

# From "Technology +" to "AI +": Reconstruction Path of Practical Curriculum System for Smart Agriculture Majors in Universities and Exploration of Practice at Yulin Normal University

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**Abstract** The deep integration of artificial intelligence technology and agricultural industry has pushed smart agriculture into a new stage of "AI + scenario", and put forward a transformation requirement for the talent cultivation of smart agriculture major in universities from "technology application" to "intelligent innovation". In response to the problems of insufficient AI integration, lack of contextualization, and insufficient collaboration between industry and education in the traditional "technology +" practical course system, this paper takes the smart agriculture major at Yulin Normal University as an example to construct a "AI + agriculture" practical course reconstruction framework and propose a four-dimensional transformation path of "goal – content – mode – evaluation". Through the practical exploration of modular curriculum design, scenario based practical design, integration of industry and education, and intelligent evaluation reform, a practical teaching system with local application-oriented university characteristics has been formed, providing a reference example for the cultivation of smart agriculture professionals under the background of new agricultural science.

**Key words** Smart agriculture; Practical curriculum system; AI +; Reconstruction path; Applied universities

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The *Guiding Professional Guidelines for the Training of New Agricultural Science Talents* issued by the Ministry of Education clearly requires that the smart agriculture major needs to strengthen the cross integration of information technology and agricultural science, and cultivate compound agricultural talents with AI application capabilities<sup>[1]</sup>. However, most of the current practical courses for smart agriculture majors in universities still follow the "technology +" model, with a focus on single technical operation training. There are prominent problems such as the disconnect between AI courses and agricultural scenarios, the mismatch between practical teaching and industry demand, and weak students' intelligent innovation ability, which make it difficult to meet the demand for talents in the development of agricultural intelligence.

As a local applied university in Guangxi, Yulin Normal University open a smart agriculture major in 2023. Based on the characteristics of agricultural industry in southeastern Guangxi, it actively connects with the development needs of regional smart agriculture and has carried out a series of explorations in the transfor-

mation of practical curriculum system. Based on this, this paper combines the practical experience of Yulin Normal University to explore the core logic and reconstruction path of the transformation from "technology +" to "AI +", providing reference for the teaching reform of related majors in similar universities<sup>[2]</sup>.

## 1 Transformation logic of practical curriculum system from "technology +" to "AI +"

The "technology +" practical curriculum system focuses on the combined application of traditional agricultural technology and single information technology, and emphasizes independent operation training in irrigation technology, fertilization technology, monitoring technology, *etc.*, and cultivating skilled talents with a focus on "using technology". The "AI +" practical course system focuses on the deep integration of artificial intelligence technology and agricultural scenarios, and emphasizes the integrated application of AI algorithms, big data analysis, intelligent equipment, *etc.* in agricultural production, and cultivating composite talents who can make good use of AI innovation to solve agricultural problems<sup>[3]</sup>. There are essential differences between the two in terms of training objectives, content design, teaching mode, *etc.* (Table 1).

## 2 Reconstruction path of "AI +" oriented smart agriculture practice curriculum system

Based on the core principles of "AI integration, scenario

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driven, industry – education collaboration, and capability oriented", a four-dimensional reconstruction path of "goal – content –

mode – evaluation" is constructed to achieve a systematic transformation of practical curriculum system<sup>[4]</sup>.

**Table 1 Comparison of core differences between "technology + " and "AI + " practical curriculum systems**

Comparative dimension	Technology + mode	AI + mode
Educational objective	Technical operational talents	AI + agricultural composite talents
Content design	Single technology independent training	Interdisciplinary scene integration training
Teaching model	Classroom lecture + laboratory operation	Project driven + scenario simulation + enterprise training
Ability focus	Technical application capability	Intelligent innovation capability + industrial service capability
Evaluation method	Results oriented single evaluation	Process oriented multiple intelligence evaluation

**2.1 Goal reconstruction; establishing the cultivation goal of "three-dimensional ability"** Based on the demand for smart agriculture talents in the AI era, a three-dimensional training goal of "agricultural basic ability + AI core ability + scenario innovation ability" is established.

**2.1.1 Agricultural basic capabilities.** It should master core agricultural technologies such as horticultural crop cultivation and livestock breeding, and be familiar with the growth patterns and industrial demands of Guangxi's characteristic crops such as *Citrus maxima* and *Litchi chinensis*.

**2.1.2 AI core capability.** It should have basic abilities in Python programming, machine learning algorithm application, agricultural big data analysis, intelligent equipment operation, *etc.*

**2.1.3 Scenario innovation capability.** It should be able to integrate AI technology with agricultural production scenarios to solve practical problems such as precision irrigation, intelligent fertilization, and disease and pest identification.

**2.2 Content reconstruction; building a "modularization + scenarization" curriculum system** It should break down the disciplinary barriers of traditional courses, reconstruct practical course content according to the structure of "basic module + core module + characteristic module", and achieve deep integration of AI technology and agricultural scenarios.

**2.2.1 AI basic practice module.** It should offer courses such as Python and agricultural data processing, fundamentals of machine learning, and agricultural Internet of Things technology to solidify the foundation of AI technology, accounting for 30% of the total class hours<sup>[5]</sup>.

**2.2.2 AI + agricultural core module.** It should set up courses on precision planting intelligent control, AI recognition of pests and diseases, agricultural big data analysis and application, *etc.*, and cultivate core application skills through project-based teaching, with a total teaching hours accounting for 40%.

**2.2.3 Regional characteristic module.** Combining the advantages of selenium rich agriculture and characteristic horticultural crop industry in Guangxi, courses such as intelligent planting practice of selenium rich crops and AI monitoring of pests and diseases of characteristic fruit trees should be offered, with a total class hour ratio of 30%.

At the same time, the educational brand of "Red Soil" should be integrated into the curriculum content. Through rural revitalization practices, science and technology courtyard services,

and other links, students' sentiment towards agriculture, rural areas and farmers and social responsibility could be cultivated.

**2.3 Mode reconstruction; innovating the "trinity" practical teaching mode** It should integrate on campus laboratories, off campus training bases, and real scene resources of enterprises to construct a trinity practical teaching model of "on campus simulation + off campus training + project practice".

**2.3.1 On campus simulation practice.** Based on the Key Laboratory of Smart Agriculture for Guangxi Characteristic Horticultural Crops and the Facility Agriculture Engineering Research Center, an AI + agricultural virtual simulation platform is built to carry out simulation training such as intelligent irrigation system debugging and AI identification of pests and diseases.

**2.3.2 Off campus practical training.** Yulin Normal University has jointly established training bases with 11 units including Guangxi Zhongnong Fuyu International Agricultural Technology Co., Ltd. and Guangxi Sanhua Ecological Agriculture Development Co., Ltd., and arranged for students to participate in practical work such as intelligent greenhouse management, agricultural big data collection and analysis<sup>[6]</sup>.

**2.3.3 Project practice experience.** It organized students to participate in the National Undergraduate "Internet + " Competition and the Smart Agriculture Innovation and Entrepreneurship Project. Relying on science and technology academies such as Rongxian *C. maxima* and Beiliu *L. chinensis*, it carried out AI technology application practice and combined scientific research achievements with practical teaching.

**2.4 Evaluation reconstruction; establishing a "smart + diversified" evaluation system** It should break through the traditional results oriented evaluation model and build a process oriented and diversified intelligent evaluation system.

**2.4.1 Diversified evaluation subjects.** It should encourage school teachers, corporate mentors, and industry experts to participate in the evaluation, with corporate mentors accounting for no less than 30% of the evaluation, with a focus on assessing students' practical abilities in their positions.

**2.4.2 Comprehensive evaluation content.** It should set evaluation indicators from four dimensions; agricultural basic ability, AI application ability, innovation ability, and professional ethics, covering multiple aspects such as experimental reports, practical training performance, project achievements, and innovation and entrepreneurship competitions.

**2.4.3 Intelligent evaluation methods.** Utilizing online teaching platforms and AI evaluation tools, real-time data on students' practical processes are collected and analyzed, achieving precision and efficiency in evaluation. It should adopt non-standard answer assessment, and emphasize the evaluation of students' innovative thinking.

### 3 Exploration and achievements of Yulin Normal University practice

**3.1 Practical foundation** College of Smart Agriculture at Yulin Normal University has a teaching team with a senior professional title and doctoral degree, accounting for 81.5% of the teachers. It has established four provincial and ministerial level scientific research platforms, and the total value of teaching instruments and equipment is over 22 million yuan, providing solid faculty and hardware support for the transformation of practical courses. At the same time, based on the advantages of the agricultural industry in Yulin City, Yulin Normal University has jointly established a modern agricultural and forestry industry college with local governments and enterprises, forming a good foundation for the integration of industry and education.

#### 3.2 Specific practical measures

**3.2.1 Optimization of course content.** In the 2023 version of talent training plan, six AI related practical courses was added, including the "Agricultural Artificial Intelligence Application" and the "Agricultural Big Data Analysis". Traditional courses such as the "Precision Agriculture Technology" is revised, and AI technology application cases are integrated. SPOC courses such as the "Landscape Effects SketchUp/lumion" are developed, and a smart classroom system that combines online and offline learning is built.

**3.2.2 Construction of practical platform.** It transforms traditional laboratories, and adds AI + agricultural virtual simulation equipment. It signs cooperation agreements with enterprises to jointly build educational practice teaching bases and expand practical scene resources.

**3.2.3 Construction of teaching staff.** It selects teachers to intern in enterprises, and conducts AI + agricultural research cooperation. Enterprise experts are invited to participate in course design and teaching, and the AI application teaching ability of teaching staff is enhanced.

**3.2.4 Transformation of educational achievements.** It organizes students to participate in doctoral social service teams, and conduct AI agricultural technology training in the fields, providing services more than 30 times a year, training more than 1 500 rural technical personnel, and achieving the organic combination of practical teaching and social services.

#### 3.3 Reform results

**3.3.1 Improving the quality of talent cultivation.** In the academic year 2024 – 2025, 10 students were awarded national level subject competitions, and 105 students were awarded at the autonomous region level. Six national level innovation and entrepreneur-

ship training programs for college students have been approved, with three of them focusing on AI + agricultural scenario applications. The admission rate for the 2025 graduate entrance examination was 32.4%, with some students pursuing further studies in smart agriculture related majors at universities such as South China Agricultural University. Over 80% of graduates are employed in local smart agriculture enterprises and agricultural technology promotion departments in Guangxi.

**3.3.2 Enhancing industrial service capabilities.** Through platforms such as the Science and Technology Academy and the Doctoral Service Team, AI pest and disease identification, intelligent irrigation control, and other technologies are applied to regional agricultural production, helping to build a selenium rich agricultural demonstration base in Luchuan County and promoting the creation of "Guizi" agricultural brand. The cumulative amount of technical services has reached more than 15 million yuan.

**3.3.3 Expanding professional influence.** The professional construction experience is exchanged and promoted at the Guangxi New Agricultural Science Construction Forum, and the cooperation model with Guangxi Special Crop Research Institute and other units becomes a typical case of industry – education integration in local universities, providing important support for the cultivation of regional smart agriculture talents.

## 4 Conclusions

The transformation of practical curriculum system for smart agriculture from "technology +" to "AI +" is an inevitable requirement for the development of agricultural intelligence and the reform of new agricultural science education. Yulin Normal University has constructed a practical curriculum system that deeply integrates "AI + agriculture" through four-dimensional reconstruction of goal, content, mode, and evaluation, forming a teaching reform feature of "scenario based, industry – education integration, and capability based". Practice has proven that this transformation path can effectively enhance students' AI application and industry service capabilities, providing useful references for the teaching reform of smart agriculture majors in local application-oriented universities. In the future, it is necessary to further integrate resources, strengthen teacher construction, improve evaluation system, and continuously promote the optimization and upgrading of practical curriculum system, in order to cultivate more high-quality and composite smart agricultural talents for the construction of a strong agricultural country.

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through data silos, allowing teachers to complete course construction, teaching interaction, learning data viewing, learning warning, and teaching evaluation on one platform. This can lower the threshold for technology usage, allowing teachers to focus on teaching itself rather than technical operations.

**4.3.2** Building a "localized and generative" digital resource library. On the one hand, led by the school, high-quality resources are systematically procured and introduced according to disciplines. On the other hand, it should encourage teachers in the school to jointly build and share, and upload excellent micro lessons, cases, and exercise libraries, forming a "living" resource library with the school's characteristics. Intellectual property recognition and rewards should be provided to contributors. In this way, it can effectively solve the dilemma of teachers' inability to cook without rice and reduce their repetitive labor.

**4.3.3** Providing technical and pedagogical support for "instant response". By establishing an "informative teaching support center", it can provide teachers with hotline, online and offline timely support. The support team should include both technical personnel and instructional designers, who can solve technical problems and provide teaching method consulting, thus providing a "safety net" for practice innovation of teachers, and allowing them to dare to try and have no worries.

#### **4.4 Innovating incentive mechanism: achieving institutional traction from "soft requirements" to "hard indicators"**

**4.4.1** Incorporating the ability and effectiveness of informative teaching into the core evaluation system. Local colleges and universities should clearly establish evaluation indicators and weights for informative teaching in teacher title evaluation, job appointment, performance assessment, and excellence evaluation. For example, it makes "successfully offering a blended learning course" or "obtaining a certain micro certification" a necessary condition or important bonus for promotion. By leveraging the role of evaluation as a "baton", it can affirm the investment of teach-

ers from an institutional perspective and make teaching innovation "rewarding".

**4.4.2** Establishing special funds and honors. By establishing the "innovation award for informative teaching" and the "golden course construction fund", material rewards and grand commendations could be given to teachers and teams who have achieved outstanding results in informative teaching, and their achievements should be widely promoted on campus as typical examples. Furthermore, it creates a campus atmosphere that "advocates teaching innovation" and stimulates teachers' sense of honor and competitiveness.

It is a complex systematic project by improving the informative teaching ability of teachers from local universities. It requires school administrators to transform from "managers" to "service providers and designers". Among the four paths mentioned above, the activation of ideas is a prerequisite, solving the problem of willingness; accurate empowerment is the core, solving the problem of methods; environmental support is the foundation, solving the problem of conditions; institutional incentive is a guarantee, solving the problem of motivation. Only by working together with the four measures can it break through the existing difficulties, help teachers from local universities successfully transform in the wave of the digital and intelligent era, and ultimately achieve an overall leap in the quality of higher education.

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