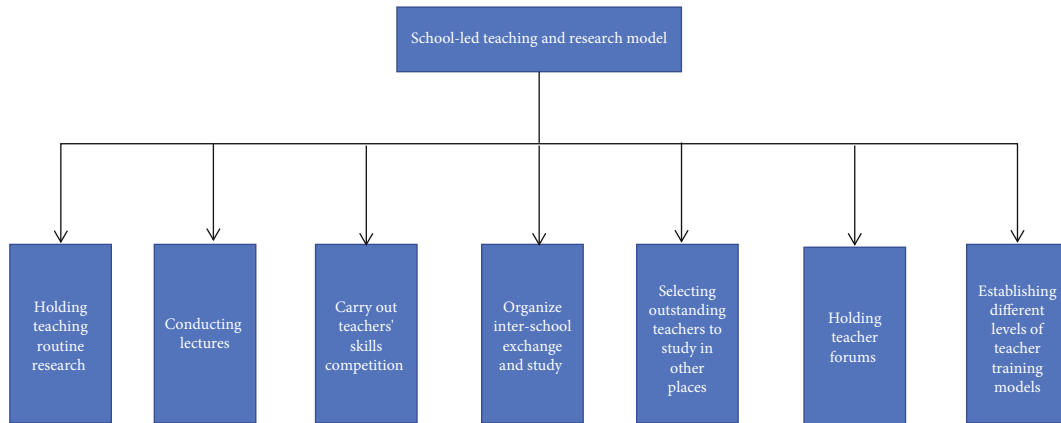


FIGURE 8: School-led teaching and research model for teacher development.

teachers to make classroom teachers clear in the classroom management of what to manage research to help classroom teachers improve their ability to learn how to manage research.

4.8. Evaluation of the Effectiveness of the School-Led Overall School-Based Teaching and Research Model. This is one of the most recognized teaching and research models, nearly 90% of teachers believe that the school-led overall teaching and research model is the most useful teaching and research model in this practical research, regular meetings are held to study the deployment of school-based teaching and research work, and a series of programs are developed to guide the

development of school-based research work, it is new teaching model to promote the development of teacher education to take the following major measures.

4.8.1. Hold Teaching Routine Research, Consolidate the Teaching Routine of Teachers. Since the implementation of the project, the school has adhered to the guidelines of routine out of efficiency, continued to deepen the teaching routine activities, through strengthening lesson preparation, lessons, grinding, listening, speaking, evaluating lessons and other aspects, forming a harmonious, positive, and progressive school culture.

4.8.2. Offering Report Lectures to Enhance Teachers' Teaching Concepts. We have actively conducted a series of training for teachers, carried out a series of report lectures to lead teachers in theory and guide them in practice, and offered a series of lectures and training that are close to the actual development of the school and conducive to the growth of teachers.

4.8.3. Conducting Teacher Skill Competitions to Improve Teachers' Teaching Abilities. Through interschool exchanges, we continue to improve the quality of classroom teaching, achieve complementary educational advantages and realize the goal of putting resources from outside the school to my use. The school builds a platform for teachers to interact and exchange ideas, invites young teachers from different schools to work together to teach classroom demonstrations, and conducts seminars after the lessons to improve teachers' teaching abilities.

4.8.4. Organizing Interschool Exchanges and Learning to Expand Teachers' Careers. Actively carry out interschool teaching discussion and exchange activities, and strive to expand channels, learn from all, increase the opportunities to cut and exchange with other schools, improve teachers' professional quality as much as possible, take their advantageous experiences in time management, goal management, information management, etc., and take the strengths of others to make up for their weaknesses.

4.8.5. Selecting Outstanding Teachers to Study Offsite to Improve Their Teaching Strategies. In order to carry out effective teaching and research, from the perspective of effectively improving teachers' professionalism, the squatting learning guidance is specially incorporated into teaching and research activities, and key teachers are sent to foreign schools to listen to lecture experience for learning, so that teachers can discover the problems that exist in their own teaching process management. What is more, it can guide and supervise the implementation of these processes, so that the teachers can benefit greatly and really promote their professional growth.

4.8.6. Holding Teachers' Forums to Improve Teachers' Teaching Quality. Every year, the teachers' forum is held to share teaching experience by the school's famous teachers, backbone teachers to manage the real, so that teachers can improve their teaching level in the exchange and collision to promote the improvement of teaching level.

4.8.7. Establish Different Levels of Teacher Training Model to Promote the Development of Teachers. In view of the weakness of teachers' teachers using a dual mentorship system to guide teachers to personal development planning, guiding teachers to grow as soon as possible under the leadership of goals and task-driven (Figure 8).

In summary, since the practical research was conducted in our school, relying solely on technology, information technology initially established your need-based research, built many professional platforms for teachers to grow and develop faster and used information technology to more standardize teachers' teaching and research activities to promote their professional development.

5. Conclusion

In the context of the rapid development of information technology, the full use of information technology solidly carried out a variety of teaching content for teachers to build a very large number of growth platform, teacher education development is very fast, highlighted by the teachers' view of teaching, curriculum, student view has changed significantly, followed by some new changes in the teaching curriculum: the information carried by these multimedia not only increases the knowledge information and richness, so that the teacher's classroom teaching, including not only text and voice but also graphics, images, animation, video, and other multimedia knowledge, so that the teacher's classroom is no longer a boring. And a new type of teacher-student relationship in the classroom to form the mainstream classroom, teachers often work with students to focus on life and research problems and comprehend knowledge to promote the direction of student learning change. Multimedia technology also transforms abstract knowledge into vivid images of concrete and intuitive content making it easy for students to grasp and gain knowledge more efficiently. Teachers in our school gradually have a clearer and more detailed plan for their educational and teaching development in the context of information technology.

Data Availability

The labeled datasets used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares no competing interests.

References

- [1] M. H. Romanowski and H. Alkhateeb, "Problematizing accreditation for teacher education," *Higher Education Policy*, 2022.
- [2] E. Istiningsih, Suyatno, and Widodo, "Academic supervision to improve teachers' readiness in utilizing information and communication technology in vocational high schools," *Universal Journal of Educational Research*, vol. 8, no. 10, pp. 4365–4373, 2020.
- [3] D. Wammes, B. Slof, W. Schot, and L. Kester, "Teacher judgement accuracy of technical abilities in primary education," *International Journal of Technology and Design Education*, 2022.
- [4] E. Wildeman, M. Koopman, and D. Beijaard, "Fostering subject teachers' integrated language teaching in technical vocational education: results of a professional development program," *Teaching and Teacher Education*, vol. 112, p. 103626, 2022.
- [5] K. C. Shannon and R. Peter, "Knowledge types in initial teacher education: a multi-dimensional approach to developing data literacy and data fluency," *Learning: Research and Practice*, vol. 8, no. 1, 2022.
- [6] D. E. A. F. Ningrum, I. Rofiki, V. A. Melinda, I. H. Erfantinni, and R. O. Febriani, "Development of biotechnology textbook

- based on bioinformatics research,” *Universal Journal of Educational Research*, vol. 8, no. 11, pp. 5188–5196, 2020.
- [7] S. Karin, K. Johan, and E. Gunilla, “Finnish subject teachers’ beliefs and use of information and communication technology in Home Economics,” *Nordic Journal of Digital Literacy*, vol. 15, no. 3, pp. 202–222, 2020.
- [8] K. Ajitha Nayar and S. N. Akmar, “Technology Pedagogical Content Knowledge (TPCK) and Techno Pedagogy Integration Skill (TPIS) among pre-service science teachers- Case study of a University based ICT based teacher education curriculum,” *Journal of Education and Practice*, vol. 11, no. 6, 2020.
- [9] D. Herro, R. Visser, and M. Qian, “Teacher educators’ perspectives and practices towards the Technology Education Technology Competencies (TETCs),” *Technology, Pedagogy and Education*, vol. 30, no. 5, pp. 623–641, 2021.
- [10] K. Rowston, M. Bower, and S. Woodcock, “The impact of prior occupations and initial teacher education on post-graduate pre-service teachers’ conceptualization and realization of technology integration,” *International journal of technology and design education*, pp. 1–39, 2021.
- [11] M. Lindfors, F. Pettersson, and A. D. Olofsson, “Conditions for professional digital competence: the teacher educators’ view,” *Education Inquiry*, vol. 12, no. 4, pp. 390–409, 2021.
- [12] H. Glaser, M. Helmsing, A. K. Parker, and K. Zenkov, “Adding the “T” to the “PACK” in clinical experiences: how technology shaped our pandemic teacher education pedagogies and partnerships,” *The New Educator*, vol. 17, no. 4, pp. 353–374, 2021.
- [13] S. Massahi, D. D. Ferreira, M. H. Avngaard et al., “Hands-on project aimed at technical education: realizing a DC magnetron sputtering system. DTU Space (Denmark); bbw Hochschule (Germany),” *IDEX Health & Science LLC (United States)*, p. 11815, 2021.
- [14] F. H. Tsai, H. S. Hsiao, K. C. Yu, and K. Y. Lin, “Development and effectiveness evaluation of a STEM-based game-design project for preservice primary teacher education,” *International Journal of Technology and Design Education*, 2021.
- [15] J. Blannin, P. Redmond, A. McLeod, and F. Mayne, “Positioning the technologies curriculum: a snapshot of Australian initial teacher education programs,” *The Australian Educational Researcher*, 2021.
- [16] L. Dekeyser, M. Van Houtte, C. Maene, and P. Aj Stevens, “One does not simply track students: the relationship between teachers’ perceived public track regard and their job satisfaction in a context of rigid tracking,” *Social Psychology of Education*, vol. 24, no. 6, pp. 1433–1459, 2021.
- [17] J. D. Hendrix, Y. L. Campbell, X. Zhang, L. H. Downey, C. B. Jagger, and M. W. Schilling, “Delivery and evaluation of a food science professional development training for Mississippi career technical education teachers,” *Journal of Food Science Education*, vol. 20, no. 4, pp. 197–207, 2021.
- [18] C. Wyss, W. Bühler, F. Furrer, A. Degonda, and J. A. Hiss, “Innovative teacher education with the augmented reality device Microsoft HoloLens—results of an exploratory study and pedagogical considerations,” *Multimodal Technologies and Interaction*, vol. 5, no. 8, p. 45, 2021.
- [19] J. M. Tsarapkina, A. V. Anisimova, B. D. Gadzhimetova, A. M. Kireycheva, and A. G. Mironov, “The impact of digital education transformation on technical college teachers,” *Journal of Physics: Conference Series*, vol. 2001, no. 1, p. 012030, 2021.
- [20] G. Foster, “A case study on teacher educators’ technology professional development based on student teachers’ perspectives in Malawi,” *Journal of Interactive Media in Education*, vol. 2021, no. 1, 2021.
- [21] S. Kiyotaka, “Language teaching with video-based technology: creativity and CALL teacher education,” *Language Learning & Technology*, vol. 25, no. 2, 2021.
- [22] B. Clare, “The quality conundrum in initial teacher education,” *Teachers and Teaching*, vol. 27, no. 1-4, pp. 131–146, 2021.
- [23] S. Mudrikah, J. T. Santoso, and D. P. Astuti, “Exploring the Technological Pedagogical and Content Knowledge (TPACK) of vocational high school’s accounting teachers,” in *Proceedings of the 3rd International Conference on Economics, Business and Economic Education Science, ICE-BEES 2020*, Semarang, Indonesia, 2021.
- [24] A. C. Albina and L. P. Sumagaysay, “Employability tracer study of Information Technology Education graduates from a state university in the Philippines,” *Social Sciences & Humanities Open*, vol. 2, no. 1, article 100055, 2020.
- [25] N. A. U. Alkali, “Utilization of Information and Communication Technology (ICT) in teaching among teachers in selected public senior secondary schools in Katsina Senatorial Zone, Nigeria,” *International Journal of Business and Management*, vol. 7, no. 12, 2019.
- [26] O. N. Utkina and N. L. Yugova, “The pedagogical technique for teachers to ensure information security of the learning process in the context of the COVID-19 pandemic,” *Research Technologies of Pandemic Coronavirus Impact (RTCOV 2020)*, p. 486, 2020.
- [27] X. Zhou, H. Meng, and H. Ma, “Strategies for continuing education of elementary and middle school teachers relying on information technology,” *Science Insights Education Frontiers*, vol. 4, no. 2, 2019.
- [28] Y. Zaslavskaya Olga and N. A. Usova, “Features of teaching the use of information technologies when obtaining financial services,” *RUDN Journal of Informatization in Education*, vol. 16, no. 3, 2019.
- [29] A. Nayar and S. N. Akmar, “Technology Pedagogical Content Knowledge (TPCK) and Techno Pedagogy Integration Skill (TPIS) among pre-service science teachers-case study of a university based ICT based teacher education curriculum,” *Journal of Education and Practice*, vol. 11, no. 6, 2020.
- [30] E. C. Bernard and University of Nigeria, Nigeria, “Status of information and communication technology training and support for science and technology teacher educators in colleges of education in Southeast, Nigeria,” *IJTSRD*, vol. Volume-3, no. Issue-3, pp. 939–946, 2019.