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Research on the Construction of A Digital Experimental Teaching System for Training New Agricultural Operation and Management Talents

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ABSTRACT
To conduct digital experimental teaching, specific methods of digital experimental teaching innovation must be implemented in agricultural universities, and reality-based suggestions that are guided by local needs and drive the transformation of educational services, leverage digital technology, innovate the teaching model system, optimize the management system, and facilitate the collaboration of multiple subjects must be proposed, in which a dynamic evaluation system is built, the improvement of teaching quality is guaranteed, and immersive practice is carried out, and students are assisted to develop in an all-round way. This is how the innovation and practice of digital experimental teaching in local agricultural universities can be boosted.

KEYWORDS
agricultural management personnel; digital education; experimental teaching

1 Introduction

The new round of scientific and technological revolution has spurred the transformation and upgrading of the education system, and the high-quality development of education is driven by digital transformation, which achieves the all-round transformation and upgrading of education goals, education models, learning services, and evaluation systems. It has become a critical direction of digital education development to build an all-round and synergetic support system for the training of innovative talents (Zhu Zhiting and Hu Jiao, 2022). Education digitization refers to the digitalization of all elements of education with the method of information technology, which drives forward innovation in teaching models, balanced allocation of resources, and accurate and efficient management, enhancing the quality of education, promoting educational equity, and facilitating talent training to cater to the development demand of the times (Zheng Yonghe et al., 2024). The research on digital education centers on national policy formulation and top-level system design (Zhong Zhixian et al., 2017), curriculum system design and digital course construction (Li Yindan et al., 2020; Kong Xiangwei et al.), exploration of digital teaching models (Wang Ying, 2019; Yuqin D, 2024), individualized teaching (Wu Nanzhong, 2024), educational evaluation system (Yan Jiaoyun et al., 2023), teacher team construction and talent training (Yang Renshu et al., 2024), advance of integration of industry, education, research and application (Wang Chengbin, 2023), etc. Currently, the research on reforming experimental teaching systems and teaching models with digital technologies must be strengthened urgently.

2 Reality foundation for the construction of a digital experimental teaching system

2.1 Digital education policy continues to advance

The national and local governments place a premium on the digital transformation of education and have unveiled a series of policy documents to provide solid policy support for digital education in local agricultural universities. The "Ministry of Education's Work Points in 2022" issued in 2022 has pinpointed that the strategic initiatives of education digitalization must be deeply carried out and the digital transformation and intelligent upgrading of education must be accelerated. The "Overall Layout Plan for the Construction of Digital China" published in February 2023 indicated the inclusiveness of digital public services, vigorous implementation of national education digitalization strategic initiatives, and the improvement of the national smart education platform. The 2024 "Action Plan to Deepen the Teaching Reform of Basic Education Curriculum" stated that the new development of basic education curriculum and teaching reform must be pushed forward in five major aspects: curriculum program implementation planning, teaching method reform, scientific literacy improvement, teaching evaluation pulling, professional support and digital empowerment.

2.2 The digital education infrastructure is in step-by-step improvement

The network infrastructure of local agricultural universities is basically complete, the campus network environment is gradually being improved, multimedia classrooms have gradually become widespread, and interactive electronic white

boards, data centers and cloud service platforms, smart classrooms, virtual simulation laboratories, ERP sand table laboratories, innovation and entrepreneurship laboratories, agricultural economics comprehensive laboratories, digital economy laboratories and other software and hardware products have been integrated with the classroom teaching and experimental teaching of entrepreneurship and enterprise digital management.

2.3 The digital education resources are increasingly rich

Digital resources are highly relevant in practical activities like those supporting the students' learning, teacher teaching, school management, and educational innovation and have far-reaching implications in promoting the transformation and upgrading of educational services and guaranteeing the high quality and balanced development of education. In 2022, the national higher education smart education platform was officially launched, which offers 27,000 high-quality MOOCs with registered users of more than 100 million. As of 2024, the platform has achieved more than 37.3 billion views and 2.56 billion visitors, while it has successfully deployed 18 provincial smart education platforms domestically. Also, more than 30 online course platforms have been established nationwide up to 2024, which are Air Course, XuetangX, Zhihuishu, Chaoxing, etc. These platforms have proffered more and more digital education resources of innovation and entrepreneurship and enterprise digital management virtual simulation experimental courses, which allow learners to be accessible to more opportunities to receive education, paving a solid ground for the high-quality, balanced and sustainable development of education.

2.4 Enhancement of teachers' digital teaching capabilities

There is the enhancement of technology and teaching integration capabilities. Teachers of agricultural universities in some areas have grasped multiple digital teaching tools and platforms like online teaching systems, multimedia teaching software, virtual simulation experimental teaching, etc.; they are capable of integrating and using digital teaching resources efficiently, which include online courses, digital textbooks, teaching videos and others.; they are able to independently prepare digital teaching resources like PPT, micro-courses, teaching videos, etc. The teachers can flexibly apply digital technology in teaching design and can innovate teaching methods to make them more targeted and practical for students, meeting students' individualized learning needs. Intelligent and personalized enhancement of teaching evaluation and feedback mechanisms is realized. The teachers collect and analyze students' learning data with big data and artificial intelligence technology, conduct precise teaching evaluations, and provide students with individualized learning suggestions and resource recommendations based on data analysis results. Meanwhile, the teachers can leverage online systems and platforms like online homework systems and examination systems to conduct teaching management and evaluation, and can provide students with feedback and guidance in time through online platforms, answering students' questions.

3 Analysis of the current situation of digital experimental teaching of agricultural operation and management personnel training

3.1 Teaching methods and means

In the aspect of teaching methods, teachers have combined a series of methods like theoretical teaching, case analysis, group discussions, and virtual simulation experimental operations. Among them, the virtual simulation experiment procedure has received relatively high attention from students. Students deem that this procedure helps them feel the business operation process more intuitively, improving their practical ability. However, it was found through interviews that some teachers have certain deficiencies in the integration of teaching methods and have not given full play to the synergistic effects of all kinds of teaching methods.

From the perspective of teaching methods, multimedia teaching tools have been widely applied, but the function exploration of digital teaching platforms is not deep enough. Some teachers only take the digital platforms as tools to display teaching content, but do not conduct teaching activities making the most of their interactivity, real-time feedback and other virtues.

3.2 Student engagement and learning effects

In terms of learning effect, students have made progress in their grasp of the basic knowledge of enterprise digital management to a certain extent, but are yet to be improved in applying theoretical knowledge to actual innovation and entrepreneurship scenarios and solving complex problems.

It was learned through the interview that the students hope to gain more project practice opportunities to cooperate

with actual enterprises and enhance their practical ability and market acuity. Meanwhile, some students have mentioned that the assessment method of the course has put particular emphasis on theoretical knowledge and the assessment of practical ability is not comprehensive enough, which has affected their enthusiasm for participating in practical learning to a certain extent.

3.3 The utilization of digital education resources

The schools have provided abundant digital teaching resources for this course, like relevant video tutorials on the online course platform, electronic teaching materials, and enterprise case libraries in virtual simulation experiment software. The survey revealed that the students' overall satisfaction with digital teaching resources is relatively high, but some suggestions have been proposed in the aspects of individualized recommendations and timely updating of resources. Some teachers have also remarked that further training and support is necessary in resource integration and secondary development, which is to better meet teaching needs.

4 There are some problems in the digital experiment teaching of agricultural operation and management personnel training

4.1 The teaching content is out of tune with market demand

Generally, the teaching and practical education design of innovation and entrepreneurship and enterprise digital management in agriculture-related colleges and universities lack uniqueness, and the teaching content design and link arrangement is likely to be homogeneous with the practice and education of management majors in general comprehensive universities; the content of innovation, entrepreneurship and enterprise digital virtual simulation experimental teaching is still confined in the theoretical framework and traditional model and is devoid of systematic arrangements that the role of practical teaching in deepening students' knowledge and love for agriculture is not put to good use. Moreover, the content of some simulation experiment courses is too theoretical and is not closely connected with actual business operations and innovation and entrepreneurship processes, so it is difficult for the students to meet the demand of economic changes in agriculture and rural areas.

4.2 Single experimental teaching model

The traditional teaching model still revolves around teacher lectures and lacks interactivity and practicality. It is relatively backward in teaching methods and modern teaching equipment and technologies are not used, which are online teaching platforms, virtual simulation laboratories and others, and the teaching result is affected. An effective experimental teaching operation mechanism is lacked, and there are problems like unclear experimental teaching goals, single teaching content, outdated experimental teaching platforms, imperfect assessment mechanism, and lacking digitalization and cross-disciplinary experience in the teaching team.

4.3 Highlighting policy guidance while neglecting practical exploration

The drawbacks of highlighting policy guidance while neglecting practical implementation, emphasizing theories while devaluing practical exploration, and stressing facility construction while downplaying practical applications have long existed in the digital education of agricultural universities. In some areas, digital education has become an administrative directive, and the problem of "constructed but not in use" is protruding. It has failed to truly play the "transformative" role of digital technology in education and teaching, which has limited the effectiveness of the practical transformation of education to a certain extent.

4.4 The teachers' digital teaching capabilities need to be further improved

Teachers and students in agricultural universities have limited understanding and application capabilities of digital education, and except the problems of current digital products themselves, the phenomena of teachers "unwilling to use", "not knowing how to use" and "not daring to use" are still serious. The lack of necessary digital literacy and educational technology competence has affected the advancement and effectiveness of digital education.

4.5 Insufficient coordination among all subjects

First, the information sharing and communication mechanism among entities is not complete, which leads to untimely

inaccurate and information transmission, affecting the synergy effect; second, there are differences in the goals and interests of each entity in the management of agricultural universities.

For example, schools seek after academic development and talent training, enterprises aim for economic benefits and market competitiveness, while governments and scientific research institutions may pursue policy orientation and the transformation of scientific research results, which may cause contradictions and conflicts in the collaborative process; third, each entity has different autonomy in resource allocation and use that resources are difficult to be integrated, and synergy is not likely to be formed. The above three reasons have resulted in the slow progress of the integration of industry, university, research and application.

5 Innovation and practice of experimental teaching in the training of agricultural operation and management talents

5.1 Drive the transformation of education services guided by local needs

The disadvantages of "locality" and "agriculture" must be turned into individual advantages, the "local" advantages of local agricultural universities must be leveraged, and focusing on serving local economic and social development, universities must be run by taking root in the local place and rural revitalization must be worked on with the local place as the basis.

(1) Based on the demand for talents in the rural revitalization strategy, the professional setting and talent training structure must be adjusted and upgraded, add majors and courses related to modern agriculture, rural governance, rural development and others must be added, and more high-quality talents with knowledge about agriculture and passionate about the countryside and farmers must be trained,

(2) The integrated development of industry, university, research, and applications must be pushed forward through practical teaching, industry-university-research cooperation, etc., which is to create a good situation of collaborative innovation and common development, improving students' practical and innovative abilities, training talents with practical operational skills and the ability to solve practical problems, and providing talent guarantee and intellectual support for rural revitalization.

5.2 Deepening the practice of integrating science, industry and education based on reality

The "main force" of local agricultural university teachers must be built in serving the society with teaching and scientific research, and based on the "main channel" of course teaching, the "real aim" of serving the society must be locked, propelling the integration of science, industry and education to be deeper and more solid. In the aspect of teacher team building, local agricultural universities not only underscore the improvement of teachers' professionalism and practical abilities, but also actively encourage and support teachers to conduct teaching and research activities digitally, building a high-quality teacher system with digitalized, professionalized, collaborative and elite methods; for course teaching, teaching reforms must be deepened, and course settings must be upgraded, strengthening practical teaching links.

With the online and offline hybrid teaching model, the theoretical knowledge of innovation, entrepreneurship and digital management must be closely integrated with agricultural practical operations. In terms of serving society, the planning and implementation of rural revitalization strategies must be engaged actively, contributing wisdom and strength to rural economic development and social progress with digital technologies.

5.3 Innovating teaching models with digital technology

In the times of digital economy, local agricultural universities must actively respond to national strategies, drive development through innovation, and take digital experimental teaching as the starting point and breakthrough point for the overall project. The deep integration of digital technology with teaching elements and teaching processes must be reinforced, and digital technology and digital products must be used to innovate teaching concepts, change teaching elements, improve teaching processes, and empower teaching evaluation. Combined with the six aspects of digital resources of "digital teaching materials, digital classrooms, convergence media teaching materials, mass entrepreneurship and innovation platform, virtual simulation experiments, practice base", "analogy method" must be used to realize combination, the "cut-in method" must be used to achieve consilience, and the "situational method" must be used for integration, and a science-industry-teaching integrated teaching model based on "creating hierarchical goals", "innovating teaching content" and "creating educational situations" for the common construction and sharing of digital experiments and practical teaching of rural practice must be built.

5.4 Optimizing the management system and promoting multi-subject collaboration

The local advantages must be given play to, and with the "four-subject collaboration" dual-track management system as the project-level design, communication among subjects must be strengthened, the responsibilities and goals of each subject must be identified, the resource allocation must be optimized, the management mechanisms must be perfected, and the flow of talents must be propelled, improving the efficiency of achievement transformation. With the school as the subject of education and integration of science, industry and education, and based on the collaboration and linkage of school leaders, academic affairs office, social cooperation office, college, experimental center and other departments, a symbiotic collaborative dual-track management system of the four types of subjects of "school, enterprise, government and township" must be built around digital resources, personalized practice must be explored through teacher training, teaching supervision, practical research, scientific research, achievement transformation, model demonstration, etc., pushing forward the integrated development of government, industry, university, and research.

5.5 Building a dynamic evaluation system to guarantee the improvement of teaching quality

In the operation of digital experimental teaching, the "seven-dimensional diversification" dynamic full quality evaluation system is adopted to realize a dynamic operation model of the integration of science, industry and education with full participation, full-process supervision and multiple-source feedback. The construction of a seven-dimensional multi-evaluation system must mainly be based on three aspects: first, the original teaching quality monitoring and evaluation system must be well used, and the combination of comprehensive supervision and special supervision, process supervision and result supervision, daily supervision and random supervision, open inspection and secret investigation must be adhered to, innovating the two-level supervision system and mechanism of schools and colleges; second, a dynamic full-process evaluation method based on digital technology and humanity must be adopted; third, the "digital fusion and innovation" full process multi-dimensional evaluation indicator system must be refined: teaching overall design, teaching objectives, teaching content, teaching team, teaching methods, teaching innovation, and teaching effect.

5.6 Implementing immersive practice to help students develop in an all-round way

In the process of the implementation of the teaching model, the the immersive operation mechanism of "five practices throughout" must be used to promote local agricultural universities to integrate specific practices with science, industry and education. In the teaching process, a "chain" of immersive five kinds of practical activities must be designed to link the "dots" in the integration process of science, industry and education, forming the "surfaces" of digital experimental teaching targeting different majors of Economics and Management, Agriculture, Horticulture, Biology Science, and Food Science, which is to drive forward the construction of a multi-level demonstration system and achieve the goal of imparting knowledge and educating people, enabling the students to win in the future.

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References

[1] Wang Qiang, Huang Da, Xie Yinbo. Innovative Practice of Integrating Science and Education in Training Innovative and Entrepreneurial Talents in the New Era[J]. Journal of National Academy of Education Administration, 2023(12): 29-36.

[2] Qin H ,Wang B ,Wang Y. An Analysis of Experimental Teaching in Undergraduate Economics and Management Major Under the Background of Industry-Education Integration[J]. Education Reform and Development, 2022, 4(1): 45-49.

[3] Zhuo Zelin, Zhou Wenwei, Li Hongyan. Integration of Science and Education in Research-Based Universities of Scientific and Technological Orientation and Self-Reliance: The Essence of the Times, Logical Turn and Implementation Path[J]. Research on Educational Development, 2024, 44(7): 54-62.

[4] Kunliang X. The Design Concept of a Virtual Experiment Teaching Platform for Digital Logic Based on LabVIEW[J]. International Journal of Hybrid Information Technology, 2015, 8(2): 229-236.

[5] Fan Xu, Du Yingbin. The Impact Mechanism of Science and Education Integration in the New Era on Regional Scientific and Technological Innovation Capabilities[J]. Science and Technology Management Research, 2024, 44(17): 111-121.

[6] Cai Jingmin, Lin Quanrong. Feasibility Exploration of Local High-Level Universities Training Strategic Forces for Regional High-Quality Development[J]. China Higher Education, 2024(9): 19-22.