

Exploration and Practice of Online and Offline Mixed Teaching Model of Botany Course in Colleges and Universities Empowered by New Quality Productive Forces

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Abstract: With the rapid development of information technology, the new quality productive forces have brought revolutionary changes to higher education. As the product of the development of modern science and technology, the new quality productivity is gradually permeating all aspects of education, which provides a strong impetus for the innovation of traditional teaching models. In botany teaching in colleges and universities, the introduction of online and offline mixed teaching model is the concrete embodiment of new quality productivity empowerment education. The purpose of this paper aims to explore how to optimize the teaching process of botany in colleges and universities, improve the teaching quality and students' learning effect, and lay a solid foundation for cultivating botany talents with innovative and practical ability by integrating the advantages of online network learning and offline classroom learning under the new background of quality productivity.

Keywords: Online and Offline Mixed Teaching Model; Botany Course; New Quality Productive Forces.

1. Introduction

Botany plays an important role in university education. It is not only a basic natural science, but also a cornerstone for students to understand the diversity and complexity of the life world. It also profoundly affects the development of many disciplines such as ecology, genetics, molecular biology, agricultural science and environmental protection [1]. By studying botany, students can master the basic knowledge of plant classification, morphological structure, physiological function, ecological habits and genetic evolution, cultivate the ability of observation, experiment, analysis and problem solving, and lay a solid foundation for future work in scientific research, teaching, agriculture, forestry and environmental protection[2]. Applying online and offline teaching model to botany course can not only break the time and space constraints, but also enable students to acquire botany knowledge anytime and anywhere, deepen their understanding through offline activities such as field observation and experimental operation, improve their practical ability, and comprehensively promote their in-depth exploration and understanding of the plant world[3].

Compared with the traditional teaching model, the online and offline mixed teaching model significantly broadens the learning boundary, which not only provides a flexible learning space beyond the time and space restrictions, allowing students to participate in learning anytime and anywhere, but also greatly enriches the teaching content and form by integrating massive network resources[4]. At the same time, the online and offline mixed teaching model also promotes instant communication and feedback between teachers and students through real-time interactive tools, and enhances interactive learning and personalized teaching[5]. However, its comprehensive popularization and application have met the challenge of technical barriers, including the

uneven distribution of technical equipment in different regions, schools and even students, the significant difference in the level of information technology ability between teachers and students, and the stability, compatibility and user-friendliness of online learning platforms and software, which have become the key factors restricting the in-depth development of the blended teaching model[6].

As a concentrated expression of scientific and technological progress and innovation, new quality productivity can promote the productivity to achieve a qualitative leap through cutting-edge technologies such as cloud computing, big data, and artificial intelligence[7]. The new quality productivity not only reshapes the model of production and efficiency, but also shows great potential in the field of education, profoundly empowering the reform of teaching model[8]. The new quality productivity realizes the efficient integration and optimal allocation of educational resources, breaks the time and space constraints of traditional teaching, and provides learners with personalized and intelligent learning paths[9]. However, whether the new quality productivity can be empowered and how to specifically empower the online and offline mixed teaching model reform are urgent problem to be solved in the current education field. This paper expounds the empowering advantages of new quality productivity under the mixed teaching model, and taking botany course as an example, further discusses the practical application of online and offline mixed teaching model of empowering new quality productivity, which provides valuable theoretical support and practical experience for the current education and teaching reform.

2. Connotation and Empowering Characteristics of New Quality Productivity to Teaching Reform

2.1. The Connotation of New Quality Productivity

New-quality productivity refers to an advanced productivity form led by scientific and technological innovation and optimal allocation of production factors, driven by modern scientific and technological revolution and industrial transformation[10]. New quality productivity breaks through the limitations of traditional productivity in the innovation of production tools and processes, upgrades and reorganizes production factors in an all-round way, and takes information technology, biotechnology, new material technology and new energy technology as the core driving forces to promote profound changes in socio-economic structure, production model and lifestyle[11]. Therefore, the new quality productivity emphasizes a high-efficiency, high-quality, green and sustainable development path, and is the key force supporting the high-quality development of the economy and society.

2.2. Empowering Characteristics and Advantages of New Quality Productivity to Teaching Reform

The new teaching reform of quality and productivity empowerment has brought about profound changes in the teaching model. Its characteristics are: first, the teaching content is more cutting-edge and rich, integrating the latest scientific and technological achievements and industrial trends, so that students can get in touch with the cutting-edge knowledge and skills[12]. Secondly, the teaching methods are more diversified and personalized, and online and offline mixed teaching is realized with the help of information technology to meet the learning needs of different students[13]. Finally, the teaching environment is more intelligent and open, and new teaching spaces such as intelligent classrooms and virtual laboratories provide students with more convenient and efficient learning experiences. These characteristics together constitute the obvious advantages of the new quality productivity empowerment teaching reform: on the one hand, the new quality productivity improves the teaching quality and efficiency, and promotes the cultivation of students' innovative and practical ability[14]. On the other hand, the new high-quality productive forces have promoted the fairness and popularization of education, and made more students have the opportunity to enjoy high-quality educational resources[15]. Therefore, the teaching reform of empowering new quality productive forces is a profound change in the field of education, which is of great significance for training high-quality talents to meet the needs of the future society.

3. Construction and Practice of Online and Offline Mixed Teaching Model in Botany Course Empowering by New Quality Productivity

The key to the new quality and productivity-empowering mixed teaching model lies in the integration of digital, networked and intelligent technologies, so as to realize the

diversified presentation of teaching contents, the extensive sharing of teaching resources, the intelligent recommendation of personalized learning paths, the implementation of diversified teaching evaluation, and the enhancement of flexibility and accessibility in the teaching process[16]. Through the integration and application of these technologies, the mixed teaching model can provide a richer, more interactive and personalized learning experience, and at the same time promote the fairness and efficiency of education.

3.1. The Construction of Online Teaching Resources

3.1.1. Digitization and Online of Course Content

Through the application of digital tools, new quality productivity provides a variety of ways for the presentation of teaching content. For example, in the teaching of plant cell structure, students can use virtual reality (VR) technology to intuitively observe and explore various components of cells in three-dimensional space[17]. In order to further improve the efficiency and attractiveness of botany teaching, we simplified and optimized the teaching resources by using digital technology. We made high-definition videos, 3 D animations and virtual experiments. This kind of immersive learning experience not only increases students' understanding of abstract concepts, but also stimulated their interest in learning. At the same time, experts are invited to record video tutorials covering plant morphology, classification, reproduction processes, etc., and develop them into e-books and online lectures. In addition, a teaching platform integrating data downloading, video-on-demand and online communication has been built, which simplifies the learning process and promote the interaction between teachers and students.

3.1.2. Integration and Open Sharing Strategy of Teaching Resources

New quality productivity provides advanced technical means and supporting platform, which makes the acquisition, integration and sharing of teaching possible. Resources are more convenient and efficient, and can play an important role in the integration and sharing of botany teaching resources[18]. For example, based on the core content of the botany teaching video, we systematically integrated various learning materials, including PPT presentations, Word documents, PDF materials, etc., and constructed a comprehensive and coherent botany learning resource library for students. In addition, the deep integration of on-campus and off-campus resources also plays an important role in the field of botany teaching. For example, the sharing of laboratory facilities, precious collections in herbariums and practice bases in botanical gardens among universities[19]. and the establishment of a multi-campus network digital teaching resource sharing system can effectively cross geographical boundaries, promote the flow and common utilization of teachers and students resources among different institutions of higher learning, and thus significantly improving the overall quality and efficiency of botany teaching.

3.1.3. Establishment of Online Learning Platform

Quality productivity is centered on information technology and artificial intelligence, which promotes technological innovation and optimization of online education platforms[20]. In order to build an efficient online learning environment, based on the existing online teaching platform

of our school (such as Superstar Learning Link), we have carefully created an online learning course of botany. The establishment of the online platform promotes the sharing and communication of teaching resources. Taking a botany course as an example, teachers can create online forum for students to share their notes and experimental results on plant observation. This kind of interaction not only promotes the exchange of knowledge among students, but also enables teachers to keep abreast of students' learning progress and needs, thus giving personalized guidance. This online learning platform integrates a variety of teaching resources, including teaching videos, well-designed courseware, detailed learning materials and interactive online tests, in order to provide students with flexible and convenient learning paths.

3.2. The Innovation of Teaching Methods

3.2.1. Innovation of Teaching Methods

The new quality productivity has provided strong support for the innovation of botany teaching methods by introducing technologies such as virtual reality (VR) and augmented reality (AR)[21]. In the practice of botany course, VR technology can build a realistic environment for plant growth, so that students can feel like they are in nature and experience the interaction between plant growth and ecology. The AR technology can overlay virtual information in the real world, provide students with intuitive and vivid learning AIDS, and further deepening their knowledge and understanding of botany. For example, in the teaching of plant identification, students can scan the leaves of plants through AR equipment, and immediately get detailed information of plants, including names, growth habits, ecological values and so on. This instant feedback learning model not only deepens students' knowledge and understanding of botany, but also improves students' practical ability and problem-solving ability. The application of these technologies not only enriches teaching methods, but also greatly improves students' interests and effect.

3.2.2. Integration of Online and Offline Teaching Activities

The new quality productivity has realized the deep integration of online and offline teaching modes through the application of intelligent teaching system and adaptive learning algorithm[22]. The online stage focuses on imparting knowledge and preliminary understanding. The application of intelligent technology such as intelligent teaching systems and adaptive learning algorithms can provide personalized learning paths and resource recommendations according to students' learning behavior and grades. Taking a botany course as an example, an online intelligent teaching system can automatically adjust the difficulty and depth of teaching content according to students' mastery, so as to ensure that each student can learn effectively at his own pace; Offline focus on deepening understanding and practical use. In botany courses, offline activities such as laboratory practice and field investigation are usually included. Through practical operation, students can experience the growth process of plants and observe the structure and function of plants, thus deepening their understanding and application of botany knowledge. The deep integration of online and offline teaching modes enables students to master theoretical knowledge and consolidate and improve it in practice. They complement each other, and promote the internalization and transfer of knowledge. According to the students' learning

situation, the pace and difficulty of teaching can be flexibly adjusted to meet diversified learning needs. In order to further promote the internalization and migration of botany knowledge, we have planned a teaching plan combining online preview with offline practice, teaching theories online, strengthening experiments offline, arranging and correcting homework by using online platforms, and providing instant answer service to ensure the consistency and efficiency of the learning process.

3.3. Assessment and Evaluation System of Online and Offline Mixed Teaching Model: Diversified Evaluation System

The vigorous rise of new quality productivity has not only injected strong impetus into the innovation of teaching model, but also triggered a profound change in the teaching evaluation system[23]. In the evaluation process of new quality productivity empowerment teaching, a diversified evaluation system integrating process evaluation and summative evaluation can be constructed, including online learning evaluation, offline classroom interaction evaluation, experimental operation ability assessment and comprehensive consideration of the final exam, forming an all-round and multi-level evaluation network. Teachers can combine the evaluation system and use advanced data analysis tools to accurately capture and analyze students' learning trajectory and realize a comprehensive investigation of students' learning effect. In the practice of online and offline mixed teaching evaluation of botany course with new quality and productivity, good results have been obtained. For example, in the process of online learning, we use the online testing and homework submission system to track students' learning trends in real time and accurately grasp students' learning progress and knowledge mastery. At the same time, combined with students' online learning time, we can also effectively evaluate their learning engagement and self-discipline ability, and provide strong support for personalized teaching. Offline class, pay attention to students' participation in class and group discussion performance. Through careful observation and recording, students' communication ability, team spirit and critical thinking ability can be comprehensively evaluated. This evaluation method not only promotes the collision of ideas and knowledge sharing among students, but also enhances the interactivity and vitality of the classroom. In experimental teaching, we regard students' hands-on skills, the writing quality of experimental reports and the test data of the online experimental examination platform as important evaluation indicators. This not only tests students' practical operation ability, but also exercises students' logical thinking, data analysis and written expression ability, laying a solid foundation for students' future scientific research. The final examination is a comprehensive assessment of students' academic performance throughout the semester. By comprehensively considering students' knowledge mastery, comprehensive application ability and innovative thinking, students' learning effectiveness can be evaluated more objectively and fairly.

4. The Guarantee for the Development of Offline and Offline Mixed Teaching Model with New Quality Productivity Empowerment

4.1. The Need for Schools to Empower the Protection of Infrastructure Construction

Driven by the new quality and productivity, the online and offline mixed teaching model goes smoothly, which puts forward an urgent demand for the innovation of school infrastructure[24]. Schools should actively respond, increase investment and optimize the infrastructure. The first step is to establish a high-speed and stable network environment to ensure that teachers and students can access seamlessly and enjoy the smooth network teaching and rich resources. At the same time, the school also needs to focus on the construction of advanced multimedia classrooms and laboratories, creating an immersive and diverse offline learning environment, and stimulate students' exploration enthusiasm. In addition, an intuitive and easy-to-use online teaching platform and tools are introduced to speed up the digital transformation and network dissemination of teaching content and make knowledge transfer more efficient and convenient. More importantly, the school should set up a professional technical support team to provide immediate solutions to technical problems in the teaching process and build a solid backing for the smooth implementation of the mixed teaching model. These measures will jointly build a seamless learning and teaching ecosystem and fully release the great potential of new quality productivity for education.

4.2. The Need to Build the Information Literacy and Innovation Ability of Teachers

Driven by the new quality of productive forces, the mixed teaching model not only requires teachers to master information technology, but also requires teachers to constantly innovate teaching contents and methods [25]. Teachers should skillfully use online teaching platforms and digital tools, integrate multimedia and interactive elements, and improve the teaching attraction and effect. At the same time, teachers should master diversified teaching methods, update evaluation skills, and use network tools to conduct effective formative and summative evaluation.

In order to ensure that teachers can adapt to the new mixed teaching model with quality and productivity, schools need to implement a series of comprehensive safeguard measures. The first task is to regularly carry out teachers' professional development projects, aiming at deepening their understanding and application of information technology and contemporary teaching strategies. At the same time, the school should ensure to provide comprehensive technical resources, including advanced software, hardware facilities and various online teaching materials, and be equipped with an efficient technical support team to solve the technical problems encountered by teachers in the teaching process. Besides, academic exchange platforms, such as teaching seminars and workshops, have been established to promote knowledge sharing and experience exchange among teachers.

5. Conclusion

In view of the difficulties and problems faced by the current

online and offline mixed teaching model, taking botany course as a practical example, a new online and offline mixed teaching model with new quality and new productivity was innovatively put forward, integrating and enriching network resources, innovating teaching methods, constructing a multi-evaluation system, supporting safeguard measures, promoting the deep integration of information technology and teaching, and optimizing teaching effect.

The online and offline mixed teaching model of botany can be more mature and perfect by constantly empowering new quality productivity. We hope to provide students with a better, more efficient and personalized learning experience through continuous exploration and practice, and cultivate more high-quality botany talents with innovative spirit and practical ability. However, we are also aware of the challenges that may be encountered in the implementation process, such as the speed of technology iteration, the increase of teachers' workload, and students' adaptation to the new model. In order to avoid these problems, it is suggested to keep track of the latest developments in technology, establish and improve the technical support system, formulate flexible teaching plans, and strengthen the monitoring and evaluation of the implementation effect of the new model to ensure that the mixed teaching model can play the best role in practical teaching.

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