Research on the Construction Path of First-Class Farmer Entrepreneurship Courses Empowered by Digital Intelligence Technology

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Abstract: Against the backdrop of rural revitalization and the rise of digital intelligence, the competency demands for agricultural entrepreneurship talent are undergoing profound changes, placing greater demands on the development of farmer entrepreneurship curricula. However, current curriculum development still faces practical challenges, including ambiguous goal orientation, outdated content systems, rigid teaching models, and inadequate evaluation mechanisms. This study constructs a four-dimensional framework—goal reshaping, content restructuring, model innovation, and evaluation reform—and empirically tests its effectiveness using a mixed-methods approach at Hainan Open University, incorporating questionnaire surveys (N = 909), in-depth interviews (N = 24), and learning analytics. The findings systematically validate three key mechanisms of digital intelligence empowerment: data-driven closed-loop, virtual-real integration, and dynamic resource generation. Following the implementation of this framework, the coverage rate of students' core entrepreneurial competencies increased from 32% to 82%, and the survival rate of entrepreneurial projects rose from 42% to 68%. This study offers a practical pathway and theoretical reference for agricultural universities seeking to develop first-class curricula in farmer entrepreneurship education.

Keywords: Farmer Entrepreneurship; First-Class Curriculum; Digital Intelligence Technology; New Farmers; Teaching Reform

1. Introduction

The development of new quality productive forces has become a central issue in advancing agricultural and rural modernization. Driven by technological innovation to enhance total factor productivity, a new generation of interdisciplinary agricultural entrepreneurship talent is emerging—individuals who combine local social knowledge with digital technology application and resource integration capabilities. Farmer entrepreneurship courses serve as a critical link between agricultural higher education and rural entrepreneurial practice, and the quality of their development directly affects the talent supply for rural revitalization.

In the era of digital intelligence—characterized by new-generation information technologies such as artificial intelligence, big data, cloud computing, virtual reality, and the Internet of Things—digital intelligence technologies function not merely as tools or media in curriculum development, but as sources of data and structural forces that reconfigure curriculum logic. The Ministry of Education's Implementation Opinions on the Construction of First-Class Undergraduate Courses articulates the principles of "student-centered, outcome-oriented, and continuously improved" development, advocating the creation of "golden courses" characterized by high-level, innovative, and challenging content. However, current farmer entrepreneurship course development faces two fundamental mismatches. First, there is a structural tension between digital intelligence technologies and traditional curriculum systems. Although technologies such as artificial intelligence and big data have deeply penetrated the agricultural sector, they are often deployed merely as efficiency-oriented "plugins" in teaching, without fundamentally reshaping the deep structures of curriculum objectives, content, interaction, or evaluation. Second, a gap exists between the adult learning characteristics of farmer students and the standardized teaching models prevalent in higher education. The continued reliance on conventional higher education pedagogies fails

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to leverage the experiential, practice-oriented strengths of farmer learners, hindering the effective translation of learning outcomes into entrepreneurial action. The root of these mismatches lies in the disconnect between course content and emerging agricultural business models, the lack of authentic entrepreneurial contexts in teaching methods, and an overreliance on standardized written tests, which cannot accurately capture learners' growth in core entrepreneurial competencies.

For agricultural universities, translating the guiding principles of the Implementation Opinions on the Construction of First-Class Undergraduate Courses into concrete strategies for farmer entrepreneurship course development—and achieving a systematic curriculum upgrade in the context of digital intelligence—remains an urgent challenge. To address this, this study takes Hainan Open University as a case study, employing a mixed-methods approach combining theoretical development and empirical validation to systematically explore the path by which digital intelligence technologies can drive the construction of first-class farmer entrepreneurship courses.

2. Literature Review and Theoretical Foundation

2.1 Paradigm Shift in First-Class Curriculum Development

The development of first-class undergraduate courses is a core driver of connotative development in higher education, with its theoretical essence rooted in the practical operationalization of the "high-level, innovative, and challenging" standards. Zhong Qiquan argues that the paradigm shift from "knowledge-based" to "competence-based" approaches requires curriculum design to transcend the mere accumulation of knowledge points and instead cultivate students' ability to solve problems in complex situations [1]. Yu Shengquan and Liu Enrui further propose that education in the digital age is undergoing a transition from "physical space dominance" to "virtual-real integrated space dominance" [2]. In agricultural education, this transformation exhibits distinct industry-specific characteristics. Shandong Agricultural University has developed a digital and intelligent talent cultivation system for agricultural management, characterized by "four integrations, two combinations, and three synergies," which implements a dual-scene teaching model combining "digital classrooms" and "rural practice" through government-school-enterprise collaboration. Similarly, practice at Jiaxing Vocational and Technical College indicates that the development of modern agricultural technology program clusters should incorporate concepts such as digital intelligence and green, low-carbon development [3]. International experience reinforces this trend: Wageningen University & Research in the Netherlands, guided by a "science-driven, problem-oriented" philosophy, embeds agricultural entrepreneurship courses in authentic industry contexts; Cornell University in the United States emphasizes interdisciplinary integration. Collectively, these efforts point toward a common direction: agricultural entrepreneurship education is shifting from disciplinary logic to problem-based logic, and from a classroom-centered approach to a context-centered approach.

2.2 The Dual Embeddedness of Adult Learning and Local Context in Farmer Entrepreneurship Education

Knowles' theory of adult learning posits that adult learners are experienced, goal-oriented, and focused on practical application; their learning process essentially involves reconstructing and building upon prior experience [4]. For farmer learners, the production and management experience accumulated through prolonged engagement with rural settings constitutes both a valuable learning resource and a potential barrier to cognitive advancement. The key lies in guiding learners to build on their experience to achieve capability enhancement. Huo Shengping and Han Dan note that farmer entrepreneurs face greater challenges in resource acquisition, and the cultivation of their entrepreneurial capabilities must be adapted to local conditions [5]. Researchers have developed an evaluation index system encompassing three dimensions: self-quality, psychological quality, and specialized entrepreneurial quality, providing a reference for curriculum goal orientation. Hunan Agricultural University's practice of integrating agricultural and rural sentiment into entrepreneurship education—through value guidance, knowledge integration, and responsibility awakening—offers a value-oriented reference for first-class curriculum development.

2.3 The Evolutionary Mechanisms of Digital Intelligence Empowerment

The empowering role of digital intelligence technologies in curriculum transformation is evolving from "tool assistance" to "paradigm reconstruction." Siemens' connectivist learning theory suggests that learning is essentially the ability to construct and navigate knowledge networks, with technology serving as a key medium for weaving these networks [6]. Yu Shengquan and Wang Zhizun emphasize that intelligent technologies are driving the transformation of education from "experience-driven" to "data-driven" models [7]. In agricultural education, digital intelligence technologies demonstrate distinctive value. Shi Xianshuai, Li Tongjie, and Chen Pingping's competency map-driven targeted teaching system deconstructs modern agricultural scenarios, establishes a three-dimensional dynamic competency model encompassing "knowledge, skills, and values," develops dual-track resources comprising "policy animation libraries and virtual sandboxes," and forms a three-stage integrated pathway of "cloud pre-learning, sandbox simulation, and field diagnosis"[8]. The concept of an intelligent cultivation platform for farmer makers further clarifies that, through the development of a farmer entrepreneurial competency evaluation index system, adaptive matching between learning content and learner characteristics can be achieved [5].

In summary, existing research has yielded substantial findings in areas such as first-class curriculum development, farmer entrepreneurship education, and digital intelligence technology application. However, integrative research that bridges these three areas remains limited. Specifically, existing studies lack targeted explorations that adapt first-class curriculum standards to the specific context of farmer entrepreneurship education, have not developed a clear framework for systematically embedding digital intelligence technologies into curriculum development, and exhibit considerable room for improvement in methodological rigor in empirical research. Addressing this theoretical gap, this study focuses on bridging these research divides and exploring the construction of a systematic pathway for empowering first-class farmer entrepreneurship courses with digital intelligence technologies.

3. Realistic Dilemmas of Farmer Entrepreneurship Courses and the Potential for Breakthrough through Digital Intelligence Empowerment

3.1 Realistic Dilemmas of Farmer Entrepreneurship Courses

3.1.1 Imbalanced goal orientation: difficulty in effectively connecting universality and locality

Current objectives for farmer entrepreneurship courses suffer from a clear "one-size-fits-all" problem, indiscriminately adopting general entrepreneurship education frameworks without adequately considering the local social networks and indigenous resource endowments on which farmer entrepreneurship depends. As curriculum design has consistently failed to achieve a fundamental shift from "supply-oriented" to "demand-oriented" approaches, universal course objectives struggle to meet the differentiated entrepreneurial needs of farmer groups, thereby significantly diminishing learners' initiative and engagement.

3.1.2 Lagging content system: serious misalignment between static knowledge and dynamic practice

Entrepreneurship is inherently a process of continuous value creation in uncertain environments. However, current farmer entrepreneurship course content remains largely a static accumulation of disciplinary knowledge, lacking a regular mechanism for updating. This leads to a serious disconnect with the rapid iteration of emerging business models such as smart agriculture and rural e-commerce. Real-world developments—such as the expansion of agricultural product marketing channels and the upgrading of digital marketing tools—are difficult to integrate into the teaching process in a timely manner. Consequently, learners find what they learn inapplicable in practice, severely undermining the course's practical orientation and utility.

3.1.3 Rigid teaching model: prominent issues of one-way instruction and lack of context

Farmer learners possess rich production and life experiences, which are highly valuable resources in entrepreneurship education. However, current farmer entrepreneurship courses remain predominantly lecture-based, with teachers as the central authority, leaving farmer learners in a passive receiving role. This approach makes it difficult to simulate the inherent complexity and uncertainty of real entrepreneurial scenarios. Revans' action learning theory clearly emphasizes that the closed-loop cycle of "questioning–reflection–action" is the core mechanism for generating entrepreneurial competence [9]. In traditional teaching settings, this critical cycle is severely constrained by physical time and space, resulting in long feedback cycles and high implementation costs, thereby limiting its practical effectiveness.

3.1.4 Biased evaluation mechanism: overemphasis on outcomes and lack of process focus

The current evaluation system relies excessively on summative written tests, focusing assessment on the amount of entrepreneurial knowledge acquired, while failing to capture learners' growth trajectories and improvement in core entrepreneurial competencies such as opportunity identification and resource integration. More critically, evaluation results are used only for final grade determination and are not systematically fed back into curriculum improvement, lacking a closed-loop of "evaluation–feedback–improvement." Although some agricultural universities have attempted to develop "whole-process, all-around, all-participant" assessment systems, weak technical support significantly constrains their implementation and effectiveness.

3.2 Mechanisms for empowering curriculum development with digital intelligence technologies

The empowerment of curriculum development by digital intelligence technologies is not a simple addition of technological elements, but a restructuring of curriculum logic through three core mechanisms.

First, the data-driven closed-loop mechanism. As the foundation for curriculum intelligence, the learning platform aggregates regional industry data and student background information through big data analytics, constructing learner profiles and industry demand maps. This enables course objectives to shift from "static preset" to "dynamic generation," resolving the tension between universality and locality in goal orientation. Simultaneously, through the collection of data on learner behavior, interaction, and outcomes throughout the learning process, analytics reveal learning patterns and teaching weaknesses. These insights are fed back into objective adjustment, content optimization, and method improvement, forming a continuously evolving closed-loop and shifting evaluation from "outcome judgment" toward "process feedback," thereby addressing the outcome-oriented and process-deficient nature of existing evaluation mechanisms.

Second, the virtual-real interaction mechanism. As the core of context construction, digital twin technologies create virtual mirrors of the physical world. Learners can engage in low-cost experimentation in virtual spaces while conducting authentic practice in physical environments, achieving seamless movement between virtual and real worlds. The integration of virtual and real technologies turns what Schön called "reflection-in-action" from an ideal into reality, effectively addressing the problems of one-way instruction and lack of context in teaching models.

Third, the dynamic resource generation mechanism. As the guarantee for content updating, knowledge graph technologies structure and link disparate information, forming a dynamically evolving course knowledge network that incorporates new industrial and policy developments in real time. This constructs a dynamically evolving knowledge network, breaking the bottleneck of slow content system updates.

Through these three core mechanisms, digital intelligence technologies can comprehensively and effectively address the four major dilemmas of farmer entrepreneurship courses, reconstruct farmer entrepreneurship curricula, and establish a four-dimensionally linked framework for constructing first-class farmer entrepreneurship courses: "goal reshaping, content restructuring, model innovation, and evaluation reform."

4. Constructing a Pathway for Digital Intelligence-Driven First-Class Curriculum Development

4.1 Goal Reshaping Through Locally Integrated "High-Level, Innovative, and Challenging" Standards Guided by New Farmer Core Competencies

The logical starting point for first-class curriculum development is a clear and appropriate goal orientation. This study integrates the high-level, innovative, and challenging standards of first-class courses with the local context of farmer entrepreneurship education, locally adapting these standards to form course objectives and evaluation criteria suitable for farmer learners. It constructs a three-dimensional model of new farmer core competencies. The knowledge dimension encompasses agricultural expertise, entrepreneurial foundations, and digital technology knowledge. The competency dimension includes opportunity identification, resource integration, risk response, and innovative practice abilities. The attitude dimension comprises sentiments toward agriculture, rural areas, and farmers, entrepreneurial awareness, sense of responsibility, and lifelong learning awareness. Based on this three-dimensional model, the localization of the high-level, innovative, and challenging standards gains clear direction. “High-level” focuses on learners’ ability to actively construct knowledge in addressing complex issues in rural entrepreneurship, reflecting the complex integration of local resources and modern technology. “Innovative” is rooted in Sarasvathy’s effectuation theory [10], encouraging learners to break disciplinary boundaries and form unique value propositions in environments characterized by limited resources and high uncertainty. “Challenging” responds to Vygotsky’s theory of the zone of proximal development, recognizing that while farmer students are rich in experience, their theoretical foundations may be relatively weak; learning tasks need to be precisely located within the zone where success can be achieved with effort.

4.2 Content Restructuring with Equal Emphasis on Modular Design and Contextual Embedding

Course content serves as the carrier for achieving objectives. Driven by digital intelligence technologies, it is necessary to shift from linear knowledge accumulation to modular, contextualized dynamic construction. Modular design draws on findings from competency map research [8], constructing a three-tier progressive module system of “Basic Cognition – Core Skills – Comprehensive Application” based on the components of farmer entrepreneurial quality. The Basic Cognition module covers meta-abilities such as entrepreneurial mindset and opportunity identification. The Core Skills module focuses on practical abilities such as market analysis, financial planning, and digital marketing. The Comprehensive Application module, through project-based learning, guides learners through the entire process from idea generation to business plan development. Contextual embedding is key to responding to the practical needs of farmer entrepreneurship. Using digital twin and virtual reality technologies, course content is embedded in highly simulated entrepreneurial contexts—such as simulating the operation of agricultural product e-commerce or the planning and implementation of smart agriculture projects—allowing learners to accumulate experience through “parallel trial and error.” Simultaneously, a collaborative content construction mechanism involving government, schools, and enterprises is established. Combined with natural language processing technologies to capture industry dynamics in real time, this enables course content to transition from “periodic revision” to “real-time updating,” ensuring content synchronization with industrial practice.

4.3 Teaching Model Innovation of “Action–Reflection–Enhancement” Supported by Virtual-Real Integration

Teaching model innovation is the core link in first-class curriculum development. Based on action learning theory and empowerment through digital intelligence technologies, a virtual-real integrated teaching model of “Action–Reflection–Enhancement” is constructed. Action advancement breaks the traditional “learn first, then do” logic. In the initial stage of the course, through virtual simulation experiments, field research, or sharing of entrepreneurial experiences by farmer learners, learners confront real entrepreneurial problems, forming perceptual understanding and problem awareness. Reflection embedding is key to competency generation. Using intelligent tutoring systems and learning analytics technologies, reflection is integrated into the action process. The learning platform provides immediate feedback through data dashboards. The enhancement loop forms an upward spiral path of “practice–reflection–theory–re-practice,” achieving deep integration of learning and practice.

4.4 Evaluation Reform through Whole-Process Learning Analytics with a Value-

Added Orientation

Evaluation mechanism reform is the safeguard for first-class curriculum development. This study proposes a whole-process learning analysis and evaluation mechanism with a value-added orientation, characterized by four aspects: (1) diversified evaluation subjects, involving teachers, peers, industry mentors, and learner self-assessment; (2) multidimensional evaluation content, covering knowledge acquisition, competency development, and attitude change; (3) diversified evaluation methods, combining tests, project work, practical performance, and learning behavior data; and (4) developmental evaluation function, using evaluation results to diagnose learning problems, provide personalized feedback, and guide teaching improvement. Learning analytics technologies provide technical support for whole-process evaluation. The platform automatically collects behavioral data such as login frequency, resource viewing duration, discussion participation, and assignment quality. Algorithmic models are used to portray learners' effort levels, thought processes, and competency growth trajectories. Evaluation results are presented in the form of visual dashboards, helping learners understand their progress and helping teachers identify teaching weaknesses, achieving bidirectional empowerment between evaluation and teaching.

5. Practical Exploration at Hainan Open University

5.1 Practice Background and Reform Framework

Since 2010, Hainan Open University has been implementing an academic education program for farmer students, with students originating from 2,562 administrative villages in Hainan Province. By December 2025, it had trained over 15,000 farmer students. Facing the structural contradiction between rural industrial upgrading and talent shortage, as well as the dilemmas in farmer entrepreneurship education, the university launched a digital and intelligent teaching reform for the "Farmer Entrepreneurship Practice" course in 2023. It constructed a four-dimensionally linked development framework of "goal reshaping, content restructuring, model innovation, and evaluation reform" and has accumulated complete data across the reform cycle. In 2025, this achievement won the second prize for Higher Vocational Education Teaching Achievements in Hainan Province.

5.2 Four-Dimensional Practice of Curriculum Reform

5.2.1 Goal reshaping guided by a three-dimensional model of new farmer core competencies

Aligning with the high-level, innovative, and challenging standards for golden courses, the abstract theory of "new quality productive forces" was deconstructed and transformed into a teachable and assessable three-dimensional model of new farmer core competencies. Knowledge Dimension: incorporating cutting-edge topics such as smart agricultural technology application, digital operations and e-commerce, and green sustainable development as compulsory content. Competency Dimension: introducing innovative practical abilities such as agricultural carbon sinks, brand intellectual property building, and deep processing of agricultural products. Attitude Dimension: using localized cases such as the Collection of Hainan Returning Youth Entrepreneurship Cases to internalize the sense of responsibility of "loving, serving, and prospering agriculture" as a driver for entrepreneurship. The talent cultivation goal was precisely reshaped from the traditional "experienced farmer" to the targeted positioning of "innovative new farmer."

5.2.2 Construction of a dynamic content updating mechanism with deep integration of demand-driven and agile iteration

A closed-loop mechanism for teaching content updating was established: "Industry Frontier → Curriculum Transformation → Teaching Implementation → Outcome Feedback." The university engaged with over 20 government units, including the Provincial Party Committee Organization Department and the Provincial Department of Education, and more than 10 leading enterprises. Over the past three years, collected enterprise demands led to the updating of 60% of teaching cases. Instructors annually assess industry frontier dynamics, rapidly transforming new technologies and models into teaching resources, ensuring that what students learn meets market needs. Teaching content modules such as "Smart Agricultural Technology Application," "Digital Operations and E-commerce," and "Green Sustainable Development" were developed. Supporting materials include a new-form textbook Farmer Entrepreneurship Practice Tutorial, a digital resource library of 30 micro-lectures, and localized case collections such as Hainan Entrepreneurship Case Collection and Hainan Returning Youth Entrepreneurship Case Collection. This forms a continuously growing and self-iterating "living" curriculum system, fundamentally solving the common problem of teaching content lagging behind industrial development.

5.2.3 Teaching model innovation with a three-stage progressive approach centered on project-based learning and scene revolution

Addressing the dual challenges of "work-study conflict" and "insufficient practical ability" faced by farmer students, a new three-stage progressive teaching model centered on "entrepreneurial projects" was pioneered: "Self-Learning → Workshop Practice → Field Implementation."

Stage One: Self-Learning — Integrating online and offline to construct an entrepreneurial knowledge graph. Local successful cases and course-based ideological and political education are used to stimulate students' local sentiment and sense of responsibility for "loving, serving, and prospering agriculture," laying a value foundation for competency generation.

Stage Two: Workshop Practice — Online and offline simulation training to refine core entrepreneurial skills. Face-to-face classes are transformed into "entrepreneurial project workshops." Using entrepreneurial project simulation sandboxes or students' own projects, they refine their ability to solve practical rural problems within a highly simulated decision-making environment, achieving the leap from "knowing" to "doing."

Stage Three: Field Implementation—Implementing real projects to complete the final step in entrepreneurship. Teaching scenarios extend to over 40 co-established field training bases, employing a "dual-tutor system and outcome transformation closed-loop." Students learn the entire process from research and design to operation in real industrial environments. Excellent projects designed are rapidly implemented, achieving the direct transformation of learning outcomes into rural productive forces, truly realizing "teaching as production, assignments as products." The "Lijia Legend Shanlan Wine" project is a representative example successfully incubated under this model.

5.2.4 Evaluation reform driven by value-added whole-process learning analytics

Utilizing the National Open University Learning Network to automatically collect behavioral data such as student login frequency, resource viewing duration, discussion participation, and assignment quality, algorithmic models are used to portray students' effort levels, thought processes, and competency growth trajectories, forming visual learning profiles. This constructs a value-added oriented whole-process learning analysis and evaluation mechanism. In course teaching, multiple subjects (teachers, peers, industry mentors, and learner self-assessment) evaluate student learning outcomes. Course evaluation content is designed from the perspectives of knowledge acquisition, competency development, and attitude change, employing diverse evaluation methods such as tests, project work, practical performance, and learning behavior data, providing a precise basis for teaching improvement.

5.3 Multidimensional Verification of Practical Outcomes

To systematically verify the reform outcomes, the study employed triangulation to collect multi-source data. For the questionnaire survey, from June to August 2024, 921 questionnaires were distributed to farmer students enrolled in the classes of 2022 and 2023, with 909 valid questionnaires returned, an effective response rate of 98.6%. The questionnaire items measuring core competency coverage underwent pre-testing, yielding a Cronbach's α coefficient of 0.87 and a Kaiser-Meyer-Olkin value of 0.82, indicating good reliability and validity. For in-depth interviews, 24 students were purposefully selected for semi-structured interviews, generating approximately 180,000 words of text data. Learning platform data: approximately 50,000 records of learning behavior data from the 2023 to 2025 academic years were exported. Entrepreneurial performance data: data on students' entrepreneurial project initiation numbers and operational status from 2023 to 2025 were obtained from the university's student affairs office.

Combining the above qualitative and quantitative research results, the practical outcomes of this curriculum teaching reform are primarily reflected in the following four aspects:

5.3.1 Significant improvement in core

competencies

Quantitative analysis shows that the coverage rate of students' core entrepreneurial competencies increased from 32% before the curriculum reform to 82% after. Among these, the improvement in opportunity identification ability was most significant, while the increase in risk response ability was relatively moderate. Interview data further corroborate this outcome: students commonly reported that through the course they "learned to identify entrepreneurial opportunities in their surroundings," "mastered methods for integrating local rural resources," and "developed a clearer understanding of potential market risks."

5.3.2 Continuous improvement in entrepreneurial project outcomes

Over the past two years, the student entrepreneurial project initiation rate has risen from 15% to 23%, and the project survival rate has increased from 42% to 68%, successfully transforming teaching outcomes into tangible entrepreneurial performance. During this period, a number of industrial leaders rooted in rural areas emerged, such as Jiang Bizhen (Lingshui fruit e-commerce), Fu Xiaofang (Wuli Road Tea in Baisha), and Zhu Xiaobao (Lijia Legend Shanlan Wine). They have become catalysts for activating regional rural economies. Furthermore, student entrepreneurial projects won two bronze awards in the Hainan Provincial Competition of the China International College Students' Innovation Competition (2024, 2025), further demonstrating the educational effectiveness of the course.

5.3.3 Positive shift in learning behaviors

The proportion of students engaged in active learning increased from 35% to 62%, participation in collaborative learning surged from 28% to 71%, and the completion rate of reflective behaviors rose from 19% to 58%. The teaching model successfully achieved a fundamental shift from "passive reception" to "active construction." Background data from the learning platform simultaneously shows significant increases in student login frequency, resource learning duration, and discussion forum interaction frequency, indicating that learning initiative and engagement were fully stimulated.

5.3.4 Highlighted industrial spillover effects

Students participating in the course actively taught the new technologies and models they learned to surrounding farmers, creating a strong knowledge spillover and demonstration effect. Among them, Jiang Bizhen's e-commerce live streaming project achieved annual sales exceeding 500,000 yuan, directly driving income growth for over 30 households. Fu Xiaofang actively promoted organic tea cultivation techniques, helping 30 farming households achieve an average per-unit yield increase of 15%. This truly achieved the educational goal and spillover effect of "cultivating one person, driving a community."

The teaching reform practice of Hainan Open University's "Farmer Entrepreneurship Practice" course fully validates the feasibility and effectiveness of using digital intelligence technologies to drive the development of farmer entrepreneurship courses. The empowerment of digital intelligence technologies is not merely a surface-level tool application but has become a structural force driving profound curriculum change, enabling a deep restructuring of curriculum logic from goal positioning and content systems to evaluation mechanisms. Concurrently, the practice process has clearly revealed issues requiring urgent attention: some older students experience difficulties adapting to digital intelligence technologies, requiring additional technical support and targeted training; the virtual-real integrated teaching model demands higher standards of school hardware and software facilities and teacher technological literacy, necessitating simultaneous development of teachers' professional abilities; the data-driven personalized recommendation mechanism may lead to an "information cocoon" effect, requiring a precise balance between personalized needs and content diversity in algorithm design.

6. Conclusion

This study focuses on the development of first-class farmer entrepreneurship courses, establishing a four-dimensionally linked development pathway of "goal reshaping, content restructuring, model innovation, and evaluation reform" driven by digital intelligence technologies. Through the teaching reform practice at Hainan Open University, it validates three core mechanisms for empowering curriculum change with digital intelligence technologies: data-driven closed-loop, virtual-real interaction, and dynamic resource generation. The innovation of this study lies in constructing an integrated curriculum development framework, achieving the transformation of digital intelligence technologies from tool-level application to curriculum restructuring logic. It proposes actionable solutions such as the localization of high-level, innovative, and challenging standards and value-added evaluation. Through a rigorous mixed-methods research design utilizing multi-source data, it enhances the empirical persuasiveness of the theoretical framework. The practice at Hainan Open University demonstrates that this pathway can effectively enhance students' core entrepreneurial competencies and improve entrepreneurial practice outcomes, providing a practical reference for similar curriculum development in agricultural universities.

This study also has certain limitations. Although the single case study has typicality, its representativeness still requires validation with more agricultural universities. The association between curriculum development effectiveness and graduates' entrepreneurial performance only covers a two-year period, lacking long-term follow-up data support. The study also has limited discussion on ethical and privacy issues related to the application of digital intelligence technologies. Against the backdrop of the deep integration of agricultural and rural modernization with digital intelligence technologies, the development of farmer entrepreneurship courses needs to adapt to the times and evolve with circumstances, continuously promoting the deep integration of digital intelligence technologies with curriculum logic. This is both a challenge faced by farmer entrepreneurship course development and a crucial opportunity for cultivating new farmers in the new era.

Acknowledgments

This paper is supported by the 2024 Hainan Province Higher Education Teaching Reform Project "Research on the Construction of First-Class Course 'Farmer Entrepreneurship Practice' from the Perspective of Rural Revitalization"(Project No.: Hnjg2024ZC-101) and the 2025 Hainan Province Higher Education Teaching Reform Project "Practical Exploration of Artificial Intelligence Empowering Student Online Learning Support Services" (Project No.: Hnjg2025ZC-85).

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