世界数字教育大会
WORLD DIGITAL
EDUCATION CONFERENCE

Best Practices in AIED:

Scenarios-Driven Educational Transformation

世界数字教育创新案例集
——场景驱动的人工智能+教育变革

Digital Education Technology Solutions

技术解决方案

世界数字教育联盟
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Preface

In the era of rapid advancement of digital technologies, digital transformation has become an irreversible trend in global education development. To promote the deep integration of digital technologies and education, facilitate international exchanges, mutual learning and collaborative application of high-quality digital education solutions, and support education technology enterprises in expanding globally and connecting with international partners, the World Digital Education Alliance (WDEA) launched a Call for Outstanding Digital Education Technology Solutions.

This book collects more than 50 outstanding digital education technology solutions from 36 enterprises and institutions, covering a wide range of fields including education-specific large models, AI agents and intelligent learning assistants, digital education platforms and application systems, digital education resource production systems, intelligent education equipment, and integrated digital education technology solutions. These solutions focus on real scenarios of teaching and learning, education governance and public education services, highlight replicable and scalable implementation paths and cooperation models, and provide valuable practical references for global digital education transformation.

The solutions come from diverse institutions, with distinct technological innovation and strong practicality. They fully demonstrate the latest achievements and development trends of global digital education technology, and reflect the exploration and practice of all sectors in promoting the high-quality development of digital education. We hope that these cases can bring some insights for international cooperation and experience sharing in digital education, help outstanding solutions to be promoted and applied globally, and jointly build a new ecosystem for the innovative development of digital education.

We would like to express our sincere gratitude to all the institutions that actively participated in the submission, the experts who carefully reviewed the solutions, and all the partners who supported the call and the compilation of this book. Together, we will continue to advance the innovative application of digital technologies in education, advance educational equity and high-quality development, and contribute to a brighter future for global digital education.

Joint Secretariat for WDEA

May, 2026

1. China United Network Communications Co., Ltd

Scenario-Driven Digital Transformation of Medical Education - Medical AI Intelligent Teaching Platform Based on Large Model and Graph Technology

Solution Introduction

Function Overview

In terms of architecture selection, the platform fully adopts a cloud-native microservices base (Java Spring Boot Vue/React) and has built an 'AI industrialised low-cost question creation' pipeline tailored to the medical field: Firstly, there is 'textbook structuring'. The system uses the MinerU multimodal parsing tool to accurately extract complex charts, medical formulas, and nested texts frequently appearing in clinical medicine textbooks. Secondly, there is 'knowledge graph question generation'. Using the KAG (Knowledge-Augmented Generation) framework, the platform extracts medical entities and logical relationships from the parsed texts and stores them in a Neo4j graph database to form a domain-specific knowledge network. Subsequently, Dify orchestrates large language models (LLMs) to perform multi-hop reasoning along logical chains such as 'cause-symptom-diagnosis' in the graph, automatically generating questions. This is followed by rigorous manual review and database entry by affiliated hospital experts. In addition, for past medical licensing exam papers, the system also supports automated parsing and structural database entry of PDF scans using AI. In terms of engineering support, a self-developed exam system capable of handling high concurrency of over 500 participants and a WebSocket-based 1V1 real-time competition engine have been implemented. Notably, we independently built an 'AI Capability Centre' at the application layer, achieving efficient collaboration between internal business data and external large language models (LLMs) through a unified API interface, knowledge base management (RAG), and AI application orchestration modules. At the data persistence layer, in addition to traditional business databases (MySQL) and caching (Redis), vector databases and graph databases have been innovatively introduced to provide a solid data foundation for AI knowledge retrieval and medical knowledge graph construction. This architecture not only perfectly meets current requirements but also leaves ample room for future functional expansion.

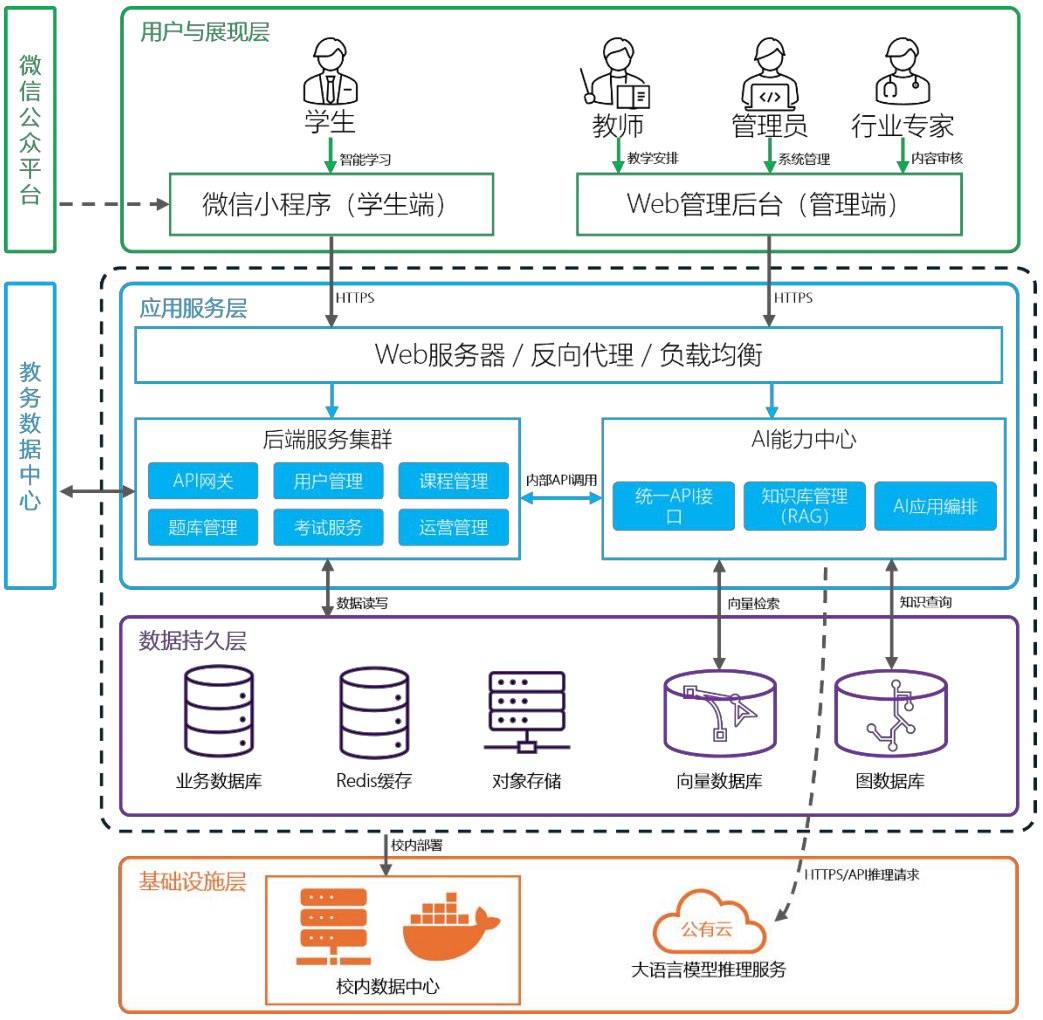

Fig. 1 Overall system technical architecture diagram

The project addresses the pain points in students' learning processes and overcomes the tedium of studying medical theory by introducing lightweight gamified interactions on the student platform. The battle module references the ELO ranking system, and when there are insufficient real opponents, the system automatically schedules AI bots of varying difficulty levels to provide practice. In terms of learning feedback, the system not only records accuracy but also tracks the knowledge graph nodes behind each answer. Leveraging data mining and algorithm iteration, it dynamically updates a student's 'list of weak knowledge points', enabling intelligent reshuffling and delivery of incorrect questions. To tackle the potential 'hallucination' phenomenon of large language models in the medical field, the development team has tightened search retrieval boundaries (Top-K), continuously optimised system-level prompts, and established a mandatory expert 'Human-in-the-loop' review mechanism to ensure the system's professional rigour.

- **Technical Highlights or Innovations:**

This project has achieved a fundamental transformation in the mechanism of educational resource production.

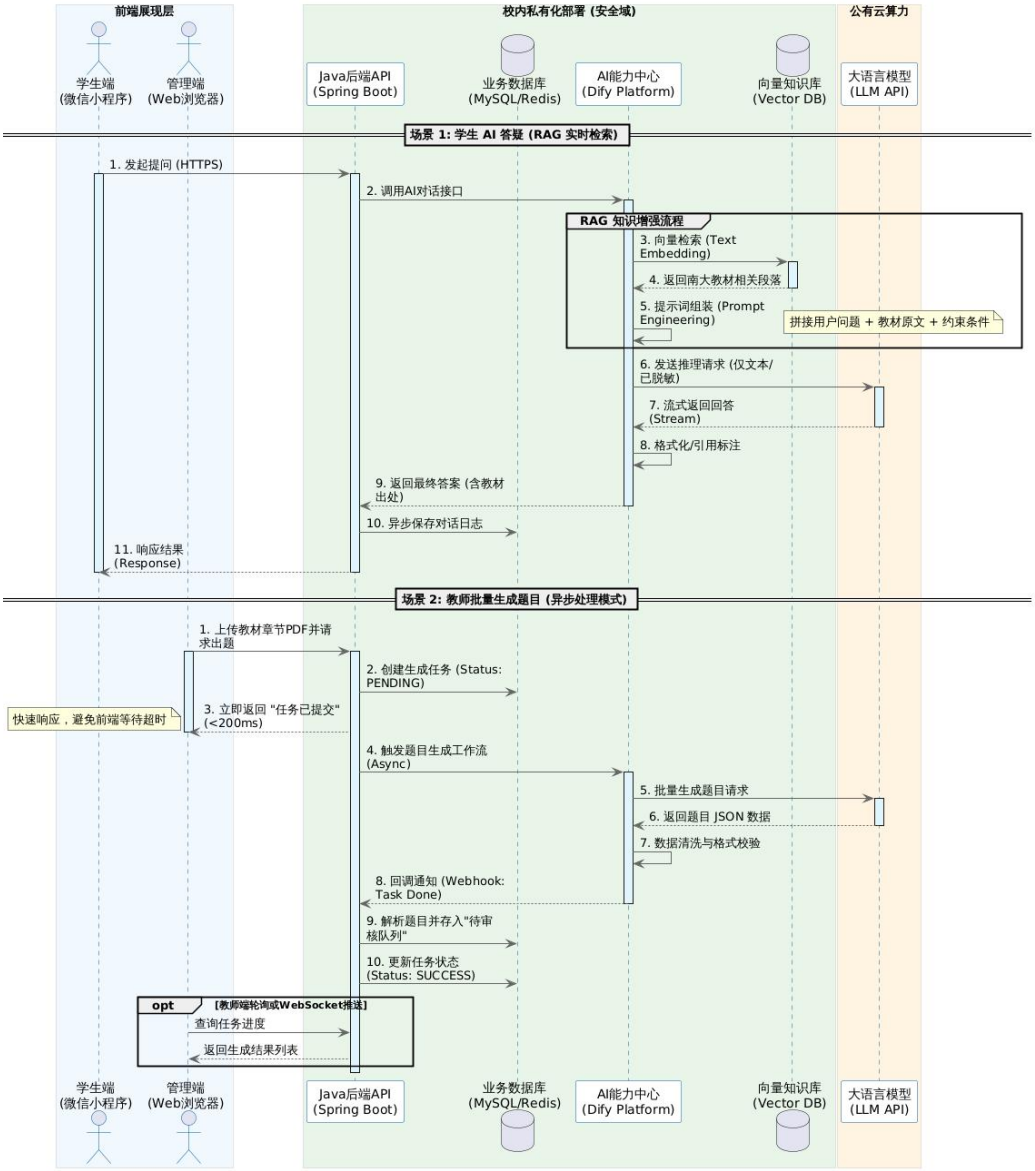

Fig. 2 Frontend and backend interaction logic diagram with AI services

Traditional academic systems often serve as mere conveyors of static question banks, whereas this project positions AI as the core productive force, achieving deep alignment of multi-dimensional syllabuses in question bank construction: not only closely adhering to the customised teaching syllabus of Nanchang University Medical School, but also deeply analysing and aligning with the 'Clinical Medicine Undergraduate Level Assessment Syllabus for Medical Schools', the 'Clinical Practitioner Qualification Examination Syllabus', and the '2025 Comprehensive Clinical Medicine Competency (Western Medicine) Examination Syllabus' (postgraduate syllabus), thereby realising semi-automated large-scale production of school-specific question banks covering all scenarios. Meanwhile, the project has introduced a competitive ranking mechanism into the serious professional medical examination scenarios, utilising psychological feedback mechanisms to effectively enhance medical students' frequency of self-practice during fragmented time, achieving a model innovation from passive teaching to active exploration.

The core technological breakthrough of this project lies in the construction of an intelligent medical question generation system based on multimodal analysis and the KAG (Knowledge-Augmented Generation) framework, overcoming multiple engineering challenges for deploying general large models in the vertical education domain: Deep Analysis of Multimodal Medical Documents (based on MinerU): Medical textbooks contain numerous irregularly formatted clinical images, data tables and biochemical formulas, and traditional OCR technology is prone to errors and paragraph fragmentation. This project integrates and deeply customises the MinerU analysis engine, capable of accurately recognising the document hierarchy (chapter, section, knowledge point) and restoring complex medical tables and formulas to Markdown or LaTeX format without loss, providing high-purity structured data for subsequent knowledge graph construction. KAG Technical Architecture Beyond Traditional RAG Limitations: Mainstream RAG (retrieval-augmented generation) relies on vector similarity matching and, when faced with disciplines like medicine that are logically rigorous and highly interlinked, often retrieves text fragments that are superficially similar but logically unrelated, leading to errors in large model outputs. This project innovatively adopts the KAG approach: on one hand, large models extract medical entities (e.g., diseases, symptoms, drugs) and their attribute associations (SPO triplets) from cleaned textbooks and inject them into a Neo4j database to construct a knowledge graph; on the other, during question generation, the retrieval module not only searches the vector space but also performs multi-hop reasoning within the graph. Reverse Generation of High-Dimensional Clinical Thinking Questions: By leveraging logical edges defined in the graph such as ‘prerequisites’, ‘similar/confusing’, and ‘differential diagnosis’, the large model can understand the context structure of knowledge. This enables AI to move beyond simple 'definition memorisation' type questions, automatically generating 'A2/A3 case analysis questions' with clinical scenario simulation capability. Additionally, AI can utilise 'similar nodes (sibling nodes)' in the graph to automatically generate highly misleading distractors, making the quality of auto-generated questions comparable to the standards of the National Medical Examination Centre.

Dify-based large model engineering scheduling and orchestration: To address the issue that a single prompt cannot accommodate multiple objectives, the platform introduced Dify to build a Multi-Agent workflow. The question-setting task is divided into the 'Key Point Extraction Agent', 'Question Stem Generation Agent', 'Distractor Generation Agent', and the 'Critique Agent' responsible for checking logical errors. This modular orchestration greatly reduces AI hallucination and improves the usability of question generation.

Application Scenarios

- **Application Environment and Implementation Targets**

Research found that the academic side and clinical tutors spend a tremendous amount of time compiling high-quality exam questions that comply with the university's teaching syllabus; students generally reported that despite extensive practice, it is difficult to build a systematic network of medical knowledge and they lack precise targeting of weak areas. Based on this, the platform established a 'dual-end advancement' product architecture: the management end focuses on reducing the teaching and research burden, providing AI one-click smart question generation and panoramic learning monitoring based on the teaching syllabus; the student end (WeChat mini programme) features scenario-based efficient practice, real-time competition in the same exam room, and a visualised personal ability radar chart.

- **Examples of Typical Application Scenarios**

At the level of teaching and research practice, the project has completely implemented the full ecological loop of 'lecture material input -> knowledge graph construction -> initial machine drafting -> expert review -> question bank output'.

Under the traditional model, clinical teaching instructors, due to their heavy daily medical tasks, would require several days to compile a high-quality final exam or mock test; now, the platform can generate initial drafts of test questions and detailed analyses within minutes, with teachers only needing to spend a very short time for minor adjustments and confirmation. More importantly, this digital workflow of 'document analysis - knowledge graph construction - intelligent question generation' is not limited to medical education; its underlying logic fully supports transfer and generalisation to other vertical fields such as primary and secondary education (K12 subjects in maths, physics and chemistry) and vocational skills training, possessing significant cross-sector demonstration value.

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

The project provides a highly pragmatic implementation plan for 'large model education'. We embed AI at the foundational level, focusing on addressing the 'dirty and heavy work' in educational research such as multimodal document analysis, knowledge graph construction and large-scale question bank production. We have developed a mature and replicable AI education digital application model, setting a benchmark in terms of technical support, standardised management, quality assurance and educational equity, playing a pioneering, standard-setting and influential role in the digital transformation of education, particularly medical education, across regions and beyond, strongly promoting the high-quality development of medical education.

Replicability, Sustainability and Promotion Potential

Promotion effectiveness: Achieved regular use on a scale of 10,000 people, with 100% coverage of online teaching, and orderly organisation of online revision and examinations.
Stable operation: Supports high concurrency at the scale of tens of thousands, with a stable and reliable system, capable of meeting the needs of daily teaching, mid-term and final exams, and mock unified tests.
Promotion model: Established a mature pathway of training—practice—trial operation—formal promotion—continuous optimisation, with the capability for nationwide replication, scalable expansion, and long-term promotion.

Illustration of a Typical Case

Nanchang University Medical College: The project was officially launched at Nanchang University Medical College in October 2025. Service scale: Currently serves over 8,000 people at Nanchang University Medical College, including teachers, students and administrative staff. Registration and activation: Online teaching, review and online examination systems have a 100% registration and activation rate, with all personnel included in a unified platform management. Organisational scale: Can support up to 10,000 people online simultaneously for teaching/exams, with stable concurrency and sufficient resources.

Basic Information of the Institution

Institution Introduction

China United Network Communications Group Co., Ltd. (hereinafter referred to as “China Unicom”) has established branches in 31 provinces (autonomous regions and municipalities directly under the central government) across China, as well as in multiple countries and regions around the world. It operates a modern communications network that spans the nation and connects the globe, supported by a worldwide customer service system. In 2025, it was ranked 269th on the Fortune Global 500 list. As a foundational communications enterprise serving the Party, government, military systems, various industries, and the general public, China Unicom plays a fundamental, pillar, strategic, and pioneering role in the national economy. It features technology intensity, end-to-end and whole-network operations, economies of scale, and serves the economy, society, and people’s livelihoods.

China Unicom faithfully fulfills its political, economic, and social responsibilities. Adhering to the leadership of the Party, upholding integrity while pursuing innovation, and focusing on its main business and core mandates, it has established “innovating on a solid foundation and advancing with stability” as the overarching theme for its development during the 15th Five-Year Plan period. It has identified connectivity, computing power, services, and security as the core tracks for fulfilling its responsibilities as a central state-owned enterprise. By transforming itself from an underlying infrastructure provider to an integrated digital service provider, China Unicom serves as a national team and main force in the information and communications industry, fully playing its roles in technological innovation, industrial control, and security support.

Experience or Qualifications in the Field of Digital Education

China Unicom has always been committed to the development of educational informatization and has signed a strategic framework cooperation agreement with the Ministry of Education to help education management departments use information technology to improve teaching quality. China Unicom has been carrying out comprehensive cooperation with the Ministry of Education in the field of educational informatization, continuously promoting the modernisation of education. China Unicom has successively established independent subsidiaries dedicated to educational informatization, including Yunqi Smart Company and the Education Legion, to fully serve educational informatization. It has undertaken numerous smart education projects, including the National Education Public Service Platform, Subject Networks, Harbin Institute of Technology, Fudan University, Shanghai Jiao Tong University, Hainan Jiangcai Institute, Yingtan Vocational and Technical College, Zhengzhou University, Hebei University of Science and Technology, and East China Normal University.

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"Art-Tech Integration" — High-Quality Dataset Construction for Vocational Art Colleges

Solution Introduction

Function Overview

This solution addresses the challenges of fragmented and disorganized data resources in vocational art colleges by building a high-quality dataset construction and open-sharing platform that follows the principle of "centralized aggregation, multi-dimensional empowerment." It achieves a critical transition from data as a resource to data as a service.

Core Functional Architecture:

Integrated Data Collection and Governance Platform

Integrates existing resources from 146 courses and 2,797 teaching materials (approximately 1124 GB) across the institution. Using ETL tools, it enables unified collection, cleaning, transformation, and loading of multi-source heterogeneous data (structured and unstructured). The platform supports multiple access methods including databases, APIs, files, and message queues, achieving a 100% data format unification rate.

Multimodal Intelligent Annotation System

Tailored to the characteristics of art education, this system establishes a four-dimensional annotation framework covering text, images, video, and audio.

- Text annotation includes entity recognition and sentiment analysis.
- Image annotation supports intelligent visual annotation and keypoint annotation (e.g., 68-point annotation for dance movements).
- Video annotation enables temporal action segmentation and multi-object tracking.
- Audio annotation covers vocal classification and instrument recognition.

The system integrates AI pre-annotation capabilities, improving annotation efficiency by over 60%.

Data Service Open Platform

Implements a precise authorization model of "one scenario, one authorization," classifying data into three categories: publicly shareable, restricted access, and prohibited from sharing. Through technologies such as API gateways, sandbox computing, and federated learning, it ensures "data usable but invisible, with controlled and measurable usage," supporting applications in teaching, research, and the cultural and creative industries.

Knowledge Graph Construction Engine

Builds an aesthetic education knowledge graph using a graph database (JanusGraph) to enable associative mapping of entities such as courses, teachers, students, intangible cultural heritage projects, and artworks, supporting intelligent retrieval and personalized recommendations.

Fig. 3 Technical Architecture Diagram

Technical Highlights or Innovations

Innovation in Secure Circulation Mechanisms with "Data Leaving the Domain"

This solution overcomes the traditional dilemma of data sharing—either locked down or exposed unprotected—by innovatively establishing a technical pathway that ensures "raw data never leaves the domain while securely outputting data value." Through a combination of API services, privacy-preserving computing sandboxes, and federated learning, it ensures that raw data is stored locally while only desensitized data value or model training results are output externally. This achieves a dynamic balance between data security and open sharing. This model has passed the Level 3 certification for cybersecurity protection and complies with the requirements of the Data Security Law and the Personal Information Protection Law.

Innovation in Multimodal Data Governance Standards for Art Education

Addressing the unique characteristics of art education resources, the solution establishes the Aesthetic Education Data Resource Catalog and a multi-dimensional classification and labeling system (covering disciplines, resource formats, application scenarios, and data levels), filling the gap in data standards within the field of art education in China. An innovative special standard for the "Digitalization of Intangible Cultural Heritage (ICH) Techniques" has been developed, transforming intangible cultural heritage assets such as Ningxia Hua'er folk songs and ethnic dances into structured, computable data assets, providing a technical paradigm for the living transmission of ICH.

Sustainable Data Ecosystem Model of "Supply-Application-Feedback"
A data value feedback mechanism has been established, where a portion of the revenue generated from data operations is reinvested into cultural initiatives such as the preservation and transmission of folk dance and the training of intangible cultural heritage inheritors. This creates a virtuous cycle of "data collection – governance – service – revenue – reinvestment." This model explores a reform path for the market-based allocation of cultural data elements and holds significant value for demonstration and replication.
Deep Integration of Domestic Technology Stack
The solution fully adopts domestic hardware and software, including Huawei Kunpeng/Hygon processors, GaussDB/Dameng databases, and the OpenEuler operating system, to build an independently controllable technology foundation. Through in-depth optimization and adaptation, it achieves smooth processing and real-time analysis of large-scale video data (4K/8K) in a domestic environment, with performance reaching the level of mainstream international solutions.

Application Scenarios

Application Environment and Implementation Targets

Hardware Environment:
Deployed on the Ningxia Hui Autonomous Region Government Affairs Cloud Platform for information technology innovation applications, utilizing a hybrid cloud architecture. Core business systems are deployed in the government affairs extranet VPC, while internet services are deployed in the internet VPC, with secure cross-VPC data transfer achieved via a gateway. Locally, digital collection facilities such as an XR industry-education integration training base and motion capture VR projects are configured.
Software Environment:
Servers run on a domestic operating system (OpenEuler), databases use Huawei GaussDB or Dameng DM, and middleware employs domestic API gateways and message queues, ensuring full adaptation to the information technology innovation ecosystem.
Implementation Targets:
On-campus teachers and students: Covering 7 teaching departments and over 20 academic disciplines, serving 235 faculty members and several thousand enrolled students.
Regional educational institutions: Art teachers and students from primary, secondary, and higher education institutions across Ningxia.
Government departments: Entities such as the Department of Education and the Department of Culture and Tourism with data-sharing requirements.

Examples of Typical Application Scenarios

Scenario 1: Digital Transmission of Intangible Cultural Heritage (ICH) and Intelligent Teaching (Local Practice in Ningxia)
To address the challenges in preserving national-level ICH items such as Ningxia Hua'er folk songs and Ningxia Xiaoqu, an "ICH Digital Inheritor" system has been developed. Performance data from inheritors is captured using motion capture equipment, and a video annotation system extracts key movement trajectories and vocal characteristics, forming a searchable and comparable database of ICH techniques. In dance performance courses, students can use VR devices to immerse themselves in learning ICH dances, while the system automatically compares their movements with standard movements and provides personalized corrections. This scenario has been piloted in the university's dance department, resulting in a 40% increase in teaching efficiency and a 25% improvement in the excellence rate of student skill assessments.

Scenario 2: Data Empowerment in the Cultural and Creative Industry (Innovation in Industry-Education Integration)
API data interfaces are provided to cultural and creative enterprises, enabling them to develop digital cultural and creative products. For instance, an enterprise used the ICH pattern dataset in combination with AI generation technology to develop a series of digital collectibles and derivative cultural products, generating over 5 million yuan in output value. Market feedback data provided by the enterprise, in turn, feeds back into the platform to optimize dataset quality, forming a closed loop of industry-academia-research-application.

Outcomes and Case Studies

Implementation Outcomes, Evaluation Data, or Practical Experience

Quantitative Outcome Metrics:
Metric CategorySpecific IndicatorTarget ValueCurrent Progress
Data Resource DevelopmentNumber of core datasets≥10Data for 6 disciplines integrated
Total data volume≥20TBCurrently 1124 GB; planned increase of 500+ GB
Data format uniformity rate100%Standardization specifications completed
Annotation accuracy rate≥98%96.5% achieved in pilot phase
Platform Service CapabilitySystem availability≥99.5%Leveraging government cloud infrastructure
API response time<200msUnder testing
Concurrent user support≥500usersUnder planning
Application ImpactProportion of courses covered≥70%Planned to cover 146 courses
Supported research projects≥5per yearIncluded in planning
Qualitative Outcomes:
Pedagogical Innovation: Supports the development of characteristic "Art + Culture & Tourism" professional clusters, facilitates the creation of digital course resources for emerging majors such as "Live Streaming and Operations," and promotes the transition of classroom teaching toward project-based and scenario-based learning.
Enhanced Research Capabilities: Provides data support for projects funded by the China National Arts Fund and the development of original performance works, helping the institution establish itself as a regional hub for aesthetic education research.
Expanded Social Services: Serves as a core node for the supply of aesthetic education digital resources in Ningxia, supporting the dissemination of aesthetic education in primary and secondary schools and promoting equitable access to public cultural services.

Replicability, Sustainability and Promotion Potential

①Replicability
Technological Replicability: The platform uses a microservices architecture and modular design, allowing rapid adaptation to the data types of other art institutions.
Standard Replicability: Standard documents such as the Aesthetic Education Data Resource Catalog and the Technical Specifications for ICH Digitalization have been developed.
Model Replicability: The mechanism of "centralized aggregation, scenario-based authorization, and value feedback" can be transferred to other cultural fields (e.g., revolutionary culture, local operas).
② Sustainability
Operational Mechanism: A closed loop of "data supply – application innovation – revenue distribution – reinvestment" has been established, with some revenue reinvested in cultural preservation.
Funding Guarantee: The project is included in the institution's annual regular budget, with special funding applied for from the Department of Education, and efforts are underway to attract social capital.

Talent Pipeline: A system of roles including data engineers, annotation specialists, and security operations has been established, and partnerships with universities are cultivating talent in information technology innovation.

③ Promotion Potential

Regional Level: The initiative is being promoted to neighboring provinces in Ningxia, with plans to form a "Northwest Art Education Data Alliance."

National Level: The institution is applying to become a pilot for the Ministry of Education's Vocational Education Digital Campus initiative, aiming to establish a benchmark for data development in art institutions nationwide.

International Level: Leveraging the Belt and Road Education Action, the project aims to export its expertise in ICH digital preservation to Central Asian countries.

Basic Information of the Institution

Consistent with the introduction of China United Network Communications above.

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Smart Reading Platform for the All-Scenario Intelligent Upgrade of Scholarly Campuses

Solution Introduction

Function Overview

Currently, at the national level, great importance is attached to enhancing adolescents' reading literacy. The "Regulations on the Promotion of National Reading" explicitly proposes to promote the balanced and coordinated development of reading for all citizens. The "Implementation Plan for National Reading Actions for Adolescents" further emphasizes establishing reading courses, conducting reading guidance, promoting the curricular and familial integration of reading activities, and proposes a technology-empowered reading innovation project, deploying AI application scenarios such as AI-accompanied reading. Against this policy background, reading education still faces the following practical challenges:

Difficulties in coordinating regional reading activities, challenges in conducting effectiveness evaluation, and uneven distribution of reading resources between urban and rural areas;

Heavy burden of campus reading activities, making it difficult for teachers to grasp students' reading status and implement individualized instruction;

Inefficient parent-child reading guidance, with parents lacking capacity in book selection and tutoring;

Difficulty in cultivating students' reading habits, due to a lack of professional reading guidance, making it challenging to develop lifelong reading habits.

Addressing these pain points, this solution constructs an AI-empowered integrated reading education platform, integrating digital reading resources and building a reading service system covering both urban and rural areas. It provides basic services such as resource sharing, library collection borrowing, and data statistics. It accommodates four-level management (province, city, county, school), supports multi-role and multi-terminal use by teachers, students, and parents, covers various types of reading activities at all levels, constructs reading literacy profiles for regions and students, and provides data support and AI-intelligent services for teaching, management, and guidance:

1) Cross-domain sharing of reading resources: It provides unified data standards, enables standardized collection of reading-related data through interfaces, breaks down information silos, achieves co-construction and sharing of excellent reading cases and resources, and further advances regional equity.

2) Scientific coordination of reading initiatives: Relying on a unified platform, it achieves standardization of the entire process of organizing, evaluating, and displaying reading activities at the province-city-county-school four levels. Simultaneously, it establishes a scientific evaluation system to precisely measure activity effectiveness, promoting the standardization and efficiency of reading promotion.

3) Precise empowerment of reading guidance: It collects data on reading behaviors, duration, and preferences to generate visualized learning situation reports, providing support for teaching and guidance. The AI question-answering service enables graphical presentation of book and activity data through natural language interaction. The data dashboard aggregates multi-source data to provide insights for resource allocation and regional governance, forming a management closed loop from data collection to decision-making.

4) Deep implementation of reading AI agents:

AI stimulates learning interest: Including services such as AI-accompanied reading and AI intelligent reading, which select excellent reading content for children and adolescents of all age groups, provide personalized book recommendations, offer immersive and interactive reading experiences, and help children cultivate deep reading habits.

AI empowers teachers' instruction: Including services such as personalized reading literacy profiles, AI reading teaching assistants, and AI reading evaluation, which characterize reading growth profiles through full-process and whole-course data recording, efficiently assisting reading lesson preparation and work evaluation.

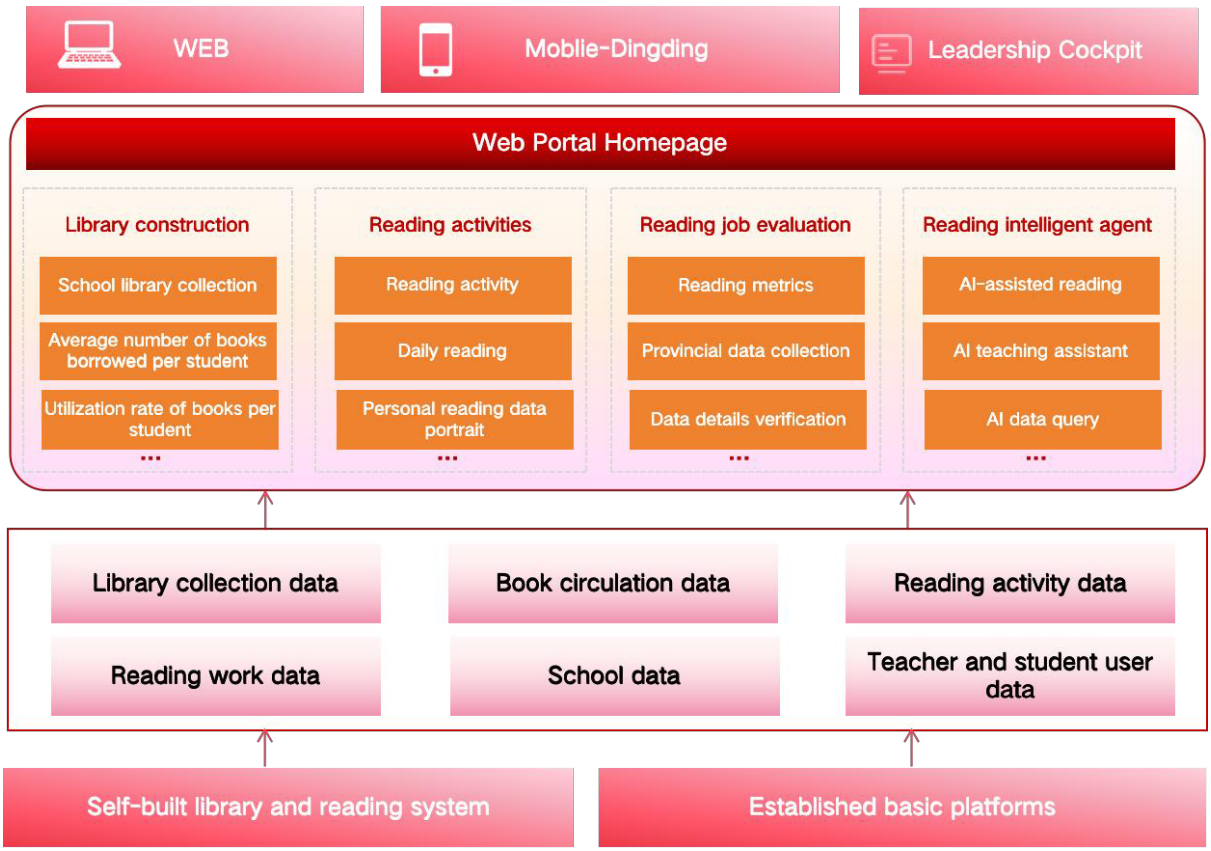

Fig. 4

Technical Highlights or Innovations

This solution deeply empowers the entire process of primary and secondary school reading education with artificial intelligence technology, achieving a core upgrade from traditional "resource-supply-type" reading services to "precision-empowerment-type" services, forming multiple innovations in educational teaching service models and the integration of technical applications.

1) AI-Driven Intelligent Reading

The platform is underpinned by multimodal data sensing at the foundational level, integrating large language models and deep learning algorithms into the core links of reading education. At the recommendation level, the system synthesizes collaborative filtering and knowledge graph technologies, and based on dynamic capture of reading interests and cognitive levels, achieves precise adaptation of book titles. At the comprehension level, leveraging natural language processing capabilities, it further guides critical reading through preset questions. In the lesson plan design phase, generative AI is introduced to assist structured lesson preparation, while administrators can directly retrieve data and generate visualized insights through natural language interaction

2) Building a Reading Ecosystem Through Full-Role Integration

This solution constructs a tripartite service architecture integrating education bureaus, schools, and families. Administrators can view the regional reading ecosystem in a penetrating manner, teachers can obtain teaching assistance and learning situation feedback, and parents can understand their children's reading trajectories in real time and participate in co-education, making reading no longer confined within campus walls but forming an educational community with school-family-society collaboration.

3) Data Closed Loop of Teaching, Learning, Assessment, and Management Integration

Traditional reading data often lies dormant within systems. This solution aggregates and cleanses multi-source data such as book borrowing and activity participation, and after AI analysis, feeds it back into personalized recommendation, teaching strategy adjustment, and regional evaluation indicator systems. This transforms data from static records into living water driving continuous improvement in reading quality, promoting regional reading governance from a mode based on vague experience to one based on precise governance.

Application Scenarios

Application Environment and Implementation Targets

The platform is adapted to multi-type and multi-level reading education scenarios in the basic education stage. In terms of software and hardware environments, the platform can be deployed on regional government dedicated networks and operates relying on regional education informatization infrastructure, with users accessing conveniently through computer terminals and mobile devices. Platform services align with regional primary and secondary school digital campus construction standards, supporting both the integrated access of school library intelligent management systems and data interoperability with existing teaching management platforms. The implementation objects of platform services cover ordinary primary and secondary school teachers and students, education administrative management institutions, teaching and research units, and student families, forming a multi-party collaborative reading education community.

Examples of Typical Application Scenarios

Scenario 1: School Reading Activity Organization and Participation

Schools rely on the platform to conduct reading activities, forming a normalized operational mechanism of "school organization, student participation."

School administrators or teachers initiate reading-themed activities through the platform, such as class shared reading, reading challenges, or book sharing sessions.

Students enter activities through the DingTalk mobile terminal and submit reading reflections or reading achievements in the Smart Reading Platform, constructing a "reading achievement showcase," presenting students' reading gains and insights through diversified forms such as mind maps, picture book creation, dramatic performance, and hand-drawn newsletters.

Reading reflections submitted by students can be assisted in grading by the AI reading reflection evaluation tool, providing instant feedback on dimensions such as content understanding, language expression, and depth of thinking. Students can also interact intelligently with the Reading AI Agent at any time, which will provide personalized book recommendations and precise reading guidance for students. Schools can comprehensively grasp the activity participation status of teachers and students and daily reading progress through the data dashboard and data boards. Based on these data, teachers can identify reading-active students and students needing special attention, timely adjust reading teaching arrangements, and achieve targeted reading guidance.

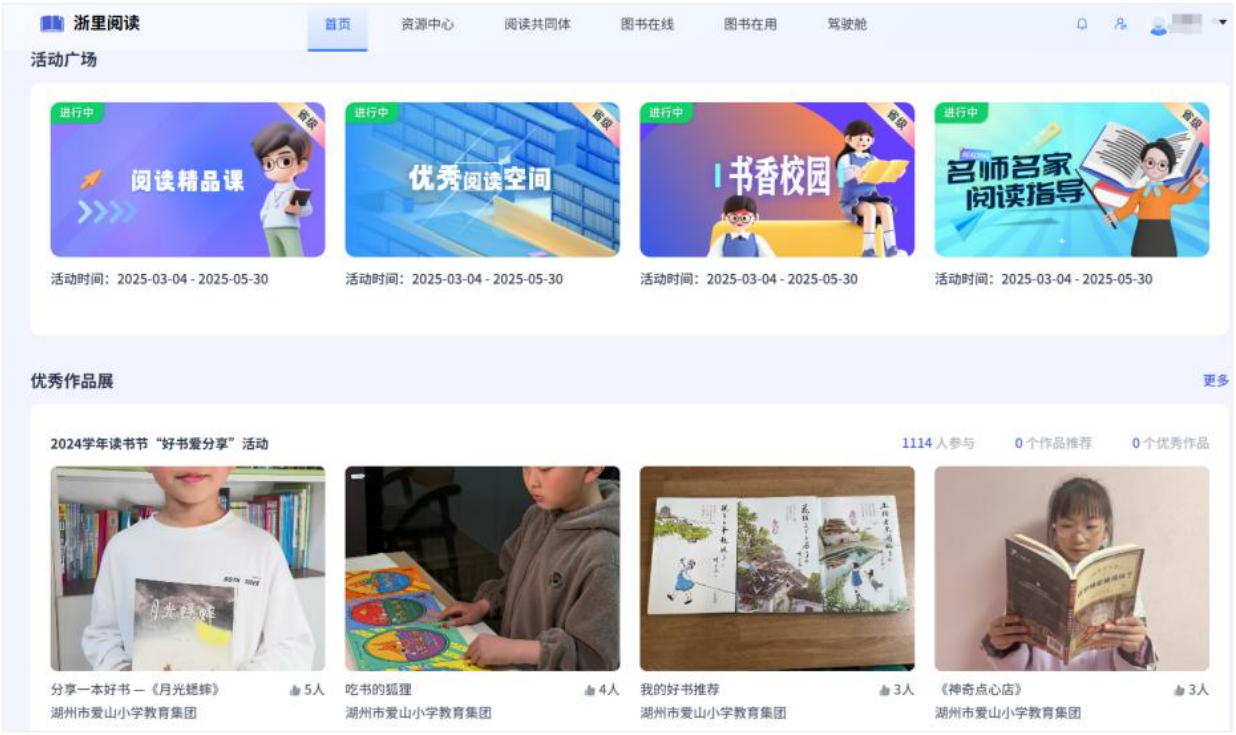

Fig. 5

Scenario 2: Creating a Reading-Campus Reading Corner Based on AI Reading All-in-One Machine
Based on the Reading AI Agent from Smart Reading Platform, integrating intelligent terminals to create an AI reading all-in-one machine, upgrading traditional book display points into intelligent reading spaces integrating resource acquisition, intelligent interaction, and data tracking.
Schools deploy the reading all-in-one machine in classroom corridors or public areas. During break times or lunch breaks, students can obtain personalized good book recommendations through touch screens, no longer facing bookshelves in confusion. The built-in AI guided reading function provides in-depth interpretation of classic books, guiding students to grasp textual connotations. Students can choose audio book listening, or participate in poetry games, knowledge quizzes, AI drawing, and other interactions, deepening understanding through fun.
The all-in-one machine records students' reading interaction behaviors throughout the process, relying on the reading literacy AI evaluation model to generate personalized growth reports, scientifically quantifying reading performance. Teachers can understand the usage frequency, popular books, and reading preferences of class students in the reading corner through the backend, adjust book configurations or recommendation directions, keeping the reading corner always vibrant and aligned with student interests.

Impact and Case Evidence

- **Implementation Results, Evaluation Data or Practical Experience**

Since the platform was launched, it has achieved data integration with the Smart Reading Platform in 3,297 of the 5,554 ordinary primary and secondary schools across the province, with 1,280 schools recognized as "Reading-Campus" schools at various levels, accounting for 59.36% and 22.9% respectively. It strives to achieve province-wide Reading-Campus coverage by 2026. Combined with the construction of a "Common Prosperity Demonstration Zone," it promotes the improvement of quality and balance through education digitalization and builds the "Bookish Zhejiang" brand.
In terms of management quality improvement, the platform has constructed a regional reading resource intelligent allocation hub, with the AI question-answering function achieving full coverage of primary and secondary schools in Zhejiang Province, effectively assisting in enhancing management decision-making efficiency.
In terms of service upgrade, library basic services have achieved 100% AI transformation, with library consultation response time shortened to within 15 seconds, and monthly active users of guided reading and creative functions stabilizing at over one million, significantly improving the accessibility of in-depth services.
In terms of teaching burden reduction, applications such as AI reading lesson plan assistants and AI reading reflection evaluation have effectively reduced teachers' lesson preparation workload by over 30%, improved reading guidance efficiency by 50%, making personalized teaching move from concept to normalized practice.
In terms of learning enhancement, the platform focuses on establishing a capability cultivation closed loop of "reading input-thinking processing-creative output," with the usage rate of creative creation functions and the quality rate of compositions showing a synchronous upward trend.

Replicability, Sustainability and Promotion Potential

This solution has broad applicability. Various regions can select appropriate functional modules for deployment according to local education informatization infrastructure conditions. Urban schools can fully utilize AI-accompanied reading, intelligent reading spaces, and other rich media functions relying on high-speed network environments; rural and remote area schools can prioritize ensuring the use of core functions such as book borrowing management and reading activity participation through basic version applications, ensuring that high-quality reading resources can directly reach every rural school across physical distances.

From the perspective of long-term sustainable operation, this solution has explored an operational model of "government-led + professional support + data-driven." Government leadership ensures the public welfare attributes and resource coordination capabilities of platform construction, professional support guarantees technology iteration and service quality, while data driving forms a positive cycle where the deeper the application, the more precise the service.

In terms of promotion value, this solution provides a practical implementation path for solving common problems such as uneven basic education reading resources and inefficient coordination. Through the platform, urban-rural and inter-school resource barriers can be effectively broken down, and high-quality reading resources can directly reach rural schools through digital means. The deep integration of AI technology and reading teaching practical work provides a feasible solution for teacher burden reduction and efficiency enhancement. The three-end connection design of bureaus, schools, and families provides a practical sample for constructing a new paradigm of home-school collaborative reading and solving the low-efficiency problem of home-school co-education.

Illustration of a Typical Case:

In early 2025, the "Zheli Reading Platform," jointly created by the Zhejiang Provincial Department of Education and China Unicom Zhejiang, was launched. Over the past year, the "Zheli Reading" platform has achieved data integration with the Zheli Reading Platform in 3,297 of the 5,554 ordinary primary and secondary schools across the province, published and collected over 2,000 reading activities, and achieved normalized application by hundreds of thousands of teachers and students. As the official support platform for provincial-level activities, it supports the development and evaluation of "Reading-Campus" construction at the province-city-county-school four levels. It has achieved:

The platform provides convenient and unified reading digitalization services for education bureaus and schools across the province; provides quantitative data on the relevant work of units at all levels, realizing effective recycling and utilization of data; provides AI-accompanied reading services to stimulate students' learning interest; reduces the workload for teachers and management personnel at all levels, assists in enhancing regional educational equity, and assists in full-scenario coverage and diversified development of reading applications.

It has constructed a provincial full-scope practice paradigm of "artificial intelligence + reading education" in the basic education field, forming a replicable and scalable digital reading education solution characterized by "pilot first, full-scope promotion, one region one feature," with significant leading and demonstrative roles.

Fig. 6 Exhibition Materials

Suggested area dimensions: 3m (width) × 2.5m (depth), with the equipment placed against the wall on the right side; a front interaction area of ≥1.5m is reserved, accommodating 1-2 people for simultaneous experience. Wired network must be adopted as the primary connection method, and an independent wired network port must be reserved for the equipment to ensure stable network physical links.

Basic Information of the Institution

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Zhengda AI Smart Hub: Heterogeneous Computing Power Management and Integrated Research-Education Application Solution Based on Gigabit Optical Network

Solution Introduction

The Zhengzhou University AI Smart Hub represents an integrated solution for heterogeneous computing power management and research-education unification, built upon a gigabit optical network infrastructure. It precisely addresses core challenges in academic research and education, including computing resources, development workflows, literature utilization, and operational management. By establishing an autonomous, efficient, and collaborative AI infrastructure system, the platform provides comprehensive support for research innovation and the democratization of AI education. Its core value lies in achieving the centralization of computing resources, the unification of development processes, the standardization of asset management, and the intelligence of operations and maintenance.

Function Overview

Centered on the demands of academic research and education, the platform establishes a comprehensive AI middleware system through four core functional modules and their corresponding services, creating a logical closed-loop of "Computing Power - Development - Assets - Operations".

- Heterogeneous Computing Power Management: This module integrates cloud, edge, and endpoint computing resources, managing chips from multiple vendors such as NVIDIA and Ascend. It achieves computing power pooling and dynamic scheduling, resolving issues of supply-demand mismatch and difficulties in heterogeneous device coordination, thereby satisfying the demands of large-scale, thousand-card research projects.
- Model Development and Training: It provides end-to-end services from data preprocessing and annotation to model training, deployment, and inference. By integrating mainstream development frameworks, it significantly reduces the environment setup time for non-expert users, addressing the pain points of fragmented development tools and low reusability of outcomes.
- Model Asset Management: This function enables full lifecycle management for models, datasets, and images, supporting version control and permission isolation. It significantly improves the model reuse rate from less than 20%, solving the problem of disorganized management of research outputs.
- Unified Operations and Maintenance: Covering management functions such as account permissions, monitoring alerts, security audits, and billing, this module ensures resources are measurable and monitorable. It resolves issues related to the lag in manual monitoring, vague cost accounting, and insufficient data security. Additionally, the system includes text processing and data annotation services.

Technical Highlights or Innovations

Focusing on domestication, heterogeneity, and computing-network integration, the platform creates multiple differentiated technical advantages. Its innovative value is tailored to the university context and holds industry benchmark significance.Full-Stack Domestic Controllability: The system constructs a "Domestic Chip, Computing, Model, and Security" integrated system. It supports over 10 domestic chips including Kunpeng and Ascend, as well as Kylin and UnionTech operating systems, forming a fully autonomous and controllable chain. Simultaneously, it maintains compatibility with NVIDIA GPUs, balancing security with the flexibility of technical transition, aligning with national information technology innovation strategies.Optimized Heterogeneous Computing Scheduling: By integrating CPU, GPU, and NPU resources, the platform employs training-inference integrated scheduling technology, improving computing utilization by over 30%. It supports millisecond-level latency scheduling for thousand-card clusters. Through internal crowdsourcing to integrate dispersed computing power, the graphics computing cluster utilization rate reaches 82.8%, far exceeding traditional industry models.Computing-Network Integration for Cross-Domain Collaboration: Relying on the national computing layout and full-optical transmission network, the system realizes terabyte-level data lossless transmission within minutes across distances of 1,000 kilometers. This breaks geographical computing barriers, supports cross-regional research projects, and serves as a typical innovation in the fusion of gigabit optical networks and AI computing power.Cloud-Native High Availability Architecture: Based on Kubernetes for microservice deployment, the architecture establishes four network planes. It achieves defense in depth through firewalls and VLAN isolation, allowing for smooth deployment on existing campus networks and supporting horizontal expansion to adapt to growing university demands.

Scenario-Based Cost Reduction and Efficiency: The platform innovates with an on-demand rental "Computing Supermarket" model, reducing single-card costs by 68% compared to self-built infrastructure. It features per-second billing and elastic scaling. High-precision text processing and automated annotation solve digitalization pain points for libraries, while opening resources to smaller institutions and supporting remote laboratory access promotes the democratization of AI education.

Industry-Academia-Research Ecosystem Synergy: Integrating over 50 domestic models, the system forms a collaborative ecosystem of "Model-Framework-Chip". It supports the co-construction of joint laboratories between enterprises and universities, promoting the transformation of research outputs, such as computing scheduling algorithms, into commercial solutions and aiding the large-scale application of the domestic AI ecosystem.

Application Scenario

Application Environment and Implementation Targets

Built upon gigabit optical network infrastructure, the system features a software and hardware environment that balances domestic adaptability with technical compatibility. The hardware layer supports chips from multiple vendors, including Kunpeng, Ascend, and NVIDIA, and is compatible with heterogeneous devices such as GPU computing nodes and AI training nodes. It relies on core switches and firewalls to construct a multi-plane isolated network architecture.

The software layer operates on domestic systems like Kylin and UnionTech, integrates mainstream development frameworks such as TensorFlow, PyTorch, and MindSpore, and utilizes Kubernetes for microservice deployment. This design allows for seamless implementation on existing campus networks and computer room infrastructure without large-scale reconstruction, adapting to the diverse hardware and software foundations of various higher education institutions.

The solution primarily serves comprehensive research universities and specialized institutions in science, engineering, and medicine. Direct implementation targets include research teams across various colleges, faculty and student bodies, and auxiliary institutions such as university libraries. Additionally, its reach extends to regional small and medium-sized universities, research institutes, and medical or technological enterprises engaged in university-enterprise cooperation. Specifically, it provides high-performance computing support and full-process AI development services for research teams; offers lightweight tools for AI teaching, training, and model development for faculty and students; delivers digital literature solutions and intelligent management for libraries; and supplies open services such as computing power leasing and technical docking for regional partner institutions.

Examples of Typical Application Scenarios

Scenario 1: Research Breakthroughs in Key Disciplines at Zhengzhou University

Deployed within national key disciplines at Zhengzhou University—specifically Chemistry, Materials Science, and Medicine—this scenario addresses the demands of over 50 national-level research projects annually, which require TB-level data processing and thousand-card GPU computing power. Through the heterogeneous computing management module, the solution integrates dispersed computing resources from 12 colleges to form a unified computing resource pool. It enables collaborative scheduling of heterogeneous chips, including NVIDIA A800 and Ascend 910, providing millisecond-latency computing support for tasks such as gene sequencing analysis and new material molecular simulation. Furthermore, relying on the model development and training platform, the system offers research teams full-process services ranging from experimental data annotation and preprocessing to model training and deployment. By integrating professional domain algorithm libraries and supporting custom model development, it resolves issues regarding difficult cross-disciplinary data sharing and cumbersome tool switching, improving model training efficiency by over 30% and accelerating the realization of research outcomes.

Scenario 2: AI Education Democratization and Regional Computing Sharing in Henan Province

Centered on Zhengzhou University, this scenario facilitates the construction of the "Computing Alliance" for universities in Henan Province. Leveraging the "Computing Supermarket" model and the cross-domain transmission capabilities of the gigabit optical network, the solution opens computing resources and AI development platforms to small and medium-sized universities in remote areas of the province. These institutions can access the platform's training environment remotely without the need to build expensive GPU clusters, allowing faculty and students to complete teaching and practical work for over 20 AI courses. This initiative covers the AI education needs of more than 3,000 students. Simultaneously, the system provides computing power and technical services for regional university-enterprise medical institutions, assisting with medical imaging data processing and disease prediction model training. Additionally, text processing services assist local university libraries in digitizing paper documents. These efforts effectively address the imbalance in regional educational and research resources.

Impact and Case Evidence

Implementation Results, Evaluation Data, and Practical Experience

Following the deployment of this solution, significant improvements were achieved in research efficiency, resource utilization, and education. The core quantitative results are notable:Computing Power: Through heterogeneous computing management and intelligent scheduling, on-campus computing utilization increased by over 30%. Thousand-card clusters achieved millisecond-level scheduling latency, and the average utilization rate of graphics computing clusters reached 82.8%, effectively resolving the coexistence of idle, fragmented resources and acute shortages.
Development: The full-process AI development platform drastically reduced the environment setup time for non-expert users (from 3-5 days) and significantly improved the model reuse rate from less than 20%, supporting the model development and training needs of over 50 national-level research projects annually.
Literature Processing: High-precision OCR technology achieved a recognition accuracy rate exceeding 98%, enabling batch digitization of massive paper collections and satisfying over 100,000 annual library literature retrieval requests.
Cost: The on-demand leasing model reduced the per-card usage cost by 68% compared to self-built clusters, while liquid cooling technology and hybrid deployment solutions significantly reduced energy expenditures.
Practical implementation yielded three core insights:
Balancing Domestication and Compatibility: The technical route established a full-stack domestic system while remaining compatible with mainstream overseas chips, achieving the dual goals of smooth transition and security controllability.
"Centralized Computing + Integrated Services": This approach solved the pain point of fragmented resources through resource pooling while creating a one-stop service around the full research and education lifecycle to meet practical university needs.
"Internal Use + Regional Sharing": This operational mode prioritizes core internal demands before opening the platform for regional sharing, maximizing value utilization.

Replicability, Sustainability and Promotion Potential

The solution possesses strong cross-regional and cross-scenario replicability. In terms of hardware and software, it is based on a mature cloud-native architecture and gigabit optical network infrastructure. It can be smoothly deployed on existing campus networks and computer rooms of various universities without large-scale reconstruction, adapting to the needs of comprehensive, science/engineering, and medical institutions. Functionally, it allows for modular customization based on disciplinary characteristics and research scale—for instance, strengthening literature digitization for liberal arts colleges or upgrading computing scheduling and model development capabilities for science and engineering institutions. Furthermore, the solution can extend to research institutes, small and medium-sized technology enterprises, and medical institutions, adapting to any organization requiring computing support and AI development services.

Sustainable operation relies on a "Public Welfare + Marketization" model. Internally, it provides basic computing and development services to faculty and students to safeguard the public welfare nature of research and education. Externally, it achieves market-oriented profitability through computing leasing, customized services, and ecosystem revenue sharing, which in turn funds technical iteration and maintenance upgrades. Additionally, deep cooperation with domestic hardware/software vendors and operators has formed a stable technical and resource support system, guaranteeing long-term platform stability.

The solution holds significant promotion value. Domestically, it can leverage the operator's national computing layout to expand into central and western regions with weaker educational resources, solving resource imbalances by constructing regional computing alliances. Internationally, its domestic heterogeneous computing scheduling and low-cost service models can serve as references for AI infrastructure construction in developing countries, aiding global digital education and democratization while promoting the application of gigabit optical network and AI computing fusion technologies.

Illustration of a Typical Case

In 2025, the Zhengzhou University AI Smart Hub integrated heterogeneous computing resources from 12 colleges to build a full-process AI middleware platform covering computing management, model development, asset management, and operations. It serves over 3,000 students in AI courses, more than 50 national-level research teams, and supports the digitization of 2 million paper volumes in the library. Key achievements include:

Unified Resource Pooling: Completed unified pool management of on-campus computing resources, realizing collaborative scheduling of multi-vendor chips (NVIDIA, Ascend, etc.). This increased computing utilization by over 30%, satisfying thousand-card GPU demands for key disciplines like Materials, Medicine, and Chemistry, and improved average model training efficiency by 30%.

AI Training Platform: Established an AI development training platform supporting full-process teaching for over 20 AI courses, allowing students to rapidly complete model development, training, and practice, thereby greatly enhancing teaching efficiency.

Library Digitization: Deployed text processing services for the library, achieving over 98% recognition accuracy for paper documents. This initiated a large-scale digitization process for the collection, solving pain points related to inefficient literature retrieval and utilization.

Unified Operations: Established a unified operations and maintenance system, making computing resources measurable and monitorable. This effectively reduced operating costs, eliminated resource waste, and created an autonomous, controllable, and efficient AI infrastructure environment for on-campus research and education.

Basic Information of the Institution

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AI-Empowered Smart Teaching Solution — Xunfei Xiaoya Intelligent Teaching Platform

Solution Introduction

Function Overview

The Xunfei Xiaoya Intelligent Teaching Platform is an integrated intelligent teaching platform designed for higher education and vocational institutions. It leverages the strengths of the National Engineering Research Center for Educational Big Data Applications, the National Engineering Research Center for Digital Learning, and iFlytek. Guided by the core design philosophy of "Data-Driven, Integrated Innovation," the platform achieves comprehensive digitalization across the entire educational cycle, including "Construction, Preparation, Teaching, Learning, Assessment, Evaluation, Supervision, and Management." It systematically reshapes teaching models, optimizes resource supply, innovates evaluation systems, enhances management efficiency, and expands the teaching environment. The platform addresses core challenges such as disjointed traditional teaching processes, fragmented data flow, difficulties in quantifying evaluation, and limited application scalability, thereby assisting higher education institutions in achieving interdisciplinary integration and personalized talent cultivation.

Platform Core Functions:

General-Specialist AI Base: The platform integrates general-purpose large language models, such as SparkDesk and DeepSeek, along with vertical-specific models in fields like education and healthcare, forming a "general-specialist" AI capability matrix that delivers precise AI functionality across all teaching scenarios.

AI Innovation Space: It features three types of intelligent agents—Smart Teaching, Capability Training, and Discipline-Specific—providing tools like AI-driven PPT generation, AI question generation, and AI video generation, allowing teaching ideas to be quickly implemented.

Integrated Smart Teaching Space: The platform supports core application scenarios online, including "Preparation, Teaching, Learning, Evaluation, Supervision, and Management" in one place. It efficiently connects the complete "pre-class, in-class, post-class" chain and the "supervision-management-review" process, enabling AI-integrated, precise teaching and management.

Data Intelligence Cockpit: A multi-dimensional data dashboard is constructed, providing multi-level profiling systems for teachers, students, courses, departments, and the institution as a whole. It supports data queries and teaching alerts, offering a scientific basis for resource allocation and policy formulation.

Technical Highlights or Innovations

Integrated End-to-End Coverage: The platform connects the entire "Preparation, Teaching, Learning, Evaluation, Supervision, Management" process, offering one-stop support for MOOC/SPOC and blended learning. It closes the loop from "cultivation objectives - curriculum implementation - quality monitoring," seamlessly adapts across multiple terminals, breaks down spatial and temporal barriers, and creates a new environment for human-AI collaborative teaching.

Intelligent Unified AI Base: It incorporates general-purpose LLMs (SparkDesk, DeepSeek, etc.), industry-specific models (education, healthcare, legal), and discipline-specific models. It breaks down static resource barriers, enabling intelligent knowledge generation, dynamic optimization, and cross-domain integration. This facilitates full-scenario coverage of AI-assisted teaching, learning, assessment, and management, focusing on enhancing quality, reducing burden, and improving efficiency.

Data-Driven Full-Link Analysis: With over 400 three-dimensional behavioral data collection points, the platform digitizes the entire teaching process, resources, and activities. Hierarchical data cockpits provide precise insights, while "conversation-as-analysis" unlocks data value through natural language interaction, empowering management decision-making.

Open Ecosystem for Co-creation and Sharing: The platform allows flexible integration of third-party applications, fostering an open application ecosystem. Multi-language versions support cross-cultural teaching collaboration and promote the co-creation and sharing of high-quality resources.

Flexible and Scalable Architecture: A configurable and scalable architecture adapts to different stages of informatization, supporting various deployment modes such as SaaS, hybrid cloud, and on-premises.

Precision Personalized Learning Engine: Leveraging cognitive diagnosis and knowledge graph technologies, the platform dynamically maps students' knowledge mastery profiles. Combined with adaptive testing and goal setting, it intelligently plans learning paths and accurately recommends learning resources, enabling personalized learning and targeted improvement for each student.

Fig. 1 Xunfei Xiaoya Intelligent Teaching Platform Architecture Diagram

Application Scenarios

Application Environment and Implementation Objects

This solution targets a diverse user base, including teachers, teaching assistants, students, supervisors, evaluation experts, platform administrators, and school/department administrators in undergraduate institutions and vocational colleges. It provides comprehensive services for course development, classroom teaching, autonomous learning, teaching management, supervision and evaluation, and data analysis. The solution is cloud-deployed, supporting public cloud, private cloud, and hybrid cloud models. It offers access both on-campus and off-campus, with terminals adapted for computers, tablets, mobile phones, and smart classroom displays, meeting the needs of regular teaching and ubiquitous learning.

The core educational scenarios it addresses are as follows:

AI-Empowered Innovative Teaching: Teachers leverage the platform to explore a "Teacher-Machine-Student" tripartite collaborative teaching model. Pre-class, they intelligently generate personalized teaching resources and pre-learning tasks using the course-specific knowledge base and AI teaching assistant, enabling precise lesson preparation based on learning analytics. In-class, they can access resources like knowledge graphs in real-time and conduct activities such as check-ins, quick quizzes, discussions, and buzzer rounds to boost engagement, dynamically adjusting teaching pace and content based on classroom feedback. Post-class, intelligent question generation and grading effectively reduce teacher workload, while the platform fully records student learning trajectories and growth curves, supporting teachers in conducting teaching reflections based on course profiles.

Personalized Autonomous Learning: Students utilize the knowledge graph's detailed knowledge structure and the heuristic guidance of the AI learning companion to explore personalized learning paths. Timely feedback and evaluation from the platform help reinforce key and difficult concepts, forming a "learning-reflection-correction-reinforcement" loop, enabling an autonomous, efficient, and personalized learning experience.

Collaborative Group Learning: The platform supports group mode creation through collaborative spaces. Teachers can establish group spaces and assign diverse collaborative tasks. Students can share resources, engage in discussions, and conduct collaborative learning within their groups. Simultaneously, group profiles provide teachers and students with statistics on intra-group contributions and inter-group comparisons, fully supporting the implementation and assessment of collaborative teaching.

Teaching Supervision and Quality Evaluation: The supervision space and review space provide end-to-end support for teaching quality monitoring and course evaluation. Supervisors can easily access course spaces to view resources, classroom trajectories, and learning analytics data, providing feedback and ratings. Evaluation experts can review course materials online and export evaluation results, enabling standardized and digitized teaching evaluation and quality assurance.

Data-Driven Teaching and Management: The Data Intelligence Cockpit aggregates data from over 400 behavioral data collection points, providing multi-level profiling and intelligent alerts for the institution, departments, teachers, and students. This makes the entire teaching process traceable and quantifiable, shifting teaching and management decisions from being "experience-driven" to "data-driven."

Fig. 2 "University-Level Data Dashboard"

Driven by the "Westbound MOOC Initiative" , Ningxia Institute of Science and Technology and Central China Normal University have leveraged the platform to implement "Synchronous Classroom" teaching innovation. This enables real-time cross-institutional peer evaluation, in-depth teaching and research interaction, and shared resources between teachers and students of both universities, breaking down geographical barriers to teaching exchange. It has fostered a new teaching ecosystem of inter-institutional cooperation and teacher-student mutual promotion, creating a practical model for collaborative education between eastern and western universities. At the 2025 Global MOOC and Online Education Conference, the institution, as a representative of Chinese private higher education institutions, showcased its AI education innovation practices powered by the platform, receiving wide acclaim.

Fig. 3 2025 Global MOOC Conference Outcomes Exhibition

Outcomes and Case Studies

Implementation Outcomes, Evaluation Data, or Practical Experience

The platform has served over one hundred undergraduate and vocational institutions nationwide, covering more than 10 million teachers and students. Among teachers who use it regularly, 85.29% report a significant improvement in overall teaching efficiency, with teacher and student activity rates exceeding 90%. Based on application data from multiple institutions, the platform has led to a 31.54% increase in lesson preparation efficiency, a 23.2% or higher increase in student classroom participation rates, a 23.93% increase in homework grading efficiency, and a 41.18% increase in learning analytics efficiency, effectively reducing burdens and improving efficiency. Innovative practices implemented by higher education institutions using the platform have been widely recognized within the industry and were featured as typical cases in the China Smart Education White Paper released by the Ministry of Education during the World Digital Education Conference. The solution was also selected as one of the first batch of "Artificial Intelligence + Higher Education" application scenario typical cases.

Replicability, Sustainability, and Promotion Potential

Replicability: The platform supports access across multiple terminals, including Web, iOS, Android, and HarmonyOS, allowing teachers and students to prepare lessons and learn anytime, anywhere, adapting to the usage habits of regions with varying levels of informatization. It offers one-stop support for both online and blended learning, flexibly adapting to different types of institutions (undergraduate, vocational) and various disciplines (science, engineering, humanities, medicine, etc.). The platform also provides both Chinese and English versions, supporting cross-linguistic and cross-cultural teaching collaboration and knowledge dissemination. Through cross-regional collaboration mechanisms like the "Westbound MOOC Initiative" , the platform has established a replicable model for cross-institutional collaboration, demonstrating significant potential for large-scale promotion across different countries/regions globally.

Sustainability: The platform utilizes a configurable and scalable architecture, supporting various deployment modes (SaaS, hybrid cloud, on-premises) that can be flexibly configured according to institutional needs. It fosters an open application ecosystem, allowing flexible integration of third-party applications. Comprehensive teacher training and operational support mechanisms are in place to ensure the platform continues to deliver value and undergoes iterative upgrades.

Promotion Value: The platform connects disciplines and courses, forming a closed-loop system from "cultivation objectives - graduation requirements - curriculum system - teaching implementation - quality monitoring - continuous improvement." This supports interdisciplinary integration and innovation in talent cultivation models, providing a complete solution for educational quality assurance. The platform highly aligns with the current global demand for personalized and integrated education reform, offering a replicable Chinese solution for the digital transformation of education.

Typical Case Study

Central China Normal University (CCNU)

Since 2012, Central China Normal University has gradually built its "Digital CCNU" strategic framework using the platform, pioneering a digital transformation path that coordinates five areas: "assisting learning, teaching, research, management, and services." The platform deeply empowers the university's distinctive focus on teacher education, achieving full coverage for undergraduate and Master of Education programs and supporting teachers and students in conducting smart teaching. To date, the university has created 75,300 course spaces, built 3,273,400 digital learning resources, and served over 253,300 teachers and students. The core breakthrough lies in the dual drive of knowledge systems and data resources: on one hand, integrating disciplinary knowledge graphs to restructure course systems; on the other hand, optimizing management decisions through full-scenario teaching data analysis, truly realizing the goal of "data-driven institution, analysis-transforming education."

Fig. 3 Teachers leverage the platform to conduct seminar-style teaching

The university's teaching and research achievements using the platform have been prolific, including winning the Special Prize for National Teaching Achievement Award, the First Prize for Scientific and Technological Progress Award (Science and Technology) from the Ministry of Education's Higher Education Outstanding Scientific Research Output Awards, and being featured prominently in the achievement exhibition at the 2025 World Digital Education Conference, showcasing innovative digital transformation practices to the world. On September 10, 2025, CCTV's News Broadcast featured a special report on Central China Normal University's innovative exploration and practical outcomes in empowering teacher cultivation through digital technology.

Fig. 4 Xunfei Xiaoya Display Design Renderings

Display Materials

Planned booth space: 15㎡. Two 75-inch smart interactive displays are required to showcase application scenarios such as AI-empowered teaching innovation models, the data monitoring cockpit, and personalized student learning.

Institutional Background

Institution Profile

Beijing iFlytek Education Technology Co., Ltd. (referred to as "iFlytek Higher Education"), established in 2014, leverages iFlytek's core artificial intelligence and big data technologies. It provides hardware and software products and smart teaching solutions covering classroom teaching, online learning, assessment and evaluation, and teaching management for higher education and vocational institutions. Its products are widely used across 31 provinces and municipalities in China.

Experience in Digital Education

With over a decade of experience in the smart education sector, iFlytek Higher Education has served more than 1,200 higher education and vocational institutions, covering over 10 million teachers and students. It has accumulated extensive experience in AI-empowered smart teaching and talent cultivation.

(3) Core Strengths

Full-Scenario Coverage Capability: The product portfolio covers the entire process of teaching, learning, assessment, evaluation, and management, possessing the capability to deliver complete solutions encompassing both software, hardware, and overall integration.

Independent Technology: Leveraging core independent technologies like the SparkDesk large language model, it supports various applications, including collaborative discipline-specific model development, intelligent teaching platform development, and research efficiency tool development.

Deep Industry-Academia-Research Integration: It collaborates with universities such as Beijing Foreign Studies University, Nanjing University, Shandong University, and Central China Normal University on joint smart teaching research. It has established "AI + Higher Education" industry-association cooperation models with the Henan Provincial Higher Education Association and the Chongqing Higher Education Association.

(4) Past Successful Projects and Accreditations

Ministry of Education (MoE) Typical Cases: Assisted 7 institutions in having 8 cases successfully selected as Ministry of Education "Artificial Intelligence + Higher Education" typical cases.

Fig. 5 8 Typical Cases of "Artificial Intelligence + Higher Education" by the Ministry of Education

Discipline-Specific Large Model Development: Co-constructed the GEST Discipline-Specific Large Model with 27 "Double First-Class" universities. Discipline-specific models co-developed with Wuhan University of Technology, China University of Geosciences (Wuhan), and other universities were showcased at the 2025 World Digital Education Conference. The "Materials+" model was launched on the National Higher Education Smart Education Platform.

Research Efficiency Tools: The SparkDesk Research Assistant covers 1,363 universities nationwide, with a registration rate of 95% among "Double First-Class" universities. It improves research outcome efficiency by over ten times, with an effectiveness rate of 90% for paper reading.

Contact Information

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Large Model-Enabled Smart Classroom Solution To Advance Human-Machine Co-Education

Solution Introduction

Function Overview

This solution is fully aligned with the national education digitalization strategy and the requirements of the "AI+Education" application pilot program. It targets three core pain points in traditional classroom settings: the mismatch between large-scale universal instruction and personalized learning needs, barriers for teachers to deliver targeted teaching, and insufficient student learning initiative. Built on iFlytek's Spark Education Large Model as its core intelligent foundation, and supported by the "cloud-edge-end" integrated architecture of smart classroom, the solution establishes a full-cycle closed-loop teaching workflow covering lesson preparation, instruction, learning, assessment and teaching research.Through the standardized "Teacher-Student-Machine" tripartite collaboration, it reshapes the classroom ecosystem, driving the profound transformation of teaching toward a modern paradigm featuring human-machine co-education and student-centered personalized instruction.

Fig. 6 Functional Framework Diagram

This solution encompasses five core functional modules:

Efficient Lesson Preparation. Built on knowledge graphs aligned with the new curriculum standards and iFlytek's Spark Education Large Model, the system intelligently assists in generating tiered lesson plans, courseware and question banks tailored to students' learning situation. This effectively reduces teachers' repetitive workload and supports innovative instructional design.

Smart Classroom Teaching. Leveraging iFlytek's AI blackboards and interactive smart classroom terminals, a standardized "Teacher-Student-Machine" tripartite collaborative classroom is established. Dynamic learning situation data enables teachers to adjust teaching strategies in real time, freeing up their energy to focus on cultivating students' higher-order thinking and socio-emotional interaction.

Personalized Learning. Dynamic personalized knowledge portraits are built for each student. Based on real-time learning analytics, customized adaptive learning that address individual differences, and overcoming the implementation challenges of tiered teaching.

Intelligent Assessment. The system supports full-question-type intelligent marking to automatically collect learning data and conduct in-depth attribution analysis, generating multi-dimensional diagnostic reports. This drives the transformation of assessment from a score-oriented model to a core literacy-oriented model.

Evidence-Based Teaching Research. Through unobtrusive, real-time accompanying classroom data collection, structured teaching archives and precise diagnostic reports are generated, forming a closed-loop，data-driven teaching research cycle to accelerate teachers' professional development.

Technical Highlights or Innovations

① Theoretical Innovation: Proposal of the "Teacher-Student-Machine" Tripartite Collaborative Smart Classroom Model

Addressing the core challenges in traditional classrooms—including the long-standing barrier of insufficient integration of educational technology into instruction, and the inherent mismatch between large-scale universal instruction and personalized learning needs—this solution has innovatively proposed the "Teacher-Student-Machine" Tripartite Collaborative Smart Classroom Model. Its core innovations are detailed below:

Firstly, it reconstructs the classroom interaction mechanism. It clarifies that the core driver of effective classroom instruction stems from dynamic adaptation and multi-dimensional interaction among three elements:the teacher's dominant pedagogical wisdom, the student's subjective constructive capacity, and the AI's collaborative support. This synergy drives the coordinated improvement of overall teaching and learning efficiency.

Secondly, it reshapes the functional attributes of the classroom. It redefines the role of the classroom,shifting it from a mere venue for knowledge transmission to a human-machine collaborative community dedicated to knowledge construction and core literacy development. Furthermore, it precisely positions AI as an intelligent support and augmentation tool throughout the full teaching and learning cycle.

Thirdly, it explores the transformation of teaching paradigms. It promotes the evolution of teaching models from the traditional "unilateral teachers-led instruction" to a new paradigm of "co-creation and co-development among teachers, students, and machines". This paradigm shift clarifies the new teaching-learning relationship in the intelligent era, providing critical theoretical references and a actionable practical framework for the morphological evolution of future classrooms.

② Technological Innovation: Building a Multi-Dimensional Intelligent Technology Matrix Driven by Educational Large Models

Taking iFlytek's Spark Education Large Model as the core technical foundation, the solution has conducted in-depth domain-specific optimization for the education vertical sector in collaboration with the National Institute of Education Sciences. This joint effort ensures the pedagogical appropriateness, scientificity, and security of teaching applications at the model source, laying a solid technical foundation for the practical implementation of educational intelligence.

Focusing on the core demands of instruction and teaching management, the project has prioritized the optimization of key supporting technologies, including high-precision OCR recognition, intelligent semantic grading, adaptive courseware generation, and multi-modal interaction for specific teaching scenarios. After rigorous verification in large-scale real-world teaching scenarios, the core performance indicators of these key technologies have reached the industry's level, providing reliable technical support for full-process instructional application.

Building On this foundation, the project has constructed a full-process intelligent teaching service matrix covering core teaching links: lesson preparation, teaching delivery, assignment management, and academic evaluation. This matrix drives the transformation of technological application from "single-tool auxiliary support" to "in-depth empowerment of the core teaching process", effectively adapting to the diversified, personalized, and high-quality development needs of education in the new era, and providing robust support for the deep integration of information technology and classroom instruction.

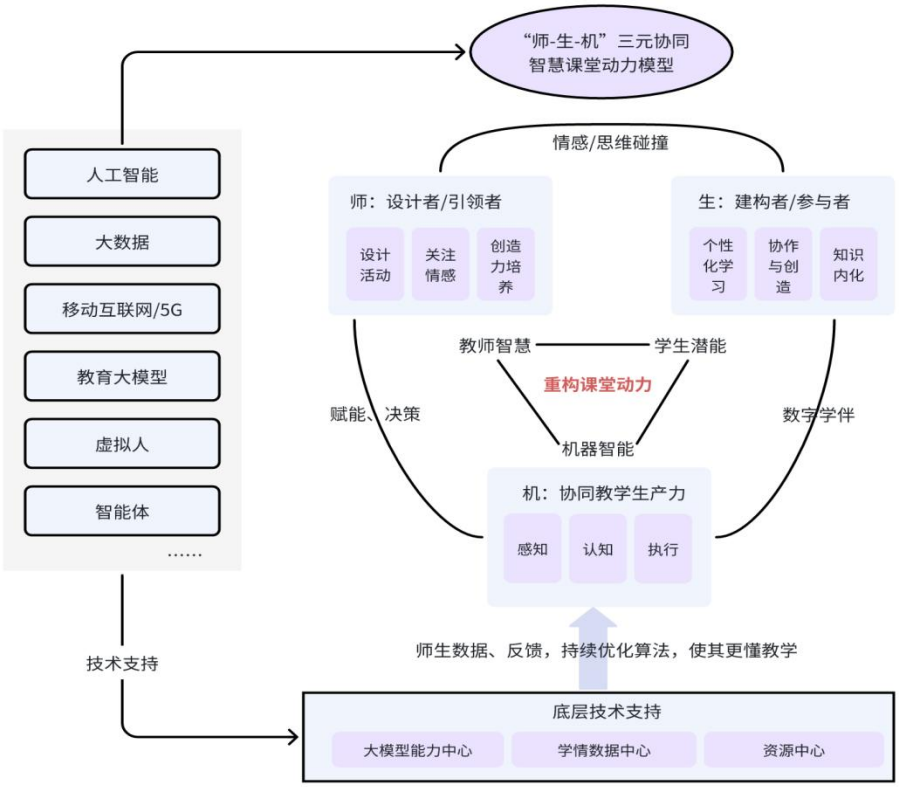

Fig. 7 "Teacher-Student-Machine" Tripartite Collaborative Smart Classroom Model

③ Model Innovation: Construction of a New "Three Entities, Three Circles, Three Stages" Smart Classroom Teaching Paradigm

Deeply integrating the "Teacher-Student-Machine" tripartite collaboration concept, this solution has further innovatively developed a new smart classroom teaching paradigm featuring the proprietary "Three Entities, Three Circles, Three Stages" framework.

Reconstructed teaching community roles: It clarifies the tripartite positioning of "teacher as the leader, student as the subject, and AI as the collaborative enabler", forming a novel teaching community with clear role division and efficient collaboration.

Established a full-scope data closed loop: By connecting data across the entire teaching process—covering pre-class, during-class, and post-class stages—it enables dynamic circulation of students' learning situation, and supports precise, timely teaching interventions.

Designed a systematic literacy advancement path: It outlines a three-stage capability development route of "Application–Integration–Innovation", which effectively supports students' strategic leap from mastering basic knowledge and skills to developing higher-order thinking and core literacy.

Through in-depth human-machine collaboration, this paradigm promotes the transformation of classrooms from a "knowledge transmission-oriented" model to a "literacy development-oriented" model, advancing the effective implementation of core literacy cultivation for students.

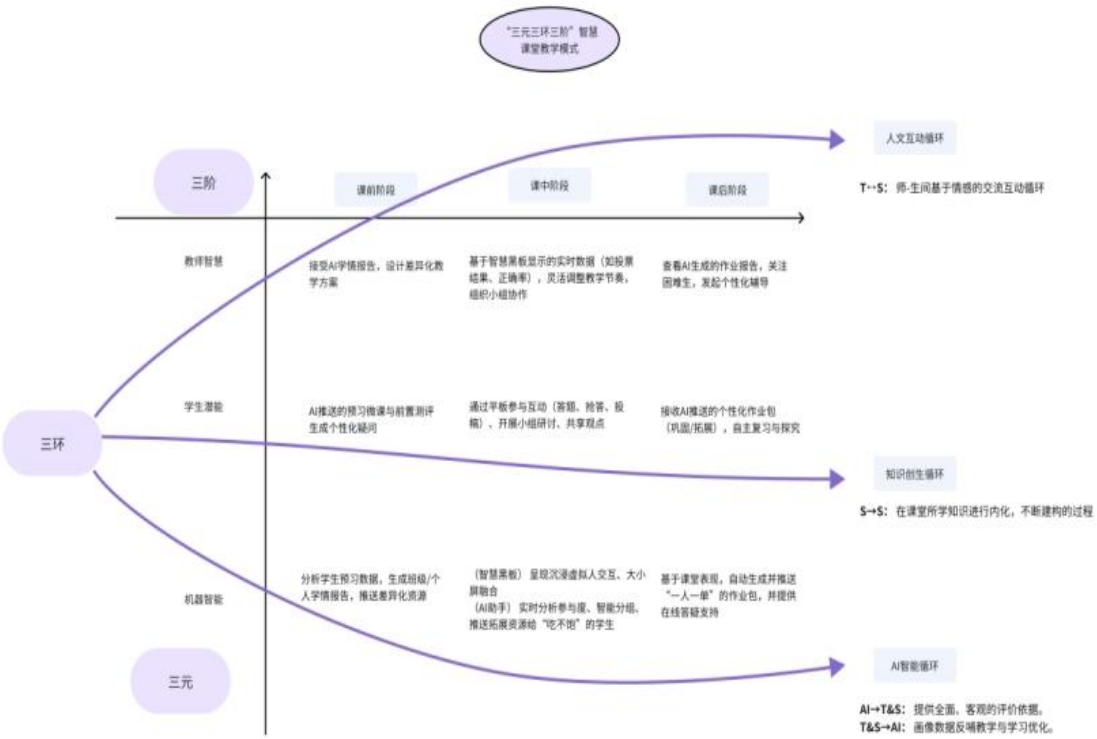

Fig. 8 New "Three Entities, Three Circles, Three Stages" Smart Classroom Teaching Paradigm

Application Scenarios

Application Environment and Implementation Targets

Built on the cloud-edge-end collaborative architecture, the solution features strong environmental adaptability, enabling flexible deployment across diverse educational environments and hardware configurations.

At the infrastructure level, in terms of hardware, it is fully compatible with mainstream brands of interactive smart panels and student terminals. It supports lightweight upgrades based on existing equipment, effectively reducing the cost of school digital transformation, and lowering the threshold for solution application and promotion.

In terms of network connectivity, leveraging self-developed weak-network optimization technology, the solution ensures stable operation of core teaching services even in low-bandwidth environments, effectively addressing network bottlenecks that have long constrained remote and rural schools.

At the instructional scenario level, the solution comprehensively supports core scenarios across all K12 stages,including regular instruction, precise teaching research, and personalized learning . It can be flexibly adapted to the unique teaching needs of small-scale rural schools, achieving full coverage of educational scenarios and ensuring the solution's practicality and on-the-ground operability.

At the End-user level, the solution services teachers and students across all grades and subjects in K12 education, providing targeted services for county-level compulsory education schools and small-scale rural schools. It is dedicated to narrowing the digital divide, promoting the inclusive sharing of high-quality educational resources, and advancing the balanced development of compulsory education.

Examples of Typical Application Scenarios

Scenario 1: Large-Scale Personalized Education under Regional Coordination – Practice of the National-Level Smart Education "Two Zones" Construction in Bengbu, Anhui

As both a national-level experimental zone for "new teaching and learning models enabled by the deep integration of teaching reform and information technology" and a national-level smart education demonstration zone, Bengbu City in Anhui Province has faced prominent long-standing challenges, including unbalanced educational development across its six districts and three counties, and the inability of traditional classrooms to effectively address students' individual learning differences.

To address these issues, the city has established the core strategy of "data-driven personalized education", and adopted the iFLYTEK's Smart Classroom Solution to build the comprehensive proprietary framework of "One Center, Two Subjects, Three School Stages, and Four Major Initiatives". This framework has effectively promoted the transformation of smart education from scattered single-point applications to large-scale, in-depth reform of teaching and learning models, delivering a replicable ,scalable practice for the high-quality development of regional smart education.

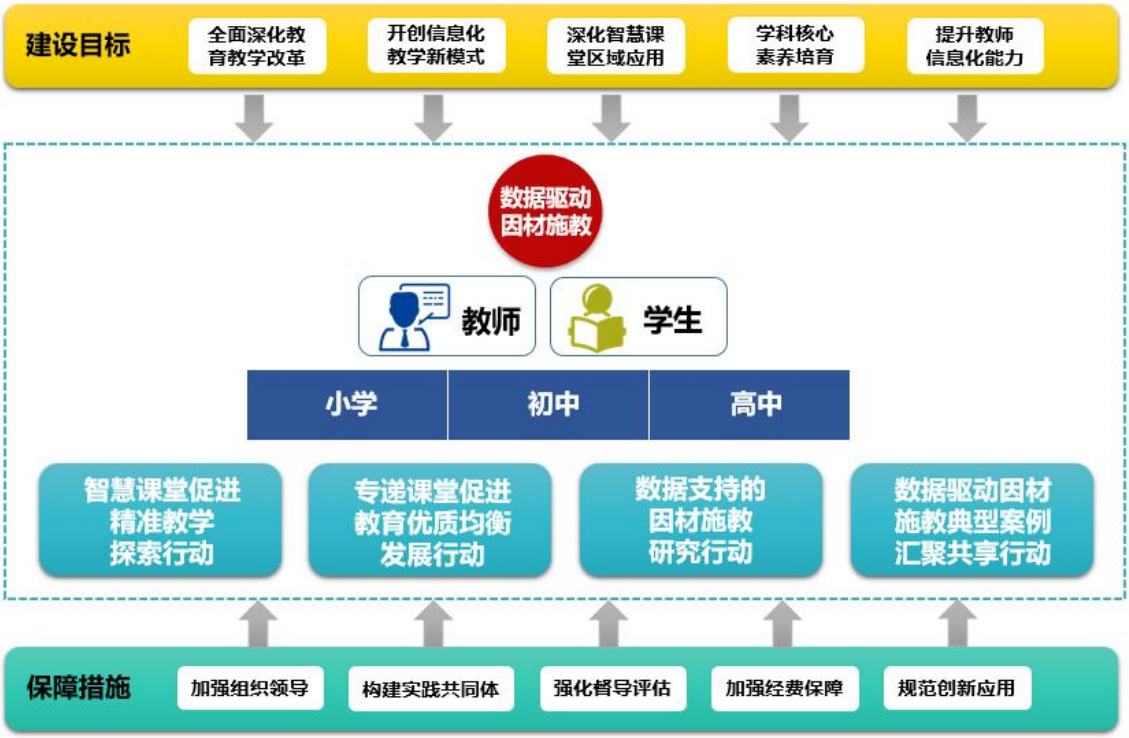

Fig. 9 Overall Framework of "One Center, Two Main Entities,Three Stages of Education, Four Major Initiatives"

First, it enables full-domain data connection and reconstructs a closed loop for precision teaching. At the municipal level, overall planning has been conducted to deploy a smart classroom system covering all educational stages. Through unobtrusive, embedded collection of full-process teaching data, dynamic student learning profiles are established. Leveraging learning analytics data, teachers effectively implement teaching tailored to individual learning needs: refining instructional design based on pre-class diagnostic assessments, precisely addressing common difficulties and doubts during class, and intelligently delivering differentiated and tiered assignments after class. This enables the practical realization of large-scale personalized instruction.

Second, it coordinates synchronous distance classrooms to advance the balanced allocation of high-quality educational resources. For rural disadvantaged schools and small-scale teaching sites, the municipal government has built a standardized synchronous distance classroom system consisting of host classrooms and receiving classrooms. Supported by high-definition interactive recording-broadcasting technology and intelligent resource recommendation, the system delivers synchronous instruction by high-quality urban teachers and cross-regional collaborative tutoring. It ensures the full delivery of all state-mandated courses and effectively narrows the quality gap in education between urban and rural areas as well as among different schools.

Third, it conducts municipal-level evidence-based teaching research to fuel the professional development of teachers. A municipal sharing mechanism for exemplary lesson cases has been established to form a high-quality teaching resource repository. Drawing on classroom teaching behavior data, evidence-based teaching research is carried out to provide teachers with objective, precise teaching diagnostics and targeted improvement strategies. This supports teachers' routine independent research and professional learning, and promotes the systematic enhancement of their professional competence.

Scenario 2: In-Depth Human-Machine Co-Education at the School Level — Dual-Driven Practice of "Red Culture + Smart Education" at Leifeng New Town Experimental Primary School, Hunan Xiangjiang New Area

Rooted in the red educational heritage of the Lei Feng Spirit, Leifeng New Town Experimental Primary School in Hunan Xiangjiang New Area addresses the core challenges in traditional teaching, such as insufficient student initiative, difficulties in quantifying the integrated development of moral, intellectual, physical, aesthetic, and labor education, and over-reliance on teachers' individual experience. Seizing the opportunity of being an artificial intelligence education pilot school approved by the Ministry of Education and the National Center for Educational Technology, the school has developed a dual-driven education system of "Lei Feng Spirit + Smart Education" through seven years of in-depth exploration and practice, promoting a profound transformation of the teaching mode—from technology-assisted instruction to "tripartite collaboration among teachers, students, and machines, and human-machine co-education".

First, it has constructed multi-modal smart classrooms to reshape a collaborative and interactive educational ecosystem. The school has built more than 40 smart classrooms based on iFlytek's "cloud-edge-end" architecture, empowered by the Spark Education Large Model. By integrating red-themed AI inquiry activities into classroom teaching, the school restructures the classroom ecosystem, transforming the traditional one-way indoctrination mode into a "collaborative co-creation among teachers, students, and machines" mode, which effectively stimulates students' learning initiative and participation.

Second, it has adopted data-driven precise teaching to implement personalized adaptive learning. Relying on a professional learning data analysis system, the school collects real-time data from scenarios such as classroom interactions and red-themed practice activities, automatically generates personalized learning status reports for each student, and pushes customized learning resources according to students' weaknesses. This enables students to conduct independent adaptive learning, effectively solving the difficulty in implementing stratified teaching and realizing the goal of "teaching students in accordance with their aptitude".

Third, it has deepened the integration of "smart five-domain education" and empowered teachers' professional development. Centered on the Lei Feng Spirit, the school extends smart education to the fields of moral, intellectual, physical, aesthetic, and labor education, and uses multi-dimensional behavioral data to accurately depict the development track of students' comprehensive quality. Meanwhile, the school has established an evidence-based teaching and research mechanism based on the whole-process teaching data, focusing on the integrated teaching of "red culture + smart education" to carry out lesson refinement, reflective practice, and research projects, thereby systematically improving teachers' digital capabilities and professional literacy.

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

The solution has been implemented in national-level smart education demonstration zones, including Bengbu (Anhui Province), Qingdao (Shandong Province), and Wuhan (Hubei Province). It covers more than 50,000 primary and secondary schools across the country, including prestigious institutions such as the High School Affiliated to Renmin University of China and Guangya Middle School, thus establishing a full-grade and full-subject smart education demonstration system.

According to actual measurements in large-scale pilot schools, the intelligent grading function can reduce teachers' repetitive marking workload by up to 75%. The accuracy of learning situation analysis and teaching resource matching has been improved by 35%, while the duration of students' inefficient and repetitive learning has been reduced by a maximum of 60%. In addition, the participation rate of students in classroom inquiry and collaborative learning has increased by 32%, significantly boosting their learning interest and independent learning abilities.

Over the past three years, application cases related to this solution have won nearly 200 national-level awards in educational informatization. A series of replicable demonstration models have been developed for various scenarios, such as targeted education in Wuhua District (Kunming), the "TISA" characteristic teaching model of Guangya Middle School, and the improvement of county-level education quality in Shengsi Islands (Zhejiang Province). Typical practical achievements have been repeatedly reported by mainstream authoritative media, including CCTV, People's Daily, and Guangming Daily.

Adhering to the standardized path of "pilot refinement → paradigm optimization → national promotion", the solution has further collaborated with 110 benchmark schools to polish full-scenario innovative teaching cases. It has also built regional large-scale application benchmarks in Bengbu, Qingdao West Coast, and other regions. By 2025, the smart classroom application case of Shenlong Primary School in Wuhan Economic and Technological Development Zone was exhibited as a basic education observation model at the World Digital Education Conference, winning high recognition from international education peers.

Replicability, Sustainability and Promotion Potential

① Sustainable Development Support System

The solution has established four core support mechanisms to provide full-chain, long-term guarantees for technological iteration, teaching implementation, and large-scale application.

First, stable R&D and talent support. The company continuously invests no less than 20% of its revenue in core technological research and development, with earmarked funds dedicated to supporting product iteration for educational scenarios. An interdisciplinary R&D and teaching research team, covering artificial intelligence, education science, and frontline teaching practice, has been formed to provide core support for the continuous optimization of the solution.

Second, a closed-loop industry-university-research-application iteration mechanism. Based on compliant teaching data and frontline user feedback, an agile iteration mechanism aligned with the academic calendar has been established. In collaboration with top normal universities such as Beijing Normal University, the solution has built an integrated industry-university-research-application system that balances technological innovation and teaching practicality.

Third, forward-looking and compliance-oriented strategic planning. In line with the national education digitalization strategy, the project has formulated medium- and long-term development plans as well as annual rolling implementation plans. Centered on the iFlytek Spark Education Large Model, it adheres to a domestically independent and controllable development path, establishes a sound data security system, and fully adapts to the needs of future education development.

Fourth, an open and collaborative industrial ecosystem. Through elite school alliances and 100 pilot schools, thousands of seed teachers have been trained, and standardized practical paradigms have been formed. The project has actively participated in the formulation of education digitalization standards, exerting a strong demonstration and leading role in the entire industry.

② Replicable Promotion Capability and Implementation Path

The solution has formed a standardized promotion model that can be flexibly adapted to diverse regions, schools, and subjects while ensuring stable implementation effects.

First, standardized teaching paradigms ensure universal applicability. Guided by the "Teacher-Student-Machine" tripartite collaboration theory, a complete "Three Entities, Three Circles, Three Stages" teaching model and supporting operational guidelines have been developed. It is widely applicable to all K12 grades, all subjects, and various school conditions, and has been verified in multiple schools to effectively lower teachers' application threshold.

Second, modular product configuration meets differentiated needs. A suite of modular products is provided, including AI blackboards, teacher assistants, and smart classroom terminals. Schools can flexibly select configurations based on their budget and informatization foundation, supporting deployment scenarios ranging from single-class pilots to school-wide and regional large-scale implementation.

Third, streamlined implementation paths ensure orderly promotion. A four-step standardized implementation pathway—"Planning → Teacher Training → Application → Evaluation"—has been summarized. Backed by a professional expert team, full-process support is provided, from top-level design and stratified teacher training to ongoing teaching guidance, ensuring the smooth and effective implementation of the solution.

Fourth, systematic resource support facilitates long-term development. An online shared resource library has been constructed, offering demonstration lessons and training courses covering all grade levels. In addition, cross-regional experience exchange platforms have been built through elite school alliances and teacher communities, forming a promotion mechanism characterized by "model-driven expansion and continuous evolution."

Illustration of a Typical Case

Case Name: Driving Regional Education Digital Transformation via Large-Scale Smart Education Deployment

Implementation Period: July 2021–Present

Implementation Location: Wuhan Economic and Technological Development Zone

Implementation Scale: It covers 39 primary and secondary schools across the district, equipped with more than 33,000 smart teaching terminals for teachers and students, and has constructed 671 smart classrooms, serving over 3,000 teachers and more than 40,000 students.

Core Achievements:

First, remarkable effects in reducing teaching burden and improving instructional quality. Third-party evaluation results show that 89.36% of teachers have achieved significant improvements in lesson preparation efficiency, 75.89% have increased the frequency of classroom interaction, and 64.40% of students have experienced an effective reduction in academic workload.

Second, steady improvement of teachers' and students' digital literacy. Assessed by the Strategic Research Base for Educational Informatization (Central China) under the Ministry of Education, teachers' digital literacy has maintained a continuous upward trend, while students' digital literacy has increased by an average of 24%. Teachers have won a total of 353 national awards and 160 provincial awards for their innovative practices in smart education.

Third, establishment of a distinctive regional smart education brand. In 2025, 15 cases were recognized as National Excellent Smart Education Cases by the Ministry of Education, ranking first among all districts in Wuhan and among the leading levels in Hubei Province. A replicable and scalable regional model for smart education practice has thus been formed.

Basic Information of the Institution

Consistent with the introduction of iFLYTEK above.

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AI-Based Assignment Solution - The SPARK AI GRADER

Solution Introduction

Function Overview

The SPARK AI GRADER is a comprehensive assignment solution developed by iFLYTEK based on continuous breakthroughs in artificial intelligence core technologies and in-depth practice in frontline education. Serving all subjects from elementary to high school, the SPARK AI GRADER enables unique functions such as step-by-step intelligent grading, refined error cause diagnosis, graded printing, intelligent learning analytics, and personalized learning for assignments from various sources including school-based teaching materials and teacher-designed exercises. It addresses problems including heavy grading burden, slow learning situation feedback, superficial data application, and difficulty in personalized guidance, forming a new ecosystem of smart assignments featuring “step-by-step intelligent grading-error cause diagnosis-precision teaching-personalized learning.”

Technical Highlights or Innovation Points

① Innovative Education-Specific Layout Recognition and Analysis for In-Depth Homework Marking in Complex Scenarios

Leveraging the iFLYTEK SPARK large model and massive volumes of student answer sheets, an innovative education-specific layout recognition and analysis technology has been developed. This breakthrough overcomes the core bottleneck of digitizing complex homework scenarios, enabling deep intelligent marking. The technology achieves comprehensive adaptive perception, supporting full-series paper sizes including A3, A4, 8K, 16K, B3, and B5, as well as custom size recognition. It recognizes students’ handwritten content and symbols, rapidly locating the positions and content of handwriting trajectory points. Among these, the recognition accuracy of students’ handwritten names and handwritten assignment numbers reaches ≥99%, and the recognition accuracy of Chinese, English, digits, and letters reaches ≥90%.

② Pioneering the First Error Diagnosis Label System with Advanced, Scientific, and Practical Value

Closely aligned with the “Double Reduction” policy requirements and grounded in national curriculum standards, the error diagnosis label system integrates educational theories, AI large model capabilities, and over two decades of accumulated teaching and learning data. A systematic and structured design of students’ error causes in answering questions has been developed, forming a unified, scientific, and scalable error diagnosis label system. This is the first time the long-standing industry challenge of “error diagnosis and large-scale personalized instruction” has been addressed, laying an important foundation for large-scale “personalized instruction, workload reduction, and efficiency enhancement”, and holding significant implications for education and teaching.

③ Large Model Combined with Cognitive Diagnostic Model for Large-Scale Personalized Learning Recommendations

Based on educational measurement theories, through item coding technology and comprehensive data collection, the system constructs fine-grained learning profiles for students—covering knowledge mastery, competency improvement, and comprehensive literacy development—and accurately models students' proficiency levels. Adapted to students' zones of proximal development and individual needs, the AI intelligently plans learning pathways and recommends appropriate resources. This generates hierarchical homework assignments and personalized homework recommendations, reducing time spent on ineffective homework and comprehensively meeting students' autonomous learning needs.

Application Scenario

Application Environment and Implementation Objects

The SPARK AI GRADER solution serves basic education stages (elementary, middle, and high schools), deeply adapting to school-based assignment scenarios, focusing on three major links: assignment implementation, precision teaching, and autonomous learning. Subject coverage includes all basic education subjects.

Software and hardware environment: An intelligent terminal integrating assignment data scanning and collection, intelligent grading, and graded printing; hardware includes scan-and-print machines with different configurations, software includes the Zhixuewang platform, mobile APP, education-specific layout recognition system, and large model multi-modal intelligent grading engine.

Implementation objects: Serves education bureaus, schools, teachers, students, parents, etc.

Typical Application Scenario Examples

Scenario 1: AI Grading and Precision Teaching Research in Mathematics

Application Background: Kangbashi No. 2 Middle School is a key junior high school in Ordos City with a strong atmosphere for mathematics teaching research. The school's mathematics teaching and research group is dedicated to creating a precision teaching model. Traditional assignment grading methods make it difficult to quickly obtain class learning situation data, and teachers lack precise basis for lesson planning, making it difficult to effectively teach based on students' common problems and individual differences.

Implementation Method: 1. Collective Lesson Planning and Assignment Design: The teaching and research group uniformly uses the grading machine for assignment scanning and data collection, analyzes student mastery based on AI reports, and dynamically adjusts teaching design and assignment difficulty; 2. Precision Review: Teachers precisely locate questions with high error rates based on class assignment reports, providing targeted explanations in class to reduce ineffective repetitive exercises; 3. Error Question Management: Students view personal error question sets through the APP, forming closed-loop error question training, and teachers can track student error question improvement.

Implementation Results: The mathematics subject average score increased by about 8 points, teaching and research group lesson planning time saved by about 30%, student error question correction completion rate reached over 95%, forming a teaching characteristic of “data-driven precision teaching research.”

Teacher Feedback: “With AI grading data support, lesson planning is no longer based on experience but is now driven by data. Review is more targeted, and student grades improved significantly.”

Scenario 2: AI Personalized Grading and Tiered Teaching for English Composition

Application Background: Jiangsu Haian Senior High School is a model high school in Jiangsu Province with high requirements for English composition teaching. English composition grading has always been one of the most time-consuming tasks for teachers. Traditional manual grading makes it difficult to balance full grading with personalized feedback. Teachers often can only select some compositions for detailed grading, making it difficult to cover all students in the class.

Implementation Method: 1. Composition Scanning and Grading: After students complete compositions, they scan them through the grading machine. The AI engine performs full-text grading, identifying spelling errors, grammar issues, sentence structure, etc., and provides comprehensive scores and improvement suggestions; 2. One Student One Report: Each student receives a personalized composition analysis report, clearly marking problem types and improvement directions; 3. Tiered Teaching: Teachers divide students into different level groups based on AI-generated class learning situation reports, assigning tiered writing tasks to achieve true teaching according to aptitude.

Implementation Results: The class composition grading cycle shortened from the original 3-5 days to within 1 day. Each student receives 5-8 personalized feedback points per composition on average. Teachers can focus on reviewing class-wide common problems, improving composition teaching efficiency by about 40%.

Teacher Feedback: “Previously, I could only select a few compositions for detailed grading. Now every composition receives detailed AI annotations. Students can see their problems, and their interest in writing has significantly increased.”

Effectiveness and Cases

Implementation Effectiveness, Assessment Data, or Practical Experience

Currently, the SPARK AI GRADER has achieved normalized application in over 3,000 schools across 33 provincial-level administrative regions in China, deeply serving over 3 million teachers and students, with an average daily scanning volume of over 6 million assignments, and has been implemented in overseas countries including Singapore. Since scaled application, the effectiveness of burden reduction and quality improvement has been significant. Data shows that after deep application, teachers’ time spent on repetitive mechanical assignment grading decreased by 83% (from 1 hour to 10 minutes), while time focused on school-based teaching research and targeted student tutoring increased by 100% (from 15 minutes/day/class to 30 minutes/day/class).

Replicability, Sustainability, and Promotion Potential

The core value of the SPARK AI GRADER solution in improving grading efficiency, reducing burden, and learning profile analysis diagnosis has been recognized by Chinese-speaking countries such as Singapore and Malaysia. In Singapore, the “kiasu” culture has created scaled in-school and out-of-school exercise scenarios in public elementary and middle schools and tutoring institutions. Using AI grading to save high labor costs and providing personalized suggestions for students has become the most valued value for Singapore customers.

Based on local grading standard adaptation, English version model training, and localized deployment of grading capabilities, the grading machine empowers precision review and targeted tutoring in the two high-stakes exam preparations for PSLE and O-level in public elementary and middle schools, driving the first procurement project landing at Singapore Technology Middle School, and creating model points at top autonomous schools such as Hwa Chong Institution and Raffles Girls’ School. Chinese primary schools and independent secondary schools in Malaysia also have space for scaled replication and promotion.

Policy guidance, teaching needs, and measurable application effectiveness provide strong support for the sustainable development of the SPARK AI GRADER solution. The SPARK AI GRADER continuously upgrades its empowerment of education and teaching. By transforming education and teaching models, optimizing resource allocation methods, and improving education system operation efficiency, it ensures the sustainability and growth of social value.

Typical Case Description

Case Name: Promoting Binjiang Education Process Reengineering through Assignment “Machine Grading”

Implementation Time: In late 2024, relevant personnel from the Binjiang District Education Department in Hangzhou City initiated investigation and argumentation. Pilot started on February 17, 2025. Expanded to 15 middle schools district-wide in May 2025. District-wide promotion notice issued in August 2025. After the new semester starts in September, expanded to 21 elementary schools, achieving full coverage of primary and secondary schools in Binjiang District.

Implementation Scale: 15 middle schools and 21 elementary schools district-wide, covering 210 middle school classes and multiple elementary school grades, with over 65,000 assignments intelligently graded daily.

Core Results: Built a promotion mechanism of pilot first, step-by-step promotion, software-hardware combination, research-training integration, forming a full-chain closed loop of “collaborative grading-precision teaching-autonomous learning.” Classes collect assignments 4.3 times per week on average, teacher report review rate increased by 40%, basic assignments take an average of 14 minutes per class from scanning to printing, achieving personalized assignments and big data application of teaching according to aptitude, becoming the first district-level assignment intelligent grading full coverage case in China. Received coverage from mainstream media including Guangming Daily, Xuexi Qiangguo, and Chao News. The official Binjiang Release WeChat official account had 45,000 shares and 15,000 likes in one week, forming a replicable and promotable “Binjiang Paradigm”.

Presentation Materials (if applicable): If the solution is ready for demonstration, exhibition and display design renderings may be provided, along with descriptions of hardware and software configurations, display environment requirements, spatial layout, etc. The presentation materials shall truthfully reflect the application form of the solution in education and teaching, and demonstrate its technological advancement, practical application effectiveness, and value for demonstration and promotion.

Fig. 10 The SPARK AI GRADER X40

The SPARK AI GRADER X40 can be flexibly deployed in campus grade corridors, offices, and school printing rooms. The installation location must be equipped with a power supply and a wired network connection.The picture on the right shows an English teacher from Jingyuan No.1 High School in Gansu Province using the machine to guide students in essay writing.

Organization Basic Information

Consistent with the introduction of iFLYTEK above.

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iFlytek StarPivot Education Digital & Intelligent Base

Solution Introduction

Function Overview

iFlytek StarPivot Education Digital & Intelligent Base is a "platform + AI" digital and intelligent infrastructure tailored for K12 schools. It unifies and connects schools' data, applications and services to support the rapid implementation of various digital and intelligent scenarios. The platform not only provides out-of-the-box application capabilities, but also enables schools to continuously expand and build customized systems based on their own needs, driving the constant upgrading of teaching, management and service scenarios, and serving as a fundamental platform for the sustainable digital and intelligent development of schools.

For high-frequency scenarios including teaching, teacher development and campus management, the base offers both out-of-the-box application functions and systematic teacher training services, helping schools to truly apply AI in practice and sustain its long-term use. It focuses on solving prominent problems in school digital and intelligent construction such as "teachers' incompetence in using AI tools, superficial application of digital technologies, difficult technology implementation and unsustainable application effects".

Technical Highlights or Innovations

Innovative Construction Model:

Empowering the construction and intelligent upgrading of the digital campus ecosystem by leveraging large models such as iFlytek Spark, the base practices the construction concept of "data base + application ecosystem". It deeply integrates large model technology with all scenarios of education, teaching, management and services, systematically addresses the actual business needs of schools, realizes technology intensification and service platformization, and fundamentally avoids repeated construction and resource waste.

Innovative Data Governance:

It establishes a unified school-level data standard and aggregates global school data through multiple channels including data import, API interfaces, low-code questionnaire filling and AI-based OCR collection. Data governance is completed via cataloging, database construction, model building and data mining, achieving horizontal and vertical interconnection of data, activating data elements, effectively empowering educational evaluation and management decision-making, and completely breaking down data silos.

Innovative Application Development:

The base builds an intelligent application creation and editing platform integrated with application development assistants and AI agent development assistants, which greatly lowers the threshold of application development. It enables ordinary teachers to independently build school-based personalized intelligent applications covering all scenarios of teaching, management, teaching research and evaluation, continuously enriching the campus application ecosystem and adapting to the dynamic business needs of schools.

Innovative Evaluation System:

Breaking through the traditional single and static evaluation model, the base constructs dynamic holographic portraits of teachers' professional capabilities and a five-dimensional growth cloud map for students. It realizes the transformation of teacher evaluation from "focusing on professional titles and qualifications" to "process-oriented and developmental assessment", and student evaluation from "score-oriented" to "all-round development and three-dimensional empowerment", making educational evaluation more objective, accurate and diversified.

Application Scenarios

Application Environment and Implementation Objects

Adapted Educational Scenarios:

The core of this solution is adapted to the full-scenario construction of smart campuses in general high schools, and can be directly extended to the digital transformation of education and teaching, academic affairs management, administrative office, teachers' professional development, students' comprehensive growth and other scenarios in the basic education stage such as primary and secondary schools, and secondary vocational colleges. It is especially suitable for solving common problems of large and medium-sized schools including low efficiency of cross-departmental collaboration, difficult data sharing, and challenging implementation of personalized teaching and evaluation.

Software and Hardware Basic Environment:

The underlying infrastructure is built with advanced technologies such as cloud computing, cloud storage, virtualization, cloud services and the Internet of Things; at the network level, the campus wired network is fully covered with all-fiber dual 10-gigabit links to the convergence layer and gigabit links to the desktop, supporting the IPv6 communication protocol standard and building a "dual egress" to ensure network stability; the computer room is equipped with dual commercial power supply + UPS power supply and generator for more than 12 hours, as well as anti-theft alarm, video surveillance, fire alarm, environmental monitoring systems and special precision air conditioners; the terminal supports multi-terminal login including computer-side portal website and mobile phone, combined with hardware equipment such as intelligent marking machines and big data precise teaching systems.

Core Implementation Objects:

It directly serves three main campus subjects — school administrators (principals, heads of various departments), teachers (subject teachers and teaching research personnel of all disciplines) and students; it can also connect with higher-level education administrative departments to provide data support and decision-making reference for regional education management.

Typical Application Scenario Examples

Scenario 1: Mianyang High School in Sichuan Province - Integrated Application Scenario of Precise Teaching and Smart Academic Affairs

Taking the education digital base as the core, Mianyang High School has implemented an application model of deep integration of full-scenario precise teaching and intelligent academic affairs management. Aiming at the pain points of heavy teaching tasks, complex academic affairs processes and strong personalized learning needs in the high school stage, it realizes the deep adaptation of digital technology and education teaching.

In the precise teaching link, relying on the big data precise teaching system and intelligent marking machine, the school has created three full-scenario data collection modes: "scanning first then marking (online marking for exams)", "marking first then scanning (manual marking for homework)", and "mobile phone collection + automatic marking (online exams)", achieving intelligent marking of multiple question types in all disciplines with an accuracy rate of over 98% for objective questions and over 95% for subjective questions, and completing more than 1.8 million online marking papers annually; the system establishes an "academic digital twin" for each student and intelligently generates more than 360,000 learning situation analysis reports. Teachers locate the common problems of the class and the individual weak points of students based on the data, and combine with the real-time early warning system for teaching risks to realize the positioning of problems to schools, disciplines, classes and individuals, and carry out precise classroom comments and dynamic teaching interventions.

In the smart academic affairs link, the intelligent education management system based on the base realizes the digital reconstruction of core businesses. The AI course scheduling engine automatically schedules courses based on multi-dimensional constraint conditions such as disciplinary characteristics, teachers' class hours and classroom resources, shortening the traditional 2-week manual course scheduling to 3 days with an efficiency improvement of 78.6%; the AI examination management engine compresses the 1-week manual examination arrangement and form-making work to 2 hours with an efficiency improvement of 96.4%, and automatically outputs various examination forms such as invigilation schedules and admission tickets, realizing the balanced distribution of invigilation workload. At the same time, it realizes the full online process of school-based course selection and 360-degree online teaching evaluation, greatly improving the efficiency and transparency of academic affairs management.

Scenario 2: Dongfeng East Road Primary School in Yuexiu District, Guangzhou City - Collaborative Application Scenario of the Integration of Moral, Intellectual, Physical, Aesthetic and Labor Education and Digital & Intelligent Governance

Focusing on the educational goal of "simultaneous development of moral, intellectual, physical, aesthetic and labor education" in the primary school stage, and aiming at the pain points of data silos and scattered AI applications in the digital transformation of basic education, Dongfeng East Road Primary School has implemented a collaborative application scenario of intelligent education with the integration of the five educations and closed-loop governance driven by data based on the "1+N" digital education ecosystem.

In the link of the integration of the five educations, relying on the "Super Education Brain", the school has created a five-loop linked ecosystem of "AI assistant for teaching, learning, evaluation, education and management", developed 8 subject AI agents and implemented 14 customized applications, constructing an "AI + five educations" agent matrix: for moral education, an intelligent research and study agent is built to cultivate students' patriotism in practical activities; for physical education, a student physical health consultant agent is launched to customize personalized exercise prescriptions for students; for intellectual education, agents such as Chinese composition evaluation and revision and English 4P interdisciplinary learning are developed to activate the innovative potential of the classroom; for aesthetic education, an intangible cultural heritage tour guide assistant and a digital art gallery are launched to cultivate students' aesthetic confidence; for labor education, an "Intelligent Planting Doctor" agent is built to empower the practice of STEM+ planting courses, realizing the accompanying empowerment of AI for all scenarios of the five educations.

In the digital and intelligent governance link, relying on the data cockpit, the school has built a closed-loop governance mechanism of "visible - manageable - optimizable", grasping the data of the school's platform operation, user behavior, core indicators and other data on one screen, and realizing the deep combination of digital and intelligent governance and the cultivation of students' core competencies.

Effects and Cases

Implementation Effects

Since the implementation of this solution in Mianyang High School in Sichuan Province in 2024, remarkable quantitative effects and practical achievements have been made: in terms of academic affairs management, the efficiency of AI course scheduling has been improved by 78.6%, the efficiency of AI examination arrangement by 96.4%, and school-based course selection and online teaching evaluation have been fully realized online; in terms of daily office work, dozens of administrative processes have been upgraded to online and mobile versions, with the average process processing time shortened by 70%, the annual platform browsing volume by teachers reaching 229,764 times, the teacher usage rate exceeding 73%, and a total of 2.8734 million pieces of various data accessed; in terms of education and teaching, more than 1.8 million online marking papers are completed annually, more than 360,000 learning situation analysis reports are intelligently generated, the teacher report viewing rate is 80%, and real-time early warning and dynamic intervention of teaching risks are achieved; in terms of teacher development, exclusive digital growth files have been established for more than 500 teachers, forming holographic capability portraits and realizing the diversified and process-oriented upgrading of teacher evaluation; in terms of student growth, more than 90,000 pieces of various student growth files have been collected, a five-dimensional growth cloud map has been constructed, completely breaking the single evaluation model of "only focusing on scores".

Since the launch of this solution in Dongfeng East Road Primary School in Yuexiu District, Guangzhou City in August 2025, the number of registered users of the digital & intelligent base system has reached 6,090, with 2,514 activated users and 1,657 active users, the cumulative visit volume is 173,000 times, the activity rate of standardized applications is 65.91%, and 34 personalized applications have been implemented.

The platform has been deeply integrated into the whole process of school teaching, assessment and management, covering all scenarios of the integration of moral, intellectual, physical, aesthetic and labor education horizontally, and realizing full-level penetration from school-level governance to class teaching and individual students vertically, forming a sound development trend of "the system has taken shape, applications are expanding, and data is accumulating", and effectively achieving the construction goals of improving teaching quality and reducing burdens, precise and efficient management, and personalized education for students.

Replicability, Sustainability and Promotion Potential

Replicability:

The top-level design framework of "one body, two wings, three connections and four driving forces" of the solution has universality and can be adapted to schools of different scales and different school stages; the formed school-based data standards, interface specifications and trusted security system can be directly reused without repeated research and development by each school; the intelligent application creation and editing platform supports each school to develop personalized applications according to its own school-running characteristics and business needs, realizing "general base and personalized applications".

Sustainability:

Taking schools as the core implementation subject, the solution relies on policy support such as the national education digitalization strategy and the creation of provincial smart education demonstration schools, and combines with the school-enterprise cooperation model to ensure the continuous iterative upgrading of technology; it continuously accumulates data through the normalized use of teachers and students, forming a positive cycle of "data empowering business and business feeding back data"; it integrates digital technology into the school cultural genes, creating a campus atmosphere where teachers and students take the initiative to embrace digitalization and intellectualization, and ensuring the long-term implementation and operation of the solution.

Promotion Potential:

This solution provides an implementable and replicable "Mianyang High School Practice" sample for the digital transformation of general high schools, and can be rapidly promoted in primary and secondary schools and secondary vocational colleges in all provinces and cities across the country; its core concepts of data governance, full-scenario connection and digital & intelligent empowerment for education can provide a reference for the construction of smart campuses in the basic education stage worldwide, and is especially suitable for solving the common problems faced by developing countries in the digital transformation of education such as discrete hardware, data silos, and disconnection between applications and actual needs.

Description of Typical Cases

Implementation Time:

Starting from 2024 (launched on the occasion of the creation of Sichuan Provincial Smart Education Demonstration School)

Implementation Location:

No. 26, West Jianmen Road, Mianyang City, Sichuan Province - Mianyang High School in Sichuan Province

Implementation Scale:

Covering five core scenarios of school academic affairs management, daily office work, education and teaching, teacher development and student growth, directly serving more than 500 in-service teachers and nearly 10,000 general high school students, and connecting with various administrative departments and grade-level teaching and research groups of the school.

Core Achievements:

- Built the education digital base of Mianyang High School and five supporting centers, created a "full-scenario • integrated" smart campus comprehensive application ecosystem, and realized the comprehensive digital and intelligent upgrading of campus management and education teaching;
- Formed a benchmark for regional smart campus construction, and the relevant experience has been promoted in the region, becoming a demonstration sample for the digital transformation of general high schools in Sichuan Province;
- Invited to give a keynote speech at the Global Smart Education Conference co-hosted by the UNESCO Institute for Information Technologies in Education and Beijing Normal University in 2025, sharing the experience of smart campus construction with the world;
- Constructed a new paradigm of smart education featuring "data speaks for itself, the system can think, and education is personalized", achieving the core goals of improving management quality, reducing teaching burdens and precise evaluation.

Basic Information of the Institution

Consistent with the introduction of iFLYTEK above.

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iFLYTEK: Constructing a New Pattern of Artificial Intelligence Empowering Scientific Literacy Cultivation

Solution Introduction

Function Overview

This solution is based on the deep implementation of the national “Double Reduction” policy and the implementation requirements of the Science Curriculum Standards for Compulsory Education, closely following the deployment of the 2025 Guidelines for Science Education in Primary and Secondary Schools. The Compulsory Education Science Curriculum Standards (2022 Edition) clearly define scientific concepts, scientific thinking, inquiry practice, and attitude responsibility as the core literacy of science courses. However, three prominent pain points persist in actual teaching. First, scientific concepts are abstract and difficult to understand. Second, inquiry activities are formalistic, leading to superficial cultivation of scientific thinking. Third, limited experimental conditions and fragmented educational scenarios result in a lack of effective carriers for fostering attitudes and responsibilities. At the same time, regional science education also faces systematic problems such as weak teachers, uneven distribution of high-quality resources, and lack of interdisciplinary practice paths.

Relying on the independently controllable domestic large model and full-process AI tool chain, iFLYTEK has innovatively constructed a "Four Innovations" paradigm to empower science classrooms.

To address the abstract and obscure nature of scientific concepts, it applies "New Resources" including Three-Dimensional interactive knowledge maps and visualizations from "Beauty of Science", breaking down barriers to knowledge comprehension and consolidating scientific concepts.In response to the lack of thinking depth in traditional teaching, it adopts "New Thinking" through human-machine collaborative thinking-oriented AI classrooms, resolving the problem of superficial inquiry and enhancing scientific thinking.To tackle weaknesses in hands-on experiments, it implements "New Practice" via digital-intelligent laboratories, breaking through constraints of time, space and resources to strengthen inquiry practice.To overcome bottlenecks in the connection between on-campus and off-campus education, it uses "New Character" through systematic project-based learning, solving the disconnect between knowledge and practice and fostering attitudes and responsibilities.

Driven by the "Four Innovations" approach, this initiative precisely addresses key educational pain points such as scientific concepts being "abstract and hard to understand", scientific thinking cultivation being "superficial", experimental practice being "resource-constrained", and moral education suffering from "disconnection between knowledge and action". It explores a new path of digital transformation featuring parallel technology empowerment and security governance, supporting regional science education to achieve leapfrog development from "insufficient supply" to "high-quality provision".

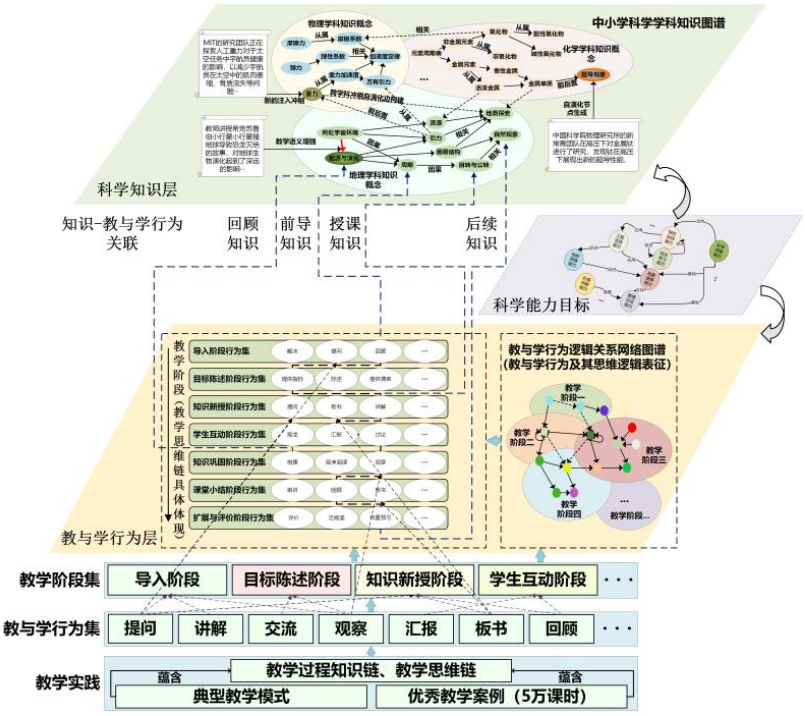

Fig. 10 Three-dimensional Knowledge Graph

Fig. 11 A teacher uses virtual experiment resources on sound vibration from "Beautiful Science" for teaching

Technical Highlights and Innovative Breakthroughs

①Innovation in Core Technology Infrastructure

Relying on iFLYTEK Spark's self-developed special large model for science education, jointly build an exclusive scientific knowledge map with authoritative institutions to achieve credible content, compliant algorithms and data security, providing stable and efficient domestic core technical support for solution implementation.

②Innovation in Multimodal Resource Integration

By integrating the multimodal understanding capabilities of domestic large models and high-quality scientific visualization resources, and following the resource development philosophy of “Beauty of Science”, a diversified and scenario-based teaching resource system has been created. It transforms abstract scientific concepts into intuitive and perceptible visual content, achieving precise matching between resources and teaching needs. Visual resources corresponding to knowledge points can be called with one click, helping teachers prepare lessons efficiently and enabling students to quickly understand scientific principles.

③Innovation in Virtual-Real Integrated Practical Technology

Adopting a virtual-real integrated inquiry model, the solution makes up for the shortcomings of traditional experiments with virtual experiments, solving problems such as limited experimental equipment, high operational risks and single scenarios. Meanwhile, it links digital sensor devices to strengthen students’ practical operation abilities, realizing hierarchical progression between virtual simulation exercises and real operation inquiry. This not only reduces practical costs but also improves the effectiveness of inquiry.

④Innovation in Human-Machine Collaborative Technology Empowerment

An intelligent learning companion has been developed to integrate multiple types of learning data and provide personalized learning guidance, linking home-school scenarios to extend the learning space from classrooms to families and communities. It also supports teachers in transforming from knowledge transmitters to knowledge producers and thinking guides, and enhances the scientificity of instructional design through an AI lesson preparation assistant.

⑤Innovation in Compliance and Security Technical Support

In strict accordance with the policy requirements for educational AI compliance, the solution adheres to the bottom lines of data privacy protection and algorithm fairness in technical design. Technologies such as encrypted storage and full-process management are adopted to regulate the collection, use and destruction of students’ academic data, eliminate algorithmic bias, and ensure that AI applications serve the essence of education without replacing the core role of teachers. Balancing technological innovation with compliance and security, it provides reliable support for the long-term and stable implementation of the program.

Application Scenarios

Application Environment and Implementation Targets

This solution is deeply adapted to four core scenarios: primary and secondary school science classrooms, laboratories, after-school services and off-campus science and innovation practices, comprehensively covering three types of users: teachers, students and managers, with strong compatibility for both software and hardware environments.Supporting both cloud-based and local deployment, the solution is compatible with mainstream teaching terminals including computers, tablets, and smart blackboards, and can be smoothly connected to regional education cloud platforms. It requires no high hardware investment, making it easy to implement in grassroots schools and underdeveloped schools.

Implementation objects cover education administrators, science teachers, students, parents, and other stakeholders. Teachers optimize lesson planning with the support of knowledge maps, greatly improving their preparation efficiency. In class, heuristic teaching is carried out with the help of AI tools and visualized resources, significantly enhancing students' interest in scientific inquiry. Experiments adopt a virtual-real integrated mode, and massive process data ensures a 100% experiment delivery rate. After class, personalized learning tasks are pushed through the scientific practice system, linking families, schools and communities to form a collaborative education ecosystem.

Typical Application Case Examples

① AI Powered Lesson Preparation and Teaching, Solving Problems of Abstract Scientific Concepts and Limited Experimental Conditions

A virtual-real integrated experiment system supported by both "virtual resources and physical intelligent equipment" is established, equipped with intelligent laboratory software and digital sensors, covering all mandatory experiments specified in the curriculum standards. It makes up for the shortages of physical equipment and high experimental risks, improves the experiment implementation rate and inquiry depth. The AI Science Experiment Software of the National Center for Educational Technology also enables real-time data statistics to fulfill curriculum standardization requirements. Meanwhile, relying on the intelligent tutor and iFLYTEK Beauty of Science teaching system, knowledge maps help teachers grasp the knowledge context and reconstruct teaching logic. With AI assistants and visualized resources from Beauty of Science, lesson preparation efficiency is improved, and activity plans and courseware can be generated with one click. This fundamentally reduces teachers' workload and solves difficulties such as abstract scientific concepts and uneven resource distribution.

② Human-Machine Collaborative Inquiry, Solving Formalistic Inquiry Activities and Insufficient Cultivation of Scientific Thinking

Supported by the heuristic question-chain learning tools built into the "Intelligent Tutor" platform, students are guided to interact with virtual teaching assistants in real time. The system accurately records students' inquiry processes and thinking feedback throughout the whole process, automatically generates personalized data analysis reports, and precisely identifies weak points in students' thinking. This promotes the upgrading of inquiry activities from "superficial hands-on operation" to "in-depth thinking", effectively achieving the goal of cultivating scientific thinking. In addition, the STEM thinking-oriented AI classroom fully captures each student's in-class feedback. Based on the scientific practice system, after-school practice tasks are accurately assigned to extend the inquiry chain, ensuring that students conduct independent thinking and inquiry after class. It further expands after-school inquiry approaches, realizes seamless connection between in-class and after-school inquiry, stimulates students' inquiry interest in an all-round way, and consolidates the achievements of scientific thinking cultivation.

Results and Cases

Implementation Effect, Evaluation Data or Practical Experience

The solution has been applied on a large scale in Hangzhou, Hefei, Guangzhou and other places, serving more than 300 schools. Adopting a three-level linkage operation mode of “municipal overall planning - district and county promotion - school implementation”, a normalized promotion mechanism has been formed, breaking through core problems in science education such as insufficient teachers, uneven resources and low experiment opening rate. Up to now, it has covered 345 schools, thousands of teachers and tens of thousands of students. Since its in-depth trial launch in April 2024, remarkable results have been achieved in pilot regions over more than one year, and sufficient data has verified the core value of the solution in three dimensions: reducing burden, improving quality, and promoting equity.

In terms of teaching efficiency improvement, teachers’ lesson preparation burden has been effectively alleviated. The generation rate of personalized lesson plans exceeds 37%, lesson preparation efficiency has increased by 64%, and average daily preparation time has been significantly reduced. The platform aggregates massive experimental process data, providing strong support for precise teaching supervision. Classroom interaction participation has risen by more than 42%, and the experiment implementation rate has jumped from less than 60% to nearly 100% for all basic experiments. Among them, the Hangzhou platform has collected process data from 30,713 experimental courses across the city.

In terms of learning mode transformation, students’ interest in scientific inquiry has improved significantly, shifting from passive acceptance to active exploration. Pilot schools in Hangzhou have carried out more than 13,000 independent inquiry activities and recorded over 78,000 interactive questions. In some schools, students’ interest in science has surged from less than 20% to 76%. In promoting educational equity, the large-scale deployment of AI tools has enabled high-quality science education resources to reach rural and underdeveloped schools with precision, effectively bridging the urban-rural digital divide.

Replicability

The case has been applied on a large scale in Hangzhou, Hefei, Guangzhou and other places, covering more than 300 schools, thousands of teachers and tens of thousands of students. Adopting the three-level linkage operation mode of 'municipal overall planning - district and county promotion - school implementation', a normalized promotion mechanism has been formed to break through core problems such as insufficient teachers, uneven resources and low experiment opening rate in science education.

In April 2025, the on-site promotion meeting of the 15th Collaboration Group of the National Science Education Experimental Area attracted more than 30 experimental schools and over 700 science educators across the province to observe and learn. Districts and counties including Tonglu County, Jiande City, Xiaoshan District and Yuhang District have successively held district-level open class exchange activities on AI-powered science education, accumulating a number of exemplary excellent lesson cases.

Typical Case Description

Since November 2024, 46 schools, 183 teachers and more than 5,000 students in Huangpu District, Guangzhou city, Guangdong Province have participated in the pilot, with the core goal of solving the pain points of superficial classroom inquiry and low teacher lesson preparation efficiency based on this solution. On the one hand, the iFLYTEK Beauty of Science teaching system has promoted the transformation of teachers' role from knowledge transmitters to thinking guides. With the help of AI-enabled critical thinking templates, teachers guide students to think deeply and develop a complete thinking process from claims to evidence, which significantly enhances the thinking depth of classroom teaching.On the other hand, a sound closed-loop operation system of "training – application – feedback – iteration" has been established. Based on the actual needs of frontline teachers, the intelligent teaching functions have been continuously optimized and updated.During the pilot period, the average lesson preparation efficiency of the 183 participating teachers increased by 64%, and the quality of classroom interaction improved remarkably. Relevant practices were reported by Yangcheng Evening News, forming a replicable and scalable model for empowering classroom teaching.

Basic Information of the Institution

Consistent with the introduction of iFLYTEK above.

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Lightweight Popularization Practice and Innovation of Artificial Intelligence General Education in K12 education

Solution Introduction

Function Overview

Centering on the Guidelines for General Artificial Intelligence Literacy Education in Primary and Secondary Schools, this solution targets four core pain points of school-based AI literacy education: insufficient class hours, shortage of professional teachers, limited funding and lack of high-quality educational resources.Adopting an integrated design of lightweight digital platform, tiered curriculum system and low-cost teaching aids, it delivers an easy-to-implement, affordable and sustainable overall solution for administrative regions and primary and secondary schools.It covers four major core modules, including curriculum supply, teaching implementation, learning status management and teacher support, enabling the closed-loop operation of teaching, learning, assessment and administration.The solution facilitates the transition of artificial intelligence education from pilot programs to full-scale popularization, and ensures equitable literacy enlightenment in the intelligent era for students across regions and schools with different resource conditions.

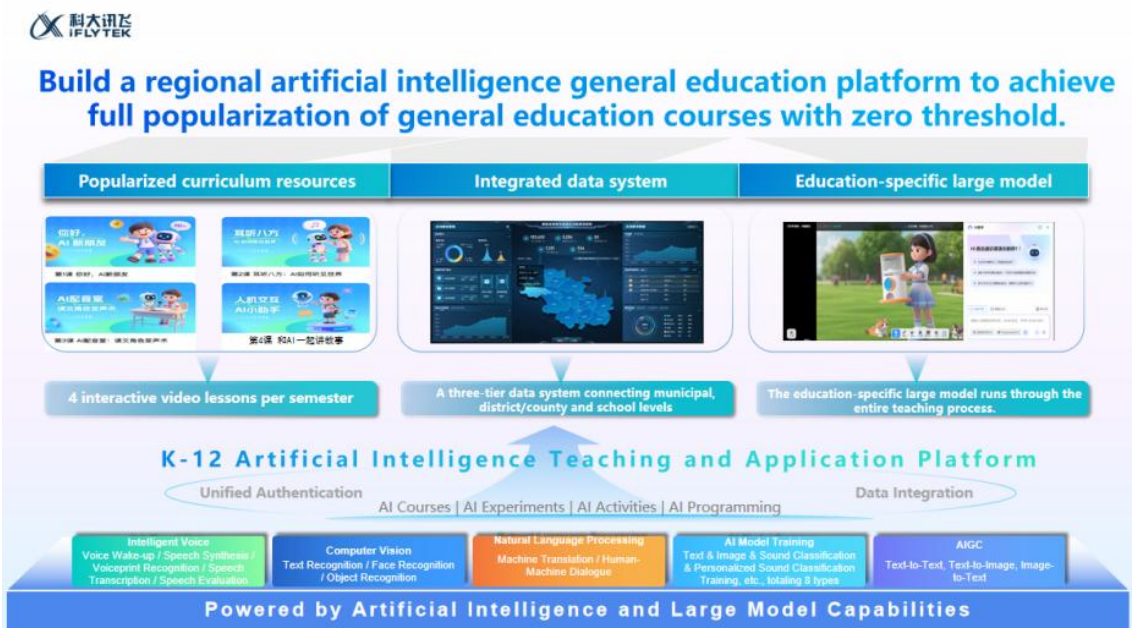

Fig. 12 Overall Architecture Diagram of Artificial Intelligence General Education

Technical Highlights and Innovative Breakthroughs

Rooted in the prevailing pain points of the education, this solution achieves differentiated innovation in three dimensions: curriculum theory, teaching models, and technological application. It overcomes the constraints of traditional artificial intelligence education, which features high implementation thresholds and difficult on-the-ground delivery. Its unique value has been fully verified through practical application across multiple regions and scenarios nationwide.

Innovation in Curriculum Theory: Construction of the "Three Stages and Four Dimensions" Curriculum Model

To address the common problem raised by frontline teachers that artificial intelligence curriculum content is fragmented and unsystematic, this solution pioneers a general AI literacy curriculum model of "Three Stages and Four Dimensions".The Three Stages refer to the competency progression path: Basic Cognition – Project Practice – Innovative Application, which precisely adapts to the cognitive regulation of students at different schooling stages.The Four Dimensions include intelligence awareness, knowledge application, thinking methods, and ethical responsibility. Breaking the traditional framework of knowledge indoctrination, it forms a complete training closed loop of technology understanding – scenario transfer – value judgment.This model provides a systematic content framework for cultivating artificial intelligence literacy among primary and secondary school students, enabling the curriculum to evolve from fragmentation to systematization and from superficial learning to in-depth cultivation.

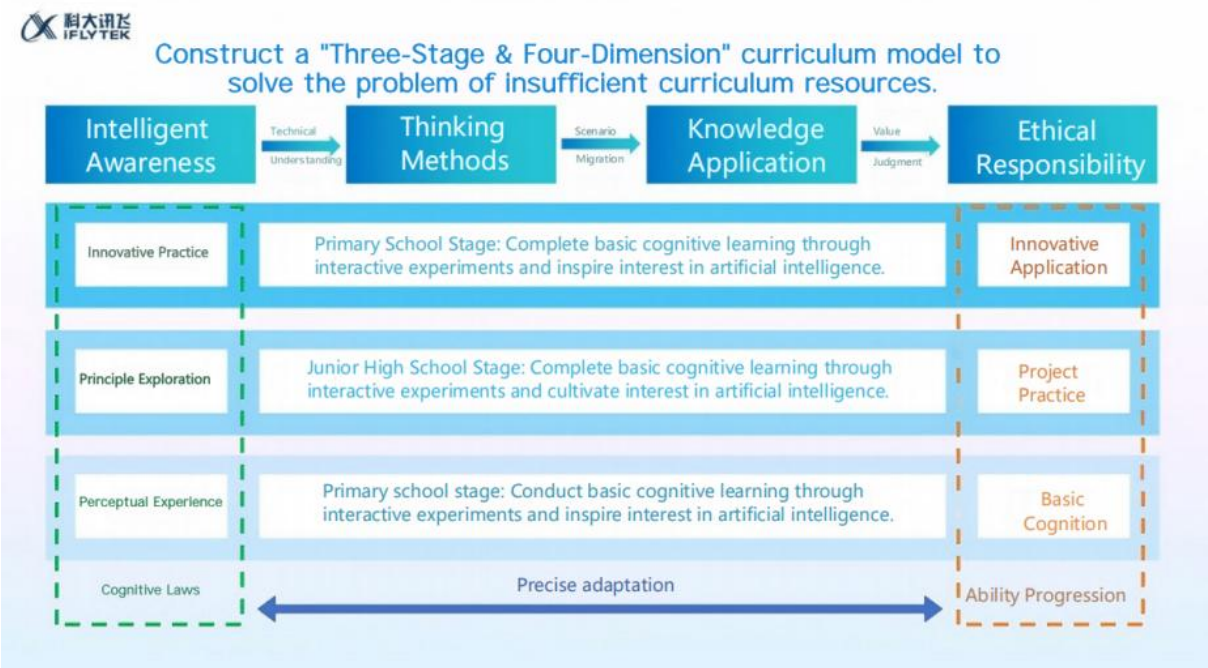

Fig. 13 "Three Stages & Four Dimensions" Curriculum Model

Innovation in Teaching Mode: Pioneering the Teaching Model of "Dual-teacher Empowerment and Micro-project Driving"

According to Survey by Tianjin Academy of Educational Science in 2025, in response to the practical dilemma that "74.9% of schools are faced with a shortage of teachers", the dual-teacher model integrates standardized teaching by virtual teachers with personalized guidance by offline on-site teachers to reshape classroom teaching scenarios. Virtual teachers undertake the explanation of professional knowledge, while offline teachers focus on classroom organization and personalized tutoring, enabling teachers of non-information technology subjects to be quickly competent in relevant teaching. Taking real-life scenarios such as intangible cultural heritage protection and intelligent transportation as carriers, micro-projects decompose technical knowledge points into actionable task modules and integrate interdisciplinary inquiry activities, such as Artificial Intelligence plus Chinese, Artificial Intelligence plus Biology.

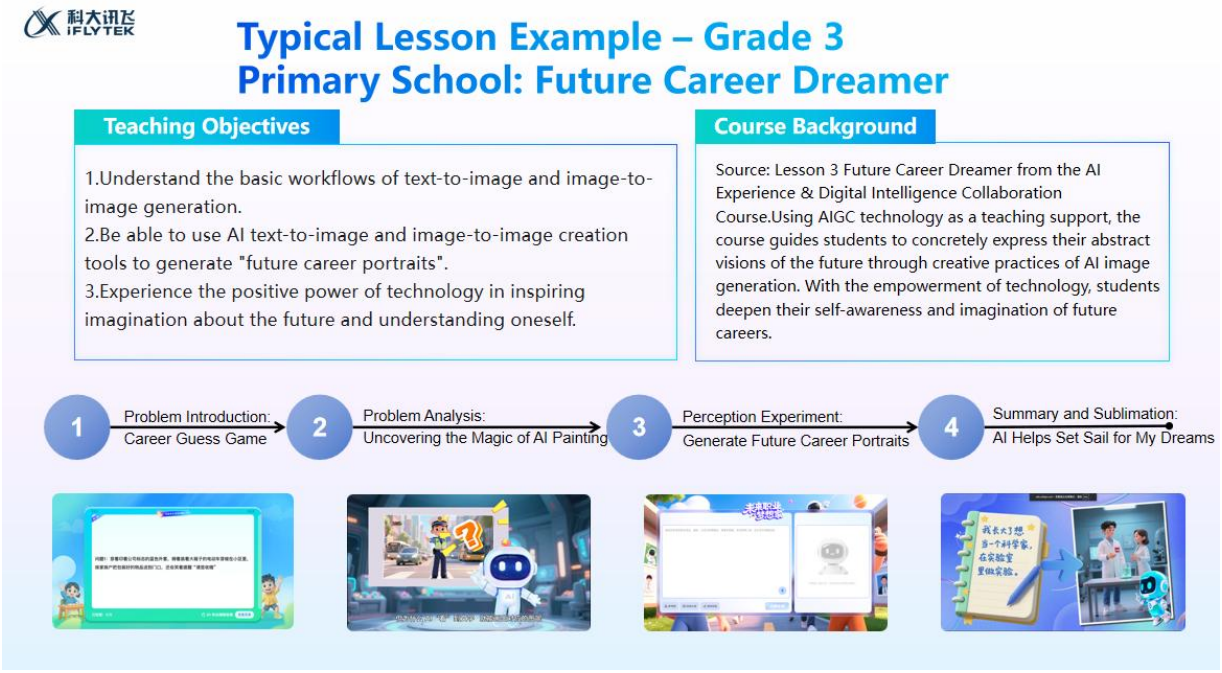

Fig. 14 Typical Lesson Example of the "Dual-Teacher Empowerment + Micro-Project Driven" Teaching Mode

Innovation in Technical Solution: Building a Lightweight and Low-Threshold Technical Framework

A survey indicates substantial disparities in digital infrastructure among 127 primary and secondary schools across eastern, central and western China. Addressing the pain points of urban and rural schools, namely high hardware investment costs and a prominent gap in equipment allocation, this solution achieves course delivery with three kinds of limitation through technological breakthroughs:

No dedicated hardware required: The platform can run in ordinary classrooms, with a built-in virtual laboratory replacing physical devices. Erlangmiao Primary School has delivered high-quality teaching without any specialized AI equipment.

No specialized teachers required: The dual-teacher model and visualized tools enable non-information technology teachers to get started quickly. All Chinese, mathematics and other subject teachers at Xuelin Primary School can conduct independent teaching.

No high investment required: The lightweight design greatly reduces school procurement costs, making the popularization of artificial intelligence education shift from high-threshold deployment to low-cost and replicable implementation.

This technical solution enables rural and urban schools to compete on an equal footing and provides a feasible pathway for bridging the digital divide.

Breakthrough in Technology Application: Realizing In-depth Integration of AIGC with Teaching Scenarios

By embedding large model technology into curriculum and experimental sessions, customized AI Q&A assistants for primary and secondary schools are developed to support students' personalized questioning and instant feedback. Meanwhile, abstract algorithms are transformed into tangible interactive experiences, lowering the threshold for technical understanding. Pilot results show that 93% of students can accurately restate the basic principles of artificial intelligence, which significantly boosts classroom engagement.

Application Scenarios

Application Environment and Implementation Targets

This solution features a wide scope of adaptation and satisfies the demands for general artificial intelligence literacy education in primary and secondary schools across regions and with diverse school-running conditions. It requires no dedicated venues or high-end equipment and delivers outstanding compatibility.

In terms of hardware environment, only ordinary classrooms, basic computers or tablets and network access are needed, with no specialized AI hardware required. Schools can choose the hardwaresoftware integrated mode or the pure software mode according to their funding conditions.In terms of software environment, the platform supports multiple operating systems such as Windows and Android, is compatible with existing campus information facilities, enables rapid deployment and launch, and avoids large-scale campus information transformation.

The implementation targets cover three groups:First, student groups. It serves students across primary, junior high and senior high schools, adapts to the cognitive development rules of learners at different ages, and accommodates the learning needs of students in high-quality urban schools and under-resourced rural schools.Second, teacher groups. It mainly supports non-information technology teachers in primary and secondary schools, such as Chinese, Mathematics, Morality and the Rule of Law, etc. as well as information technology teachers by providing standardized teaching support and competency training.Third, educational institutions. It includes administrative education authorities at all levels, teaching and research institutions, as well as primary and secondary schools. It provides overall support for the large-scale advancement of regional AI education and helps build a promotion ecosystem of "regional overall planning - school implementation - achievement radiation".

Typical Application Case Examples

Taikang County, Henan Province, China: Artificial Intelligence Introductory Teaching in Disadvantaged Rural Schools

To address the dilemma of small-scale rural schools featuring no prior AI curriculum experience, no dedicated equipment and no specialized teachers, this solution has been implemented at Erlangmiao Primary School in Taikang County.Relying on the standard general literacy education platform, the system can be deployed in ordinary classrooms without additional dedicated hardware.Teachers commented: "In the past, students found it difficult to understand abstract concepts; now, the platform visualizes these concepts intuitively and greatly boosts their learning interest."The research team led by Professor Zhao Huichen, Vice Dean of the College of Education, Henan University, participated in the whole-process observation and evaluation. They pointed out that the platform converts abstract algorithms into visualized operations, effectively lowering the cognitive threshold.The principal stated that the platform visualizes abstract concepts, fulfills rural children's dream of receiving AI enlightenment, and effectively narrows the digital literacy gap between urban and rural students. This practice verifies the adaptability and practicality of the solution in resource-scarce scenarios.

Shunyi District, Beijing, China: Regional Large-scale Popularization and Promotion

To advance the full coverage of artificial intelligence education across the region, this solution has implemented a promotion model featuring municipal overall planning – regional linkage – inter-school collaboration in Shunyi District. At the regional level, an inter-school resource sharing platform is built based on the solution. District-wide teacher training and teaching research activities are organized, enabling full participation of teachers from all 54 local schools.At the school level, relying on the "Three Stages and Four Dimensions" curriculum system and the dual-teacher model, regular general artificial intelligence courses are offered. Interdisciplinary AI teaching and research groups are established to accumulate high-quality exemplary lessons. At the teacher level, educators can access standardized lesson preparation resources, learning analytics feedback and personalized training via the platform, so as to improve their teaching proficiency efficiently.

From November to December 2025, all 54 schools in Shunyi District realized the regular delivery of relevant courses, covering over ten thousand teachers and students. A replicable regional promotion model has been formed, which demonstrates the solution's implementation capacity in large-scale scenarios.

Results and Cases

After multiple rounds of pilot trials and large-scale promotion, this solution has achieved remarkable teaching results and accumulated solid practical experience. Pilot statistics show that 84.62% of teachers agree that the curriculum content matches students' cognitive level, and 92.31% recognize the effectiveness of the dual-teacher teaching model and the ease of platform operation.In the pilot program at Yingzhou Branch of Hefei High-tech Innovation Experimental Primary School Education Group, inquiry activities were carried out 134 times on average per lesson, experiments and tool applications were used 236 times, with average usage of 5.9 times among students. This has transformed classroom teaching from the passive mode of "watching videos and listening to concepts" to the active mode of "hands on practice and innovative application".

As of now, the solution has been replicated and promoted across 15 provinces, municipalities and autonomous regions nationwide, enabling routine teaching in more than 1,000 participating schools.In the autumn semester of 2025, over 80 provincial, municipal and district-level teacher training sessions were organized, covering more than 2,000 teachers and accumulating 180 high-quality exemplary lessons.From August to December 2025 in Beijing, courses were offered in over 500 schools across 10 districts. The initiative trained more than 670 teachers, benefiting over 20,000 teachers and students. The platform's AI capabilities were invoked 810,000 times, and tool experiments were conducted 90,000 times. Internationally, the solution has been launched in Malaysia and Uzbekistan and gained recognition from local education communities.

As a pilot school for “AI + Education” in Zhejiang Province, Xuelin Primary School in Qiantang District, Hangzhou, conducted the pilot and promotion of general artificial intelligence literacy education from January to December 2025. The pilot covered 12 classes and over 500 students. A teaching team of 10 members was established, among whom 8 were non-information technology teachers. Regular teaching was arranged for 4 class hours per semester, and the practical experience has been gradually extended to the whole Qiantang District and 13 districts and counties of Hangzhou.The pilot has achieved outstanding core outcomes. It effectively addresses the shortage of teachers who are proficient in AI and enables the 8 non-specialist teachers to deliver independent instruction. It also greatly improves students’ AI literacy, allowing them to proficiently participate in virtual experiments and project inquiry. Several student works won awards in regional exhibitions.The school has formed practical experience featuring “dual-teacher instruction plus interdisciplinary teamwork”, which has been promoted across the district and the city, accelerating the comprehensive popularization of general AI literacy education in Hangzhou. Relevant practices have been reported by media including Xinhua News Agency and China Education Online, establishing it as a benchmark case for regional AI education popularization.

Basic Information of the Institution

Consistent with the introduction of iFLYTEK above.

Contact Information

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iFLYTEK AI Vocational Education – Professional Cluster Construction and Talent Cultivation Platform Based on Human-AI Collaborative Teaching

Solution Introduction

Function Overview

The iFLYTEK AI Vocational Education Platform is developed by iFLYTEK to address the needs of the "New Double High" construction in vocational education. It is built on the domestically developed and independently controllable iFLYTEK Spark Large Model, integrates the "Human-AI Collaborative Teaching" theory from Tsinghua University, and connects the entire chain of "Industry–Jobs–Specialties–Curriculum–Talent Quality," systematically solving the challenges of implementing "Job-Oriented Teaching" in vocational institutions.

Module	Core Capabilities
Industry Research System	Multi-source data-driven research, automatically generating industry analysis reports
Professional Cluster Construction Platform	Automatically builds "Industry-Job-Competency-Curriculum" four-dimensional maps, intelligently generates talent cultivation plans
Task-Based Teaching Platform	Job-oriented teaching centered on real-world job tasks, enabling Human-AI collaboration
AI Innovation Center	Intelligent agent creation and editing, with 30+ built-in AI tools
Vocational Education Large Model Foundation	Integrates multimodal teaching data with the iFLYTEK Spark Large Model

Table 1 Modules and the core capabilities of the platform

Technical Highlights

Human-AI Collaborative Task-Based Teaching – Driven by Job Competency Maps, AI Automatically Constructs Teaching Tasks

① Multi-dimensional Authoritative Industry Research: Collects 56 indicators across four dimensions (Industry, Enterprise, Job, Specialty), with data sourced from official institutions including the Ministry of Industry and Information Technology, Ministry of Education, and Ministry of Human Resources and Social Security, supporting monthly dynamic updates.

② Job Competency Map Driven: Automatically constructs a four-dimensional "Industry-Job-Competency-Specialty" map, enabling precise alignment between talent cultivation and industry needs.

③ AI Automatically Deconstructs Typical Work Tasks: Tasks originate from national occupational standards. AI automatically evaluates coverage based on competency maps and deconstructs them into learning tasks (including objectives, steps, and evaluation criteria), with teachers retaining review rights to achieve Human-AI collaboration.

④ Competency Illumination Closed Loop: Upon task completion, corresponding competency map nodes are automatically illuminated, generating job adaptability evaluations, achieving a visual closed loop of "Learning Process → Competency Achievement."

⑤ Task Library Accumulation: Completed tasks are accumulated into a task library for reuse and iteration, supporting transformation into teaching intelligent agents.

Advantage	iFLYTEK AI Vocational Education	Competitors
Data Sources	Official institutions, 56 indicators, dynamic updates	One-time research, static reports
Task Generation	AI automatic deconstruction + human review, quantifiable coverage	Manual design only, not scalable
Competency Closed Loop	Task completion → Map illumination → Real-time job adaptability evaluation	Unable to achieve closed loop
Official Endorsement	Collaborative research project with Ministry of Education's Vocational Education Center	Lack of authoritative support

Table 2 Core Advantages

Application Scenario

Application Environment and Implementation Targets

This solution is primarily applied in vocational colleges and applied undergraduate institutions in China and globally. The implementation environment requires basic campus network infrastructure and digital teaching environments with computer/mobile terminal access. Target users include:

Institution Administrators: Macro-level decision support and effectiveness evaluation tools for professional cluster construction.

Program Directors: Intelligent assistance platforms for program planning and talent cultivation plan development and optimization.
Teachers: AI tools and rich job-task resources covering the entire process of lesson preparation, teaching, and evaluation.
Students: Personalized, task-oriented learning paths and 24/7 AI learning companions, supporting job-oriented and self-directed learning.

Typical Application Scenarios

Scenario 1: Professional Cluster Construction and Dynamic Optimization of Talent Cultivation Plans (China·Henan Polytechnic Institute)
Pain Point: The Electronic Information Engineering Technology professional cluster faced challenges in accurately aligning with regional industry needs, rapidly responding to job changes, and scientifically validating talent cultivation plans.
Implementation: Using the platform's "Industry Research System" and "Professional Cluster Construction Platform," the school automatically collected and analyzed data from 4 industries, 22 partner enterprises, and 42 job positions in Henan and surrounding areas, identifying 174 core competencies. Based on this, AI intelligently generated and dynamically revised talent cultivation plans for 5 specialties within the cluster, generating optimization suggestions by comparing against national teaching standards via the "Talent Cultivation Plan Optimization Agent." These job competencies were then directly used to guide classroom teaching, achieving precise mapping from industry needs to teaching implementation.

Scenario 2: Task-Based Teaching Driven by Job Competency Maps (China·Changsha Vocational and Technical College)
Pain Point: When conducting project-based teaching, teachers struggled to obtain typical work tasks and engineering cases from real job positions, relying on experience for instructional design, leading to a disconnect between teaching content and actual work scenarios.
Implementation: Using the platform's "Task-Based Teaching" module, the school automatically transformed 31 job positions and 268 core competencies, jointly identified with partner enterprises, into teachable "learning tasks" via the "Learning Task Generation Agent." Taking "Excavator Hydraulic System Fault Diagnosis" as an example, AI automatically deconstructed it into progressive learning tasks: "Principle Cognition → Simulation → Component Testing → Complete Machine Troubleshooting." Teachers could directly integrate these tasks into project-based courses. Students simulated real work processes by completing task sheets, with the AI teaching assistant providing guidance and answering questions throughout the process. After task completion, the corresponding job competency map nodes were automatically illuminated, allowing students to see their job adaptability changes in real time. This model significantly improved the relevance of teaching content to job requirements and enhanced student motivation and learning outcomes.

Outcomes and Case Studies

Implementation Outcomes, Evaluation Data, and Practical Experience

The platform has been implemented in 11 pilot institutions under the Ministry of Education's "Research on Artificial Intelligence Applications in Vocational College Smart Campuses" and multiple "New Double High" construction institutions, serving over 1,000 teachers and 50,000 students, achieving significant results:

Improved Professional Construction Efficiency: At Henan Polytechnic Institute, the cycle for revising talent cultivation plans was shortened from the traditional 3-6 months to within 2 weeks, an efficiency increase of over 80%.

Enhanced Precision of Teaching Resources: At Yunnan Vocational College of Mechanical and Electrical Technology, the platform helped the Electrical Automation Technology professional cluster identify 16 job positions and 1,754 core competencies, automatically matching relevant teaching resources, improving resource precision by over 60%.

Improved Student Learning Outcomes: At Changsha Vocational and Technical College, student satisfaction with courses increased from 85% to 94%, and participation in job-related competitions saw a 20% increase in award rates. Through the platform's "Job Adaptability Dynamic Assessment," students could clearly see their gaps relative to target positions, enhancing learning motivation.

Deepened Professional Cluster Development: At Changsha Vocational and Technical College, the platform supported the construction of an "Industry-Job-Competency-Specialty" map covering 6 specialties and 61 courses, linking 1 industrial chain, 9 industries, 14 job clusters, and 25 enterprises, summarizing 47 typical work tasks and identifying 67 skill points and 58 knowledge points.

Intelligent Agent Development: The college co-developed 58 specialized intelligent agents with iFLYTEK, creating three types of deep integration scenarios (task-based teaching, competency training, intelligent evaluation), improving curriculum construction and teaching implementation efficiency by over 40%.

Talent Cultivation Quality: At Changsha Vocational and Technical College, the 2025 graduate initial employment rate exceeded 90%, with a related-field employment rate above 76%. Employer satisfaction reached 97.56%, and student satisfaction reached 95.12%.

Replicability, Sustainability, and Promotion Potential

Replicability: The solution is based on a standardized SOP covering seven stages: "Requirement Definition → Computing Infrastructure Preparation → Corpus Data Preparation → Model Training → Agent Development → Operation Optimization." This model can be flexibly configured according to the industrial characteristics and specialty settings of different regions and institutions, offering high replicability.

Sustainability: The platform adopts a "School-Enterprise Co-construction, Continuous Operation" model. Through the "Artificial Intelligence Education Management Service Center," it enables data sharing and model iteration, creating a positive cycle of "Data → Model → Application." The built-in intelligent agent creation tools encourage institutional innovation, forming sustainable endogenous development momentum.

Promotion Value: This solution precisely responds to the global demand for high-quality vocational education and industry-education integration. Its "Job-Oriented Teaching" philosophy and "Human-AI Collaboration" technical path provide a reference and replicable Chinese solution for developing countries and regions facing the challenge of mismatched talent supply and industry needs.

Typical Case Study

Case Name: Changsha Vocational and Technical College – "Vocational Large Model Empowering Mechanical Manufacturing and Automation Professional Cluster" Project

Implementation Period: March 2025 – June 2026

Location: Changsha, Hunan, China

Scale: Focused on the Mechanical Manufacturing and Automation professional cluster, covering the entire school.

Key Outcomes:

① Map Construction: Identified 19 job positions and 1,046 competency items, built 1 industry map, linked 31 job positions in the job map, summarized 47 typical work tasks in the competency map, and created 6 specialty maps, achieving "Job-Oriented Teaching and Learning."

② Teaching Model Innovation: Established a new paradigm of "Human-AI Collaborative Task-Based Teaching," automatically deconstructing real-world tasks like "Excavator Hydraulic System Fault Diagnosis" into progressive learning tasks with AI assistant support.

③ Improved Talent Quality: In 2025, graduate initial employment rate exceeded 90%, related-field employment rate exceeded 76%, employer satisfaction reached 97.56%. Students won 1 Bronze Medal at the World Skills Competition and 2 First Prizes at the provincial level.

④ Outcome Dissemination: Led the establishment of the Changsha Advanced Equipment and Intelligent Manufacturing Industry-Education Integration Consortium. The project's outcomes were shared as a typical case at Tsinghua University to Ministry of Education leaders and peers. The national online quality course "Mechanical Drawing" was adopted by over 200 institutions across the country. The "Chinese + Vocational Skills" project was launched in Indonesia, exporting curriculum standards and training packages.

Display Materials

Product Architecture Diagram: Based on the Vocational Education Large Model Foundation, supports dynamic adjustment of talent cultivation plans, panoramic data analysis of industries/professions/jobs, deep deconstruction of job competency maps, and implementation of Human-AI Collaborative Teaching to meet the scenario requirements of the "New Double High" construction.

Fig. 15 Product Architecture Diagram

Fig. 16 Student End: Task-Based Learning

Learning Interface Diagram: Shows the application form of students conducting task-based learning, AI Q&A, and job competency benchmarking via mobile devices.

Fig. 17 Exhibition Booth Layout Diagram

Display Requirements: Approximately 15 square meters of exhibition space, equipped with high-definition display screens (for demonstrating platform operation), touchscreen all-in-one devices (for visitor experience), and display boards (showcasing core values and cases). The environment requires stable network connectivity and basic power support.

Institutional Background

Consistent with the introduction of iFLYTEK above.

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iFlytek AI Learning Machine - An Intelligent Educational Device for Personalized Learning

Solution Introduction

Function Overview

Equipped with the self-developed Spark Large Model, the iFlytek AI Learning Machine builds core functions such as AI Precise Learning, AI Q&A Tutoring and AI Enhancement Courses based on advanced AI algorithms. It has a built-in massive free learning resource library for multiple disciplines, and is equipped with an eye-protecting screen with low blue light features. On the premise of protecting visual health, it provides full-stage learning tutoring from kindergarten to senior high school. Relying on AI large model technology and the technical path of scaled individualized teaching, it can accurately analyze students' learning status, customize personalized learning plans and intelligently recommend learning content, truly realizing individualized teaching and effectively improving students' learning efficiency.

① AI One-on-One Precise Learning: Through multiple rounds of AI interactive inquiry, it actively explores students' knowledge status, learning habits and available time, and generates exclusive learning paths combined with local examination requirements; it diagnoses and traces the root causes of knowledge gaps with a 3D knowledge graph, constructs a personal exclusive knowledge graph, and intuitively presents the mastery level of each knowledge point.

② Heuristic Q&A Tutoring: Realizing the core transformation from "giving answers" to "teaching methods", the AI teacher guides students to independently deduce answers and cultivate logical thinking through progressive heuristic questions, achieving the learning goal of "mastering a type of questions by learning one example".

③ AI Interactive Courses: Building a self-developed personalized curriculum system, covering all disciplines and all stages from kindergarten, primary school, junior high school to senior high school, and designing adaptive interactive forms for different age groups to effectively stimulate students' interest in learning.iFlytek drives the innovation of educational hardware with artificial intelligence technology, focuses on students' personalized learning needs, guides students to explore learning independently, enhances learning interest, and helps artificial intelligence technology empower educational equity.

Technical Highlights and Innovations

The iFlytek AI Learning Machine has built a long-term development mechanism centered on technology-driven, data feedback and ecological content collaboration. Relying on a profound accumulation of professional and technical talents, it has set up an independent Artificial Intelligence Research Institute and an Education and Teaching Research Center, and formed a research and teaching team of over 1,000 people to continuously promote the iterative upgrading of AI technology and teaching resources.

① In-depth Integration of Large Models: Building AI capabilities exclusive to education, integrating the iFlytek Spark Education Thinking Chain with the DeepSeek Visual Thinking Chain to realize in-depth heuristic tutoring; completing the upgrade of natural language interaction, supporting the understanding of complex questions and multi-round dialogue, and achieving a human-like teaching interaction experience.
② Multimodal Perception and Interaction Technology: Creating an immersive learning experience, transforming textbook characters into intelligent learning companions that can communicate, answer questions and guide critical thinking, enhancing the fun and interactivity of learning; supporting multiple forms of interaction such as voice questioning, photo-based problem searching and AR homework, and improving learning efficiency through multi-sensory stimulation; capturing students' learning status with cameras and sensors, dynamically adjusting the learning rhythm, and effectively preventing learning fatigue and distraction.
③ Cognitive Intelligence Technology: Realizing in-depth understanding of educational scenarios, integrating knowledge points of the new curriculum standard to build a disciplinary knowledge network, supporting intelligent recommendation and associated learning; dynamically adjusting the rhythm of knowledge push based on the continuously accumulated learning data to ensure that learning content is highly adapted to students' ability levels; accurately judging the types of students' errors and providing targeted solutions.iFlytek has established in-depth cooperation with more than 50,000 primary and secondary schools across the country. Its data middle platform collects tens of millions of pieces of data on on-campus precise teaching and regional examination feedback every day. Relying on the iFlytek Spark Large Model, it realizes one-on-one precise learning diagnosis and personalized learning planning for terminal users.

Application Scenarios

Application Environment and Target Groups:

Full coverage of educational scenarios:① Family independent learning scenario: Adapting to the full-process learning needs such as pre-class preview, in-class synchronization, after-class homework, review and examination preparation, literacy improvement and health protection;② On-campus auxiliary teaching scenario: Realizing the linkage of smart classrooms and the rapid access to school-based resources, helping to improve the quality and efficiency of on-campus teaching;③ Off-campus tutoring scenario: Focusing on serving rural schools and left-behind children groups relying on education public welfare programs, helping to realize the balanced distribution of educational resources.

Software and hardware environment (taking the flagship new product T90 Pro as an example):① Software resources: Equipped with more than 8,000 AI interactive courses, over 30,000 full-subject synchronous courses, more than 10,000 micro-courses on knowledge points, over 5.6 million sets of real exam papers and secret mock papers, full-subject synchronous electronic textbooks, graded reading resources, more than 2,000 simulated interactive laboratories, and covering literacy content such as KET/PET special training, programming and art; supporting multi-account (for multiple children in a family), parental control, and synchronization and backup of learning data.

② Hardware configuration: 14.8-inch screen with 120Hz refresh rate, adopting 32-megapixel auto-flipping binocular camera, supporting fingertip word checking, test paper shooting, AI correction and sitting posture monitoring; matched with the 3rd generation AI StarFlash stylus, equipped with a 2000mAh battery and 45W fast charging to meet the all-day learning needs.At present, the iFlytek AI Learning Machine has formed a multi-product matrix, serving a total of more than 1.7 million students and covering 32 provinces across the country, becoming the preferred intelligent educational device for parents and students.

Typical Application Scenario Examples

① Zhu Sanxi from Hefei, Anhui: Having used the learning machine for more than 400 days, he regained his learning momentum and got rid of ineffective question brushing, and was admitted to the International Department of Hefei No. 168 High School (a key provincial high school) with a score of 688 in the senior high school entrance examination;

② Tang Zhiyuan from Huai'an, Jiangsu: Having used the learning machine for more than 200 days, he successfully quit his "gaming addiction", planned his learning arrangements rationally, and was admitted to Jiangsu Hongze High School (a key local high school) with a score of 696 in the senior high school entrance examination;

③ Huang Kerui from Yangjiang, Guangdong: Having used the learning machine for more than 500 days, he accessed high-quality educational resources in first-tier cities with the help of the learning machine, greatly improving the efficiency of examination preparation, ranking among the top 50 in the city in the senior high school entrance examination, and being admitted to Guangdong Experimental High School from a fourth-tier city;

④ Luo Zihan from Leiyang, Hunan: Having used the learning machine for more than 700 days, his interest in learning and awareness of independent thinking have been significantly improved, and he has learned to draw inferences about other cases from one instance. He rose from more than 200th in the school ranking to be admitted to Hengyang No.8 High School (a key provincial high school) with a high score of 1016 (full score 1040) in the senior high school entrance examination.

Effects and Cases

Implementation Effects, Evaluation Data or Practical Experience

iFlytek's AI technology is deeply integrated into the whole teaching process, covering links such as large model lesson preparation, multimodal teaching, hierarchical homework and personalized learning. It not only helps teachers implement individualized teaching, increasing the pertinence of homework assignment by 36%, but also helps students reduce inefficient learning time by 55%. Since pioneering the AI one-on-one precise learning model in 2019, it has solved a total of 44.67 million and 59.87 million knowledge weak points for primary and middle school students respectively, saving a total of 13.75 million hours of learning time. Relying on 22 years of in-depth experience in smart education, iFlytek realizes AI one-on-one precise diagnosis of students' knowledge structure through algorithm and big data technology, and plans exclusive learning paths based on the "Zone of Proximal Development" theory.

This solution has covered more than 50,000 schools across the country and established 83 demonstration zones for individualized teaching. After using it, the proportion of inefficient learning of students has decreased by 55%, and their learning enthusiasm has increased by 29%. The industry-leading AI one-on-one precise learning ofthe iFlytek AI Learning Machine is centered on the closed-loop learning model of "Assessment - Learning - Practice". It realizes efficient learning by quickly diagnosing knowledge weak points, planning exclusive learning paths, consolidating knowledge points through drawing inferences about other cases from one instance, matching 3-5 minute micro-courses focusing on unmastered knowledge points, and providing one-on-one detailed explanation of wrong questions. Compared with traditional teaching aids and online courses, the time for checking and filling knowledge gaps in the same chapter is reduced by 64%, and the mastery rate of knowledge points is increased by 3.1 times. (Data source: iFlytek Education Technology Learning Status and Data Platform)

Replicability, Sustainability and Promotion Potential

Replicability: With a wide range of scenario adaptability, it covers 32 provincial-level administrative regions in China, adapts to multiple versions of textbooks and various scenarios such as campuses and families, and helps educational equity; it has been implemented in more than 600 schools in Japan, Singapore and other countries overseas, can be customized to adapt to the education systems of various countries, and meets the educational needs of Southeast Asian countries and countries along the "Belt and Road"; covering all learning stages without repeated development, it adapts to students' full-cycle learning needs.

Sustainability: Forming a positive flywheel of technological iteration relying on the self-developed Spark Education Large Model to continuously upgrade core capabilities; integrating resources from more than 300 prestigious schools and real questions of high school and college entrance examinations in recent years, and linking with local teaching and research institutions to ensure the timeliness and authority of content; building a dual-cycle development model of "C-end + B-end + Public Welfare" to achieve a win-win situation of commercial and social value.

Promotion Potential: It can effectively narrow the gap in regional educational resources, help educational equity, reduce the teaching and learning burden of teachers, students and parents, promote the in-depth integration of AI technology and education, and export China's AI education solutions to the world; there is a strong market demand at home and abroad, and with the core advantages of high cost performance and easy implementation, it has great potential for large-scale promotion and becomes a core carrier for the popularization of AI education.

Description of Typical Cases

iFlytek, in conjunction with the China Youth Development Foundation of the Central Committee of the Communist Youth League, launched the 2025 "iFlytek AI Learning Machine · Project Hope AI Education for a Smart Future" public welfare project and successfully concluded it. The project donated a total of 510 learning machine devices to 29 schools in 4 provinces including Anhui, Yunnan, Guizhou and Sichuan, covering more than 35,000 students according to incomplete statistics, and effectively helping educational equity with artificial intelligence technology.

Display Materials

Fig. 18 Design Renderings of T90 Pro

The picture shows the design renderings of T90 ProCore software and hardware configuration: With the self-developed Spark Education Large Model as the core, it builds a full-scenario and personalized tutoring system; equipped with the highly anthropomorphic AI teacher "Xiaoyue", it can provide accurate error cause analysis and immersive blackboard writing explanation for wrong questions. The content ecology is improved, integrating resources from more than 300 prestigious schools across the country and real questions of high school and college entrance examinations in the past decade, linking with local teaching and research institutions to keep pace with the requirements of the new curriculum standard, and covering all stages from preschool enlightenment to senior high school examination preparation; equipped with 126 AI tutoring tools, supporting multi-language switching and localized curriculum customization, adapting to multiple versions of textbooks in China, and having practical functions such as parental control and learning data statistics.

The hardware end is the world's first eye-protecting screen with beneficial natural light and nano paper-like technology, which deeply simulates the full spectrum of natural light, bionically adds beneficial spectrum, and actively nourishes vision; matched with the 3rd generation StarFlash AI stylus, it supports direct answering and correction of all types of questions on the screen, with over 10,000 levels of pressure sensitivity and magnetic wireless charging; the flagship combination of AI smart four cameras, including a 32-megapixel + 13-megapixel auto-flipping binocular camera, features clearer recognition and more accurate correction; a 12000mAh large-capacity battery, 12GB+512GB large storage, combined with a CNC integrated all-metal body, which is sturdy, durable, beautiful in appearance.

Basic Information of the Institution

Consistent with the introduction of iFLYTEK above.

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3. NetDragon Websoft Holdings Limited

OpenQ: AI-Driven Global Learning and Content Production Infrastructure

Solution Introduction

Function Overview

Artificial intelligence is reshaping the way knowledge is produced and disseminated. From UNESCO's report Reimagining Our Futures Together: A New Social Contract for Education to the inclusion of AI-empowered education in the national strategies of various countries, a global consensus is clear: education systems urgently need to move from "resource digitization" to "capability intelligence." However, this transition is blocked by three real-world bottlenecks – content production remains at a "handicraft workshop" stage, the "one-size-fits-all" standardized delivery cannot address individual differences, and there is a significant time lag between vocational education and industry needs. These three bottlenecks are interlocked. To break this deadlock, we need not just a better tool, but an AI-native educational infrastructure that runs through the entire chain of content production, intelligent learning, and industry-education collaboration. OpenQ is an integrated technological response to the above challenges.

OpenQ is a one-stop AI-empowered education platform for learning and content production. With core capabilities such as multi-agent team collaboration, UGC educational co-creation, and personalized intelligent learning companions, it builds a modular AI learning infrastructure to achieve full-chain AI education upgrades -- from intelligent learning and content production to a growth system. Leveraging core technologies such as large language models (LLMs), the platform creates an AI content production pipeline that can generate, at scale, learning objectives, syllabi, courseware, assessments, and various other educational materials. Combined with a multilingual localization engine, it supports cross-regional adaptation and distribution of educational content. The platform integrates a gamified learning platform and a content distribution system, supports an online + offline hybrid infrastructure, and incorporates a human-AI collaborative review mechanism to ensure content quality. The core functions cover four dimensions:

- Multi-agent collaborative orchestration – Through a one-stop AI toolset, it supports the entire process of educational content creation, learning task decomposition, etc., significantly improving teaching, research, and learning efficiency.
- Cross-product account integration – It uniformly accumulates learning data, honor certifications, and growth trajectories, forming personal and accumulative educational assets.
- UGC educational co-creation ecosystem – It builds an open educational content library, enabling the democratization and continuous iteration of educational content.

- AI intelligent learning companion services – It dynamically generates personalized learning paths for each learner, using Socratic guidance plus emotional companionship to deliver personalized, continuous, and adaptive intelligent education services.

At the same time, the platform integrates onestop AI learning tools such as writing, translation, summarization, and Q&A. It supports a unified honor and certification system (course certificates, learning badges, etc.), and provides automated learning services such as exercise grading and mistake summarization. From content production to learning implementation, it systematically addresses core pain points in global education: content shortage, low efficiency, and lack of equity, thereby enabling equitable and highquality learning across different educational environments worldwide.

Technical Highlights and Innovations

- Multiagent collaborative architecture technology to build an education efficiency engine – Based on a multiagent team collaborative orchestration mechanism, it enables intelligent allocation and task collaboration among AI tools. It can support the entire process of educational content creation, learning task decomposition, resource matching, and execution in one stop, breaking the capability boundaries of a single AI tool, significantly improving overall learning and teaching efficiency, and achieving intelligent reconstruction of educational workflows.
- Fullchain content production technology driven by large language models – Leveraging the core capabilities of LLMs, it builds an endtoend AI content production pipeline that supports scalable and standardized generation of learning objectives, syllabi, courseware, assessments, and other educational content. Combined with automated AI instructional design technology, it makes instructional design intelligent and highly efficient, solving the industry pain points of low efficiency and difficulty in scaling traditional content production. At the same time, a humanAI collaborative review mechanism ensures content quality and professionalism.
- Multilingual localization engine technology – It provides multilingual localization capabilities adapted to different regions around the world, enabling rapid translation, cultural adaptation, and regional adjustment of educational content. It supports crosscountry, crosslanguage content distribution, removes language barriers, and makes highquality educational content accessible to diverse educational environments globally, especially meeting the content needs of lowresource education regions.
- Agent dynamic path planning technology – Based on multi-dimensional user information (learning data, ability level, learning goals, etc.), the agent dynamic path planning algorithm generates personalized learning paths for each learner. Combined with Socratic guidance logic (guiding learners to think independently through questioning, elicitation, and further questioning, rather than giving direct answers), it shifts the learning model from "passive indoctrination" to "active inquiry."
- Full-chain account integration and unified growth-hub technology to build a lifelong education foundation – It achieves cross-product account integration and builds a unified growth hub that uniformly accumulates and manages users' learning data, honor certifications, and growth trajectories, forming accumulative, continuous, and progressive personal educational assets. It creates a lifelong educational growth system, enabling effective accumulation and connection of learning outcomes.

Application Scenarios

Application Environment and Implementation Targets

This solution is applicable to a wide range of educational scenarios, including K-12 education systems, vocational education institutions, lifelong learning platforms, national-level digital education platforms, and international education cooperation projects. The hardware environment supports common terminals such as standard computers, tablets, and mobile phones. It is adaptable to both online cloud deployment and offline on-premises deployment. The software environment can be integrated into various existing education platforms without the need for complex system modifications. With a network bandwidth of 20 Mbps or above, large-scale deployment can be achieved, enabling rapid implementation in both high-resource and low-resource educational environments. The solution serves the following user groups: K-12 students, teachers, and educational institutions; job-oriented learners and vocational school teachers/students in the vocational education field; adult learners in lifelong learning communities; operators and users of national or regional digital education platforms; and cross-regional educational institutions and learners involved in international education cooperation. In particular, it addresses the core demand for high-quality educational content in low-resource education regions.

Examples of Typical Application Scenarios

Scenario 1: Scalable Curriculum Content Production and Personalized Learning in K-12 Education Systems

K-12 schools and educational institutions use the AI content production pipeline of the OpenQ platform to quickly generate syllabi, courseware, exercises, assessment papers, and other materials aligned with curriculum standards. This significantly reduces teachers' lesson preparation workload and addresses the shortage of high-quality teaching content. The illustrated "Story Scroll AI Production Line" – combined with traditional short-video production logic – innovatively deconstructs and builds a full-chain AI production model consisting of: "intent analysis → script outline → styling & props → script → storyboard → prompts → images → TTS → video." This breaks the limitations of traditional production processes and enables the scalable generation of content such as classical poetry and narrative stories.

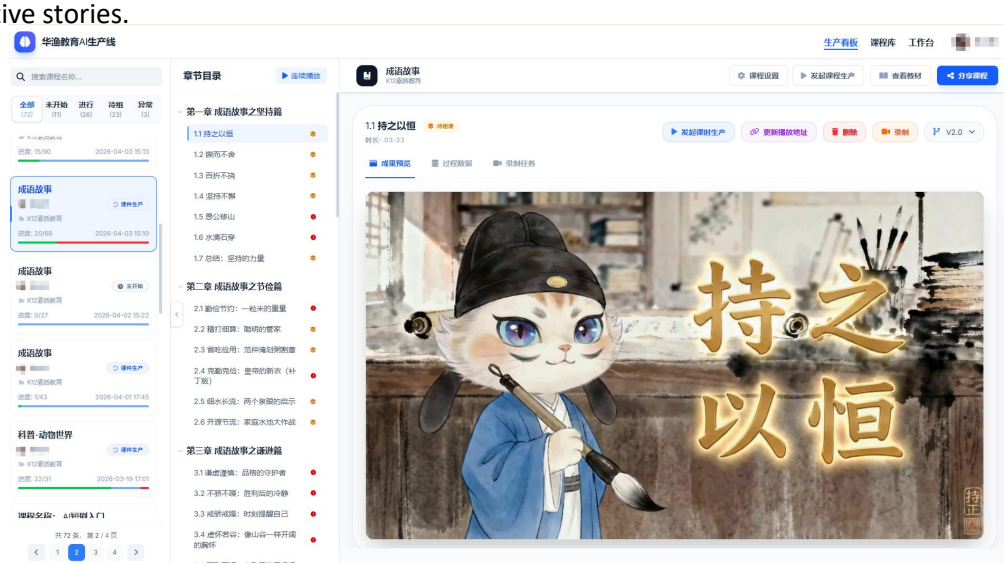

Fig. 1

At the same time, the platform generates personalized learning paths for students, intelligently allocates study plans, and automatically grades exercises and summarizes mistakes. The AI learning companion provides real-time encouragement, procrastination reminders, and emotional support, while offering targeted tutoring on students' knowledge weak points. Through Socratic guidance, it inspires students to solve learning problems on their own, thereby improving learning efficiency and independent thinking skills. Teachers can view student learning data on the platform to achieve precision teaching.

Scenario 2: Vocational Education and Lifelong Learning – Job-Oriented Course Development and AI-Driven Industry-Academia Co-Creation

(1) Rapid Development of Job-Oriented AI Courses

Vocational education institutions and adult learning platforms leverage OpenQ's multi-agent collaborative architecture and content production capabilities to quickly develop tailored vocational courses that meet the competency requirements of different job roles. These courses cover a full range of content types, including video scripts for courses, illustrated handouts, knowledge cards, etc. The platform combines job competency requirements to formulate personalized career advancement paths for learners. It integrates AI learning tools such as translation, summarization, and Q&A to help learners rapidly master job-related knowledge and skills. At the same time, it provides unified competency ratings and course certificates, enabling standardized certification of learning outcomes and adapting to the fragmented, personalized learning needs of lifelong learners.

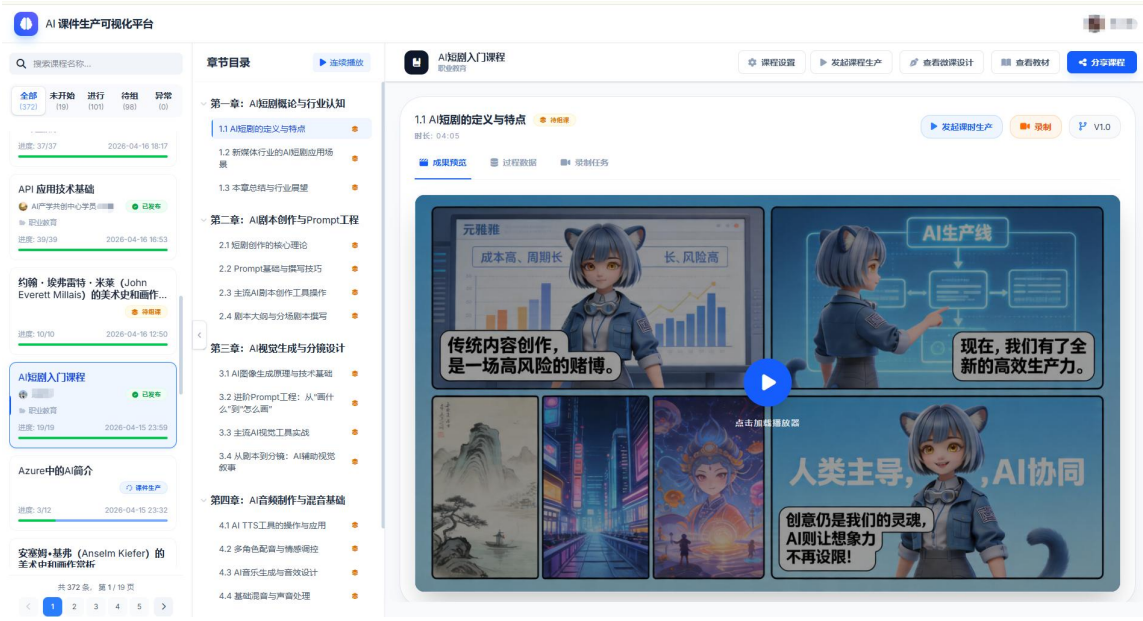

Fig. 2

(2) AI Industry-Academia Co-Creation – From "Learning Ends When the Course Ends" to "Putting Learning into Practice"

The core differentiator of OpenQ in the vocational education scenario is that it goes beyond mere course learning and establishes a complete closed loop from learning to real-world industrial practice. Relying on the OpenQ platform, NetDragon has partnered with universities to establish an "AI Industry-Academia Co-Creation Center", building a four-stage closed loop of "Learn – Practice – Create – Accumulate":

- "Learn" – Precision Skill Development. For university and vocational college students majoring in digital media, software technology, animation production, and related fields, OpenQ offers industry-level AI technology and 3D content production courses. These courses are jointly developed by corporate project experts and college instructors, reverse-engineered based on real project requirements, and cover core skills such as AI-assisted content creation, 3D resource modeling, and production of educational short videos.
- "Practice" – Immersive Hands-On Training. By building a metaverse practice platform for resource production, students form project teams in a virtual collaborative environment and simulate the entire workflow of a real corporate work setting (requirements analysis → content production → quality review → delivery and acceptance). The platform incorporates a progressive competency certification system. After completing the training, students receive a quantifiable "digital skills profile" that serves as the entry criterion for undertaking real projects.
- "Create" – Real-Project Co-Creation. Students who pass the certification formally undertake real production tasks from NetDragon's Resource Production Management Center – including product-level educational short videos, 3D teaching resources, and AI-assisted courseware. The platform intelligently matches projects based on the skills profile. Student outputs are first reviewed by AI quality inspection and then by corporate mentors for final approval, ensuring they meet commercial standards. Students receive compensation, experience, and a portfolio, while the company gains a manageable, high-quality human resource – achieving "increased income and enhanced capabilities for students, and cost reduction and efficiency improvement for the company."
- "Accumulate" – Standardized Model Codification. The entire process experience is systematically summarized to form a reusable "AI Industry-Academia Co-Creation Model Library" (including complete standard documentation for platform setup, course design, project management, and competency certification), enabling new partner institutions to quickly replicate and integrate. Cases and experience accumulated through co-creation are fed back into the OpenQ course system, creating a virtuous cycle of "industrial practice enriching teaching content.

(3) Unified Competency Rating and Standardized Certification

Throughout the entire process described above, OpenQ provides a unified competency rating and course certificate system: objective, quantifiable competency ratings are generated based on multi-dimensional information (learning data, training performance, project delivery quality, etc.); learners receive standardized course certificates with traceable and verifiable outcomes; and through the unified growth hub, all records are accumulated as a lifelong learning portfolio that accompanies the learner's career.

Scenario 3: Large-Scale Digital Construction of National-Level Digital Education Platforms

National or regional digital education platforms integrate the AI content production, multilingual localization, and content distribution capabilities of the OpenQ platform to rapidly build a large-scale, high-quality educational content repository, supporting multilingual adaptation and cross-regional distribution, thereby breaking down digital divides and geographical barriers.

Through hybrid infrastructure support, the platform enables the integration of online cloud learning and offline localized learning, adapting to different network and hardware conditions across regions. At the same time, relying on a unified growth hub, it establishes personal education asset profiles for learners nationwide, achieves crossplatform interoperability of learning data, promotes educational equity and inclusiveness across the country, and builds a nationallevel digital education public service system.

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

Quantitative Evaluation Data:

As an AI-driven global learning and content production infrastructure, OpenQ addresses the common pain points in the global digital transformation of education, such as insufficient content supply, weak personalization, and a lag in industry-education matching. It has been implemented in scenarios including K-12 education, vocational education, lifelong learning, and national-level digital education platforms, achieving quantifiable, verifiable, and replicable practical results.

At the individual level: First, content production efficiency has been greatly improved. Leveraging the AI content production pipeline and multi-agent collaborative technology, the efficiency of educational content production has increased by more than 80%. The platform can generate thousands of courseware/learning materials per day on a single platform, significantly reducing the cost of teaching, research, and content development. Second, the learning experience and outcomes have been significantly optimized. Personalized learning paths and AI learning companion services have increased learner engagement by more than 60%, while independent thinking skills and knowledge mastery have been markedly enhanced, achieving a transition from "standardized learning" to "personalized learning."

At the organizational efficiency level, especially in vocational education scenarios, OpenQ's "industry-education collaborative content production model" has achieved triple improvements in efficiency, cost, and quality. Relying on the LLM-driven full-chain content production pipeline, the efficiency of course content production has increased by more than 80%. The cost of university-enterprise collaborative content production is 50% lower than market prices. The UGC co-creation ecosystem has already accumulated over ten thousand high-quality educational resources.

Data from the pilot at Fuzhou Vocational College of Software Technology shows that teachers and students co-created more than 1,800 high-quality training resources, with marginal production costs reduced to the hundred-yuan level. Students' training outcomes are directly transformed into commercially usable educational resources, forming a shareable vocational education resource library and a sustainable closed loop of "teaching input → outcome output → revenue feedback."

At the macro level: First, educational equity has been effectively advanced. Through the multilingual localization engine and hybrid infrastructure support, the accessibility of high-quality educational content has improved, effectively bridging the educational content gap in low-resource regions and promoting the inclusive sharing of global educational resources. Second, an educational ecosystem has been initially established.

The UGC educational content cocreation ecosystem has attracted a large number of users to participate in content creation, forming a continuously iterating open educational content library, which has already accumulated over ten thousand highquality educational resources, achieving the cocreation of educational content by all and inclusive access. Third, benchmark collaborations have been established in multiple scenarios. A partnership has been formed with ByteDance's Volcano Engine to jointly promote deep cooperation in technology, resources, and ecosystems in China's higher education and vocational education sectors, scaling the production of a new generation of AIGC educational resources and creating a globally cocreated and shared innovative education ecosystem. With the support of the World Bank, a cooperation agreement has been signed with Cameroon's Ministry of Secondary Education to jointly promote the digital transformation of 250 schools across Cameroon.

Replicability, Sustainability and Promotion Potential

This solution demonstrates strong replicability: (1) Technologically, it adopts a modular distributed system architecture with flexible design, enabling seamless integration with various existing education platforms and digital education systems without extensive system overhauls, adapting to different institutions' technical foundations. (2) In terms of scenarios, it can cover all types of educational scenarios including K-12 education, vocational education, lifelong learning, and national-level digital education platforms. It supports multiple languages, is applicable to different countries and regions worldwide, and can be deployed simultaneously in both high-resource and low-resource educational environments, without being limited by geography, resource conditions, or education type. (3) At the deployment level, it supports online + offline hybrid deployment, has low requirements for hardware and network conditions, and enables rapid large-scale deployment and promotion.

In terms of sustainability: (1) The UGC educational content co-creation ecosystem allows ordinary users to participate as education providers in content creation, enabling continuous iteration and updating of educational content, ensuring the library remains current and diverse. (2) Based on cutting-edge technologies such as large language models, the platform can achieve continuous iterative upgrades of its technical capabilities, constantly improving core functions such as content production, personalized recommendation, and intelligent guidance. (3) The full-chain growth hub and honor certification system attract users to engage in long-term learning, forming a sustainable user ecosystem. At the same time, the platform's business and operational models enable self-sustaining revenue generation, ensuring long-term operation and development.

In terms of promotion value, the project closely follows the global trends of digitalization and equity in education, aligning with the core goals of the World Digital Education Alliance to promote educational equity and inclusion and to advance the development of digital public goods for education. It can be scaled up globally among educational institutions, digital education platforms, and international education cooperation projects. It has particularly high application value in low-resource educational regions, providing a demonstrable, referenceable, and scalable practical model for the development of global digital education, thereby promoting high-quality and equitable development of education worldwide.

Basic Information of the Institution

Institution Introduction

NetDragon Websoft Holdings Limited (HKSE: 777) was founded in 1999 and incorporated in the Cayman Islands in 2004, with its IPO completed on November 2, 2007. The company is headquartered in Fuzhou, Fujian, China. NetDragon operates through two primary segments—Gaming and Education. The company develops and operates flagship online games including Eudemons Online, Conquer Online, and Heroes Evolved. Its education business focuses on AI-powered learning solutions, interactive displays, and global EdTech infrastructure. NetDragon's overseas education subsidiary, Mynd.ai, is listed on the New York Stock Exchange. Its interactive displays and software are deployed in over 1 million learning spaces across 126 countries. The company's education products serve more than 150 million users in over 192 nations, including over 20 Belt and Road countries.

Experience or Qualifications in the Field of Digital Education

The company is a key national software enterprise under the national planning layout, a national cultural industry demonstration base, a key national cultural export enterprise, and has been named one of the "Top 30 National Cultural Enterprises" for three consecutive years. It ranked third on Forbes China's "China's Top Potential Enterprises" list of high-growth listed companies and has been listed among the "Top 100 Chinese Internet Companies" for thirteen consecutive years. And it received the "China Copyright Gold Award" in 2025.

In 2018, NetDragon acquired Edmodo, a K-12 learning community platform. Edmodo, a global learning community platform with over 150 million registered users, has been selected as the designated national online learning platform for K-12 education in Egypt and Ghana, and has been listed by UNESCO as a recommended distance learning platform.

Through its education strategic investments in recent years, NetDragon's education footprint has expanded to cover 192 countries and regions, serving over 150 million users and more than 2 million classrooms, establishing a worldwide K-12 education community network and ecosystem.

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EDA in Thailand: AI-Ready Life-long Learning Ecosystem

Solution Introduction

Function Overview

EDA AI-Ready Learning Ecosystem is an integrated, scalable solution designed to transform education from a static, curriculum-centered model into a dynamic, learner-centered ecosystem that bridges formal schooling with lifelong career success. The solution consists of four interconnected pillars:

- AI-Enhanced Classrooms (K-12) – transforms traditional classrooms with ambient AI, voice-activated interactive panels (Promethean), and multimodal learning tools. Teachers gain access to real-time AI-generated content, automated assessments, and gamified lessons, while students learn to use AI productively.
- Self-Paced Learning & Innovation Labs – repurposes classrooms after hours as hands-on innovation spaces. AI tutors provide individualized support, enabling students to master concepts at their own pace; students also engage in AI-assisted "vibe coding" and app development, shifting teachers into mentoring roles.
- Zuno Career Companion – a Gen-Z-focused AI app that delivers personalized upskilling pathways, surfaces in-demand skills, and connects learners to jobs or freelance opportunities. It combines AI-powered recommendations with a human community.
- Blockchain-Based Micro-Credentials – enables industry-co-issued, verifiable credentials stored in a digital wallet (NFT-based). Smart contracts align incentives among corporations, educators, and learners, ensuring credentials are portable, fraud-resistant, and directly tied to market needs.

Educational Pain Points Addressed:

- Rising graduate unemployment – US bachelor's degree holders (20–24) face 29% unemployment; Thailand saw a 72% increase; GCC youth unemployment reaches 26%.
- Skills obsolescence – the average half-life of skills is <5 years (2.5 years in tech), yet university curricula update slowly.
- Ineffective credentials – traditional diplomas are time-consuming to verify, lack portability, suffer high fraud risk, and can be lost if institutions close.
- AI disruption – traditional pedagogy fails to prepare students for an AI-integrated workforce.

Core Value:

The solution positions EDA as a global benchmark for AI-ready learning by delivering a cohesive, proven technology stack that seamlessly connects education to employment. Its core value lies in scalability, interoperability, and public-private alignment: it uses technologies already deployed at massive scale (2M classrooms, 200M LMS users), integrates industry partners as co-creators of credentials, and offers a replicable model for other nations seeking to modernize their education systems.

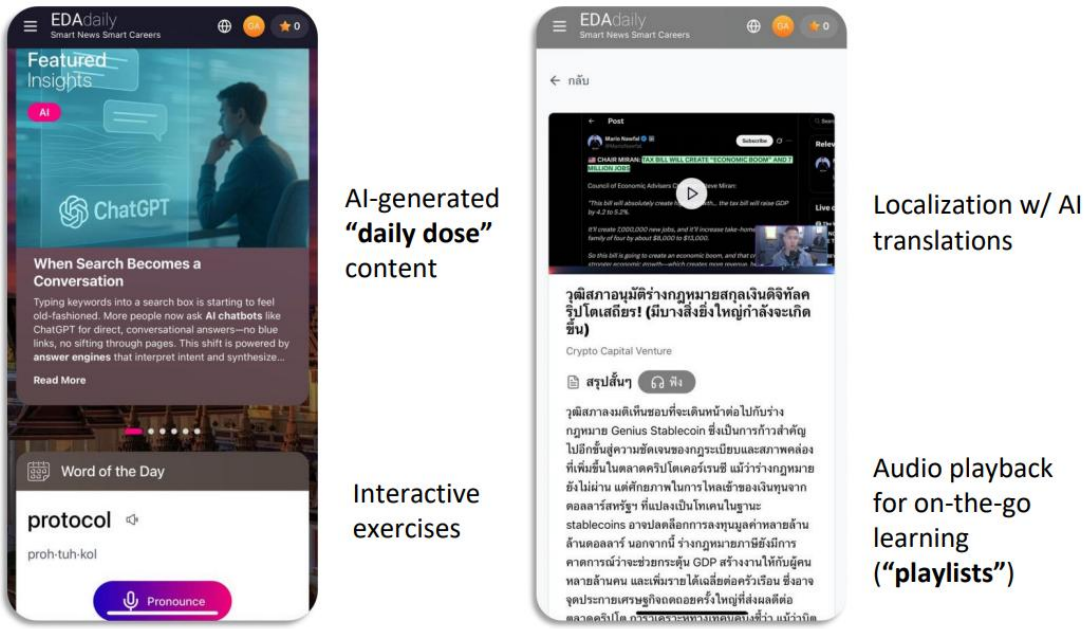


Fig. 3

Technical Highlights or Innovations

1. Proven-at-Scale Classroom Infrastructure

Unlike conceptual AI pilots, this solution builds on hardware and software already deployed globally:

- Promethean interactive panels – used in 2 million classrooms worldwide, providing a mature hardware entry point for AI-enhanced learning.
- National-level LMS & content delivery – serving 200 million users, capable of distributing AI-generated personalized content at scale.
- Voice-activated ambient AI – purpose-built for K-12 environments and already tested in real classrooms, enabling hands-free interaction and reducing teacher workload.

2. AI Content Generation & Personalization Engine

The system automates creation of teaching materials, assessments, and gamified content, integrating with partners like the Egyptian Knowledge Bank to adapt global knowledge to local curricula. This engine enables:

- Real-time localization – content can be instantly tailored to language, culture, and curriculum standards.
- Teacher empowerment – educators become "knowledge entrepreneurs," creating and monetizing original materials through a secure marketplace.

3. Zuno – Government-Backed AI Career Companion

Zuno is currently deployed in Thailand under a formal Memorandum of Understanding (MOU) with the Ministry of Higher Education, Science, Research and Innovation (MHESI) . The initiative, launched in Bangkok in early 2026, creates a Learn-to-Career Ecosystem that links education, skills development, and workforce productivity.

- Policy alignment – supported by Thai government as a national workforce strategy.
- Local ecosystem integration – implemented through NetDragon's subsidiary EDA (Thailand) , ensuring local relevance.

- Focus on SMEs – provides equitable talent matching for small and medium enterprises, addressing a critical market gap.

4. Blockchain Credentialing with Private-Sector Incentives

The solution uses NFT-based digital wallets to store diplomas, transcripts, and micro-credentials. Key innovations include:

- Smart contract revenue sharing – corporations that co-design courses receive a share of credential issuance fees, aligning incentives for high-quality, market-relevant content.
- Fraud resistance & portability – credentials are tamper-proof and can be verified instantly across borders, eliminating the "single point of failure" of centralized databases.
- Industry co-ownership – large employers participate in defining competencies, assessment difficulty, and verification, ensuring credentials reflect real-world needs.

Application Scenarios

Application Environment and Implementation Targets

The solution is designed for primary, secondary, and post-secondary education systems, as well as workforce development and lifelong learning contexts. It supports:

- Hardware Environment – integrates with existing school infrastructure, adding:

oPromethean interactive panels with voice-activated AI capabilities
oStandard computing devices (tablets, laptops) for student access to LMS and AI tutors
oMobile devices for the Zuno career companion app (iOS/Android)

- Software Environment – operates on a unified digital ecosystem comprising:

oNational-level LMS with content delivery and analytics (deployed at 200M+ user scale)
oAI content generation and gamification engine
oBlockchain credentialing system with digital wallet
oZuno AI platform with personalized learning and job matching

- Connectivity – designed for both high-bandwidth school networks and mobile-friendly low-bandwidth access for individual learners, ensuring inclusivity.

Examples of Typical Application Scenarios

- K12 AI-Enhanced Classroom:

A public school in Qatar deploys voice-activated interactive panels and ambient AI tools. Teachers use AI-generated content and assessments to personalize lessons, while students learn AI literacy through multimodal, interactive experiences.

- After-School Innovation Lab:

A school's classroom is repurposed after hours as an innovation lab. Students work with AI tutors at their own pace, build apps using AI-assisted coding, and educators act as mentors—enabling hands-on exploration beyond the standard curriculum.

- Youth Career Upskilling & Job Matching:

A new university graduate uses the Zuno app to identify skills gaps for high-growth sectors. The app provides localized, AI-curated learning paths, and upon completing industry-backed micro-credentials stored in a digital wallet, the graduate is connected to employers who recognize and prioritize these verified credentials.

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

Quantitative Evaluation Data:

National-Level LMS & Content Delivery System: 200 million users actively utilizing the platform across multiple markets, demonstrating proven scalability and reliability.

Interactive Classroom Hardware: 2 million classrooms globally deployed with Promethean interactive panels, representing the world's leading interactive display solution in education.

Voice-Activated Ambient AI: Deployed across classrooms with purpose-built technology for multimodal, AI-enhanced instruction.

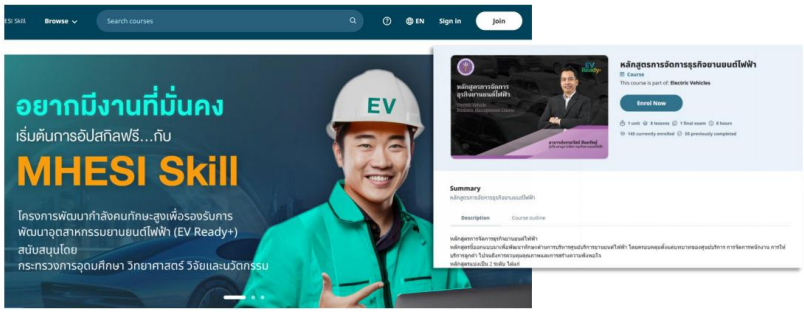
Practical Experience:

Thailand National Rollout: The Zuno career companion app is formally integrated into a policy-led AI initiative under Thailand's Ministry of Higher Education, Science, Research and Innovation (MHESI) . A formal Memorandum of Understanding (MOU) was signed in Bangkok, officially launching a "Learn-to-Career Ecosystem" that links education, skills development, and workforce productivity.

In support of Thailand's nationwide upskilling strategy, the Ministry of Higher Education, Science, Research and Innovation (MHESI) is making significant investments to expand the nation's workforce into high-growth sectors including electric vehicles (EV), semiconductors, and artificial intelligence (AI). As part of this policy-led initiative, the Thai government has allocated 8 billion baht specifically for human capital development in these sectors, with a clear target of producing 80,000 skilled personnel in advanced semiconductors and EV fields within five years.

NetDragon, through its Thailand subsidiary, is delivering on this national mandate by providing an AI-enhanced learning platform designed to train the technical workforce, thereby directly contributing to the country's upskilling and economic transformation goals.

Course exploration and enrollment for those interested in the field



AI features including AI chapter summaries, quizzes, and on-demand chat

Accredited certification for those who pass

Fig. 4

Replicability, Sustainability and Promotion Potential

Replicability Across Countries and Contexts:

- Complementary Design: The solution is intentionally designed to integrate with existing national curricula and institutional structures, avoiding the need for wholesale system replacement. This allows phased adoption in any country regardless of education governance model.

- Multi-Language & Localization: The system is architected to surface global domain expertise while adapting content to local languages, cultural contexts, and labor market needs.
- Proven Cross-Border Expansion: The Zuno app's launch in Thailand demonstrates a repeatable model: partnership with a national ministry, policy alignment, and phased deployment.

Sustainability Model:

- Educator Monetization Ecosystem: Teachers are empowered as "knowledge entrepreneurs" who can create, refine, and monetize original teaching materials through a secure marketplace, creating organic content growth and incentivizing quality.
- Blockchain-Aligned Incentives: Smart contracts enable revenue-sharing with corporate partners for credential issuance, while token staking mechanisms discourage fraud, creating a self-sustaining economic model.
- Public-Private Partnership: Corporations contribute domain expertise and co-design credentials, gaining recruiting priority and brand promotion, ensuring ongoing private-sector investment and relevance.

Promotion Potential:

Global Benchmark Positioning: The solution directly addresses the universally recognized problem of graduate unemployment (e.g., 29% increase in US young graduate unemployment, 72% in Thailand) and skills obsolescence (average skill half-life <5 years). This universal pain point makes the model highly exportable.

Illustration of a Typical Case

Case Title: Zuno "Learn-to-Career" Ecosystem Launch in Thailand

Time: Currently launching; MOU signed in 2025

Location: Thailand

Scale: National-level, policy-led initiative under the Ministry of Higher Education, Science, Research and Innovation (MHESI)

Implementation Context:

Thailand faced rising new graduate unemployment (72% increase) and a widening gap between university curricula and workforce requirements. The Ministry partnered to deploy Zuno, an AI-powered career companion app designed for Gen Z learners.

Key Outcomes:

- Policy Integration: Zuno became part of Thailand's formal AI national initiative, ensuring alignment with government priorities and sustained funding.
- Access & Personalization: The app provides localized, AI-curated learning paths that identify in-demand skills, bridging gaps between formal education and high-growth sectors.
- Certification: Since its launch in mid-May, we have trained 3,000 people, with more than 1,000 receiving certification to pursue careers in the EV industry
- Employer Connection: Learners complete industry-backed micro-credentials stored in digital wallets, connecting directly to employers who prioritize verified credentials.
- Scalable Model: The Thailand deployment serves as a replicable blueprint for other ASEAN and GCC countries facing similar workforce challenges.

Basic Information of the Institution

Consistent with the introduction of NetDragon above.

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4. Promethean

ActivPanel 10 with ActivSuite

Solution Introduction

Function Overview

Promethean ActviPanel 10 Premium with Promethean ActivSuite™ is an integrated solution of hardware and software designed to enhance classroom engagement and improve learning outcomes whilst allowing teachers to use the operating systems native to their school or district both at and away from the ActivPanel. Comprised of tools like Explain Everything whiteboard, Promethean ActivSuite enables educators to deilver dynamic, interactive lessons with ease using annotation, polling, and multimedia integration. Designed for use with Promethean's interactive displays and compatible with multiple platforms, it empowers teachers to deliver immersive, student-centered learning experiences. With Promethean ActivSuite, educators gain a powerful solution that transforms traditional teaching into interactive and impactful 21st-century education.

The project was inspired by research we conducted into problems teachers face when implementing new technology. Educators often juggle multiple tools and platforms which can disrupt learning and classroom flow. Our solution, Promethean ActivSuite, integrates lesson planning, delivery and student interaction into one ecosystem, reducing complexity and making adoption and useage less overwhelming and streamlined with the flow of the classroom. Intuitively designed, Promethean ActivSuite allows teachers to access their preferred panel apps from anywhere, anytime they need them. Strong online support materials on Learn Promethean to help with adoption and training.

K-12 teachers need help reducing their tech overload as well as help accessing content and resources when they need it and ActivPanel 10 Premium offers the solution. ActivPanel 10 Premium delivers familiarity by allowing teachers to use their operating system of choice where all their preferred resources are available. This choice of operating system is a unique benefit compared to other edtech solutions that rely on panels with built in operating systems and apps that require teachers to switch between content sources and different operating systems.

In addition, ActivPanel 10 Premium delivers industry leading specifications including best-in-class visual quality, low energy consumption, high quality sound with an 8 mic array and built-in soundbar, and accessories including a new ActivPen® 2 and All-in-one Remote (remote available in N.A. only) so that every student, no matter where they are, can equally engage in lessons.

Audience

Most interested parties will be passionate, forward-thinking educators committed to raising academic standards who constantly seek new ways to enhance student learning and embrace innovation in the classroom by integrating the latest educational technologies to create interactive, engaging lessons.

We will reach these teachers through our existing extensive customer base, and use our exciting new campaign " Rethink the ordinary" through social media, email campaigns, blogs, podcasts, and webinars. Some of these assets will be translated into six different languages to enable us to reach more of our global audience.

Project Innovation

ActivPanel 10 builds on previous Promethean solutions by significantly enhancing performance through improved hardware specifications, usability through user research and testing, and integration with existing platforms used in schools globally. ActivPanel 10 features upgraded processing power and memory, resulting in smoother performance, faster loading, and more responsive touch interaction. Building on the groundwork laid by previous ActivPanel displays and software solutions, it introduces a more intuitive interface that simplifies lesson delivery and device navigation.

Our insights are rooted in our mission to enhance teaching flexibility, student engagement, and classroom efficiency. ActivPanel 10 supports any teaching style—in-person, hybrid, or remote. With this solution, teachers are no longer tied to a desk or a single platform.

ActivPanel 10 is built to evolve with scalable software support, sustainability in design, and compatibility with emerging technologies. It shifts the focus from simply "interactive display" to "connected teaching hub," that adapts to teachers, rather than forcing teachers to adapt to it.

With upgraded whiteboarding, multi-touch capabilities, and integration with cloud-based tools, ActivPanel 10 makes it easier to integrate with other classroom systems in ways previous panels could not. Supporting for improved security protocols and long-term software updates, ActivPanel 10 is future-ready and aligns with school network requirements.

Intuitive, easy to use lesson planning and delivery tools allow teachers to spend less time on administrative tasks and more time working with students to address learning needs in real time. Interactive content, polls, and multimedia resources capture student attention, making lessons dynamic, impactful, and memorable.Teachers can more easily tailor content to individual learning styles helping every student progress. And with polling features, teachers can gain instant insight into student understanding and can immediately adjust instruction when needed. Cloud-based platforms and digital whiteboards make it easier for everyone to participate—both in the classroom and remotely.

Project Impact

The impact of this project will be that IT teams spend less time troubleshooting, freeing up resources for strategic support and innovation. Durable hardware, scalable software, and compatibility with evolving edtech tools mean schools get a future-ready investment that continues to deliver value for years.

It will scale through extensive marketing campaigns, global tradeshow exhibits, and through sales and channel demonstrations of the Promethean solution. This flagship solution will be further broadcast through social media, podcasts, and through the Promethean website.

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5. ZTE Corporation

All-in-One Machine for Vocational Education Vertical Models

Solution Introduction

Function Overview

This solution focuses on the intelligent upgrading of the full scenarios of teaching, learning, training and evaluation in vocational education, launching the All-in-One Machine for Vocational Education Vertical Models—an AI-enabled education product integrating hardware infrastructure, training and inference platform, and agent development capabilities, featuring software-hardware collaboration and ready-to-use out of the box.

Based on ZTE's self-developed technical system, the all-in-one machine integrates general computing servers, intelligent computing servers and converged storage nodes, equipped with the Nebula series large models, AIS training and inference platform, and Co-Sight Agent Factory. It provides end-to-end services for vocational colleges from model training, scenario development to application deployment.

Its core functions cover four key links of vocational education:

Intelligent Teaching Assistance: Supports AI lesson planning assistant, teaching plan generation, test question generator, assignment grading, etc., significantly reducing teachers' repetitive workload and improving teaching preparation efficiency by over 30%.

Personalized Learning Support: Realizes "one-to-one" precise learning support through AI learning assistant, knowledge Q&A, targeted error practice, and adaptive learning path recommendation.

Professional Training Empowerment: Combines vertical models for communication, intelligent manufacturing, computer and other majors, invokes enterprise real desensitized work orders and fault databases, and builds virtual simulation and role-playing training scenarios close to industrial practice.

Educational Management Optimization: Integrates intelligent agents for course scheduling, examination management, teaching evaluation, campus security, etc., promoting the intelligent upgrading of smart campus governance system.

The solution directly addresses three core pain points in current vocational education:

Serious homogenization of teaching resources, lacking professional content matching industrial post competencies.

Insufficient teacher-student interaction, making personalized tutoring and timely feedback difficult.

Training scenarios disconnected from real working environments, lagging in students' post competency cultivation.

By constructing a "1+N+X" architecture—1 base large model, N professional vertical models, and X teaching application scenarios—it realizes the leap from "general AI" to "industry-savvy AI", making large models truly understand majors, courses and students.

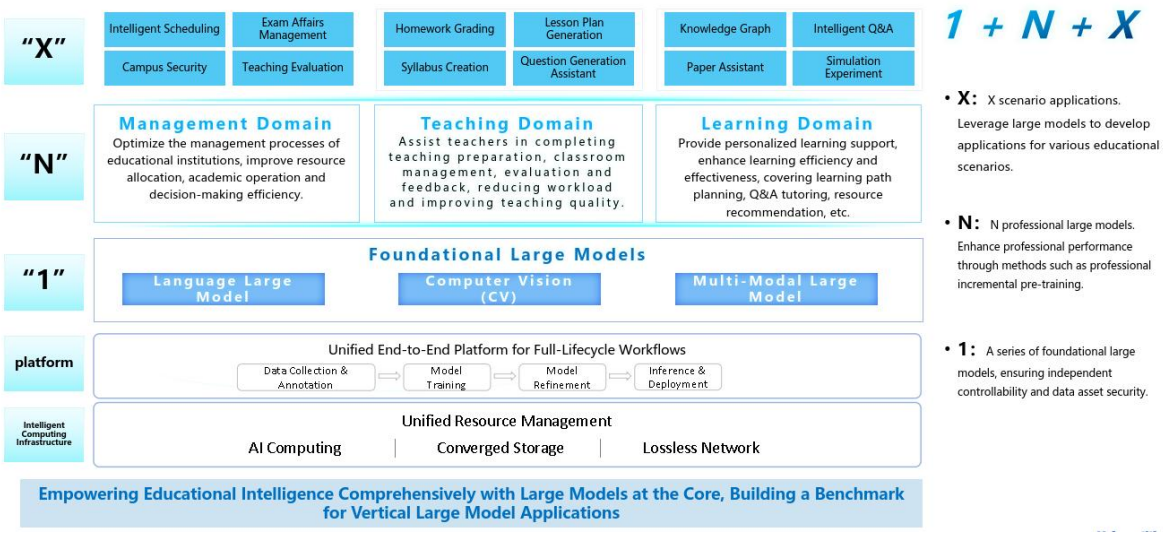

Fig. 1 "1+N+X" Model Development and Application Architecture

Technical Highlights or Innovations

1、Self-developed integrated training and inference platform for efficient closed-loop iteration of educational models

Equipped with ZTE's self-developed AIS model training and inference platform, it supports full-process capabilities including data preprocessing, distributed training, automatic tuning, and one-click deployment. Compared with general cloud platforms, AIS optimizes incremental pre-training and LoRA fine-tuning processes for educational small-sample and high-professional scenarios, shortening professional model training cycles by 40% and reducing resource consumption by 35%. For example, in the construction of the "Communication Large Model", domain-enhanced training with refined equipment manuals and fault databases has improved knowledge Q&A accuracy to over 90%.

2、Co-Sight Agent Factory enables agile development of educational applications

Based on the Co-Sight Agent Factory, teachers and researchers can quickly build AI teaching assistants, AI learning partners, AI evaluators and other agents through drag-and-drop orchestration without programming. It has GAIA authoritative test certification and top performance in open-source frameworks. The platform provides 200+ plug-ins and 1,000+ API interfaces, supporting seamless integration with educational administration systems and LMS platforms. For instance, teachers can generate an AI-guided agent with a closed-loop capability of "questioning-explanation-quiz-feedback" within 5 minutes based on course PPTs and question banks, greatly lowering the threshold for AI application.

3、Multimodal fusion and edge deployment ensure data security and real-time response

The all-in-one machine supports local deployment, keeping teaching data on campus and meeting strict privacy and compliance requirements of the education industry. It also integrates CV large model capabilities to realize visual intelligent applications such as automatic summarization of video courses, classroom behavior analysis, and training operation compliance detection. Combined with lossless network and converged storage architecture, inference latency TTFT ≤1s and QPS ≥24, ensuring stable services under high concurrency.

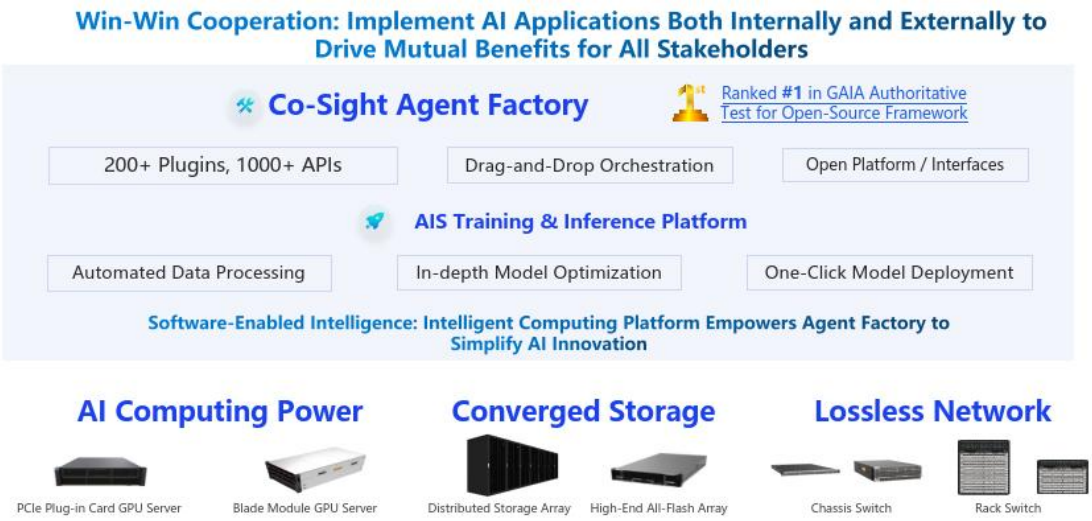

Fig. 2 Platform Capabilities of the All-in-One Machine for Vocational Education Vertical Models

Application Scenarios

Application Environment and Implementation Targets

The application of vertical large models in education focuses on three majors: intelligent manufacturing, communication, and computer. It adapts to teaching scenarios including major construction, curriculum development, teaching implementation, research innovation, and industry-education integration. The solution can be widely used in vocational colleges, application-oriented undergraduate universities, and educational technology enterprises.

In terms of software and hardware environment, vertical large models support local deployment in two forms: all-in-one machine deployment and computing cluster deployment, compatible with mainstream GPU models such as NVIDIA, Hygon, and Kunlunxin. For colleges or regional education platforms with strong computing resources, computing cluster deployment ensures data security and system stability; for small and medium-sized teaching units, all-in-one machine deployment enables low-cost and rapid access. After deployment, large models can connect with existing teaching management systems (e.g., LMS, educational administration system, smart classroom platform) via APIs for data interoperability and business collaboration.

The service objects of this solution mainly include:

Teachers: For curriculum design, teaching plan generation, assignment correction, learning situation analysis and other teaching-research work, improving teaching efficiency and personalization.

Students: Providing AI learning partners, personalized learning path recommendation, knowledge Q&A, career planning, employment guidance and other services, enhancing autonomous learning and employability.

Teaching managers and major leaders: Assisting in major planning, curriculum system optimization, and teaching quality evaluation.

Examples of Typical Application Scenarios

- Intelligent Teaching Assistance: AI Teaching Assistant and Teaching Plan Generation

Institution: A vocational and technical college in Zhejiang Province

Model: Intelligent Manufacturing Large Model

Vertical models have been applied to teaching preparation, supporting teachers to quickly generate high-quality teaching plans, courseware and instructional designs. By inputting course topics or teaching objectives, the model automatically extracts relevant knowledge points, organizes teaching logic, recommends teaching cases, and generates standardized teaching plan texts. Verified in practical teaching-research activities, this function significantly reduces teachers' time spent on basic lesson preparation and improves teaching preparation efficiency.

- Professional Training Empowerment: Simulation Training for Communication Posts

Institution: A vocational and technical college in Sichuan Province

Model: Communication Large Model

For the training needs of communication technology majors, vertical models combine real enterprise work order data (desensitized) to build role-playing training scenarios for posts. Students simulate tasks such as base station fault handling and network optimization in a virtual environment, with the model providing real-time operation guidance, scoring feedback and improvement suggestions. Deployed in training courses in cooperation with vocational colleges, this application improves students' post operational ability and problem-solving skills.

All the above application scenarios are based on ZTE's practical projects in vocational education, realizing rapid development and deployment relying on the AIS training and inference platform and Co-Sight Agent Factory, with replicability and large-scale promotion value.

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

This project achieved breakthrough results in the final exam of the Industrial Robot Application System Integration course at Wenzhou Polytechnic in December 2025. The "Intelligent Manufacturing Professional Large Model" jointly trained by ZTE and the college participated in the entire theoretical and practical assessment as an "AI Examinee", independently completing all questions including single-choice, true-false and programming questions without human intervention, covering core capabilities such as industrial robot system planning, path optimization, fault diagnosis and collaborative control.

Ultimately, the model ranked first in the whole grade in comprehensive score rate, outperforming the general large model with 10 times parameter volume by more than 3%, fully verifying its significant advantages in professional understanding depth, logical reasoning accuracy, engineering standard compliance and multi-task collaborative response.

Practice shows that the vertical large model can not only accurately understand complex process principles and system integration logic in vocational education, but also conduct independent analysis and decision-making based on real teaching scenarios. Feedback from the teaching team indicates that the model has achieved normalized auxiliary application in curriculum development, intelligent Q&A, training guidance and assignment correction, effectively reducing teaching burden by over 30% and improving teaching feedback efficiency by 50%.

Meanwhile, local deployment on the “ZTE Vocational Education Vertical Large Model Intelligent Computing All-in-One Machine” keeps teaching data on campus, ensures low model operation latency and secure and controllable systems.

Replicability, Sustainability and Promotion Potential

· Replicability: The project adopts “general base model + industry knowledge injection + local deployment + low-code agent development”, supporting rapid adaptation to different majors (e.g., electronic information, automotive manufacturing, construction engineering) and vocational education systems in different countries/regions. The built-in Co-Sight Agent Factory allows teachers to build exclusive teaching assistants via drag-and-drop, completing application development such as intelligent Q&A, training guidance and test generation without advanced programming, greatly lowering the usage threshold. In addition, the system supports deployment of mainstream open-source models (e.g., Qwen3, Deepseek), with strong compatibility and flexible lightweight configuration for resource-constrained regions.

· Sustainability: The project has established a long-term operation mechanism of “enterprise empowerment + college leadership + dynamic iteration”. ZTE provides initial computing equipment, technical training and continuous algorithm upgrade services, while colleges accumulate high-quality corpora through daily teaching to continuously feed model optimization, forming a closed-loop iteration of “teaching-data-model-teaching”. Meanwhile, model capabilities can be extended to textbook development, curriculum standard formulation, international bilingual teaching and other scenarios, with long-term evolution potential.

· National Promotion Value: ZTE has jointly selected 70 vocational colleges with the Vocational Education Development Center of the Ministry of Education for vertical model training and application. It will further promote cooperative models and model capabilities to vocational colleges nationwide relying on the Vocational Education Center platform.

Illustration of a Typical Case

Case Name: Wenzhou Vocational and Technical College Completes Localized Deployment of a Large Model for the Intelligent Manufacturing Program

Implementation Period: October 2025 – December 2025

Implementation Scale:

Jointly invested over 100,000 units of language corpora in the intelligent manufacturing field and more than 6,000 sets of PLC control-related data; deployed one ZTE vocational education-specific large model intelligent computing system to complete localized model training and inference; applied to synchronous teaching and assessment scenarios for 120 students across two grades of the Intelligent Manufacturing program in the School of Mechanical and Electrical Engineering.

Core achievements: The large-scale model for intelligent manufacturing ranked first in overall scores on the final exam; its performance outperformed general large models with 10 times more parameters by 3 percentage points; it facilitated the transformation of AI from an "auxiliary tool" to a "active participant," pioneering a new paradigm of "AI-assisted examination"; it established a reusable "AI + teaching evaluation" standard workflow and assessment system, earning high recognition from the expert panel.

Basic Information of the Institution

Institution Introduction

Founded in 1985, ZTE Corporation is a leading provider of integrated communication and information solutions in China, headquartered in Shenzhen. The company focuses on providing innovative communication technology products and services to global customers, covering three major businesses: operator networks, government and enterprise businesses, and consumer businesses. Its services cover more than 160 countries and regions worldwide, providing technical support and solutions for over 500 operators and thousands of government and enterprise customers.

Adhering to independent innovation, ZTE has built a complete R&D system, with 11 R&D centers in China including Shenzhen, Nanjing, Xi'an, Shanghai, Beijing, Chengdu, Chongqing, Tianjin, Changsha, Wuhan and Sanya, as well as overseas R&D institutions in Sweden, the United States, France, India and other countries, forming a global collaborative technological innovation network.

Experience or Qualifications in the Field of Digital Education

Relying on core technologies such as 5G, cloud computing, big data and the Internet of Things, ZTE actively participates in educational informatization construction. Through its government and enterprise business sector, the company provides smart campus, remote interactive teaching, education private network, education cloud platform and other solutions for universities, vocational colleges and basic education institutions. For example, it participates in 5G + smart education pilots in universities in Nanjing, Xi'an and other places, supporting the implementation of scenarios such as virtual simulation training and remote collaborative teaching.

ZTE holds international certifications such as ISO9001, ISO/IEC 27001 and CMMI Level 5, owns numerous patents related to communication and information technology, and some technical solutions have been applied to regional education private network construction and digital upgrading projects of vocational colleges. ZTE continues to empower the digital and intelligent transformation of the education industry with "connectivity + computing power", helping to build an efficient, secure and ubiquitous educational informatization infrastructure.

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6. Huawei Technologies Co., Ltd.

Huawei Smart Education Industry Solutions

Solution Introduction

Function Overview

Here are our all-scenario solutions for all education customer segments.
In terms of talent cultivation, the digital training platform helps cultivate ICT talent. Each year, more than 200,000 students can be trained to master ICT technologies and engage in ICT-related work.
In the smart classroom scenario, Huawei provides the smart classroom solution, which is student-centric and extends the classroom boundary. By integrating the interactive IdeaHub, HUAWEI CLOUD, and learning management systems of certified partners, Huawei provides solutions such as hybrid learning, group discussion, and recording classroom. Make future learning more attractive and free from space constraints.
In the managed service scenario, Huawei provides campus networking and high-quality 10GE campus network solutions to help customers manage campus activities more efficiently and provide better services for customers.
In scientific research, we provide scientific research HPDA, scientific research computing, and education and scientific research network solutions to help teaching and research customers improve research and information sharing efficiency.

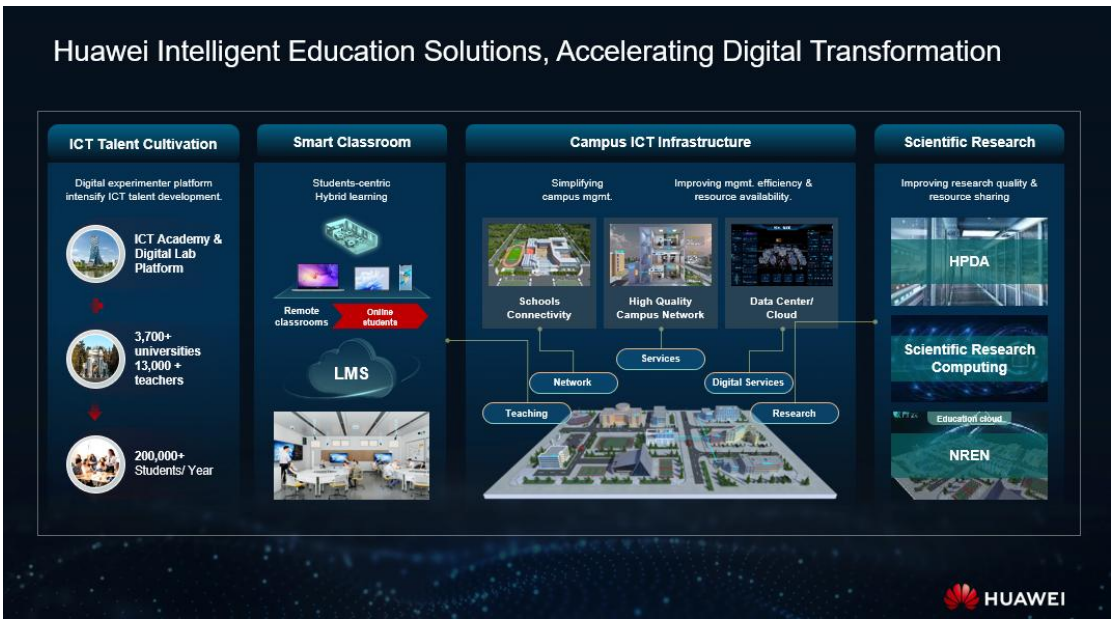

Fig. 1 Huawei Intelligent Education Solutions

Audience

We develop two key circles: college CIOs and industry partners. CIOs of universities are composed of top universities and administrative organizations in each region. The industry partner circle consists of education industry organizations, industry associations, media partners, and education public welfare organizations. The two circles carry out activities on N local platforms through Huawei, industry white paper, ICT academy/contest, showcase global publicize, and innovation forum.

Implementation

With the advent of the digital era, education is undergoing great changes. The application of more and more digital means and innovative teaching methods has fully stimulated students' enthusiasm and creativity in learning and improved learning efficiency and quality. Traditional teaching has steadily advanced to intelligent teaching. In order to adapt to the continuous development of smart teaching, classrooms have evolved from traditional classrooms to digital, data-based, and intelligent classrooms.

Huawei Smart Classroom Solution is based on cloud, edge, network, and device infrastructure. With IdeaHub and IVS1800 series products as the core, Huawei Smart Classroom Solution integrates high-quality education partners and provides regular recording classrooms, interactive discussion classrooms, and tiered recording classrooms for education industry customers. Focusing on experience, the platform-based architecture that integrates software and hardware and supports long-term planning and continuous innovation of the teaching environment.

We divide the development of the smart classroom into three stages. The smart classroom 1.0 is teaching informationization. It mainly uses the smart large screen to carry teaching applications, uses the electronic blackboard to enrich the teaching mode, and accumulates digital teaching resources. That is, we usually see a large screen + blackboard in the school classroom most common feature. Smart Classroom 2.0 is a digital teaching, which focuses on online and offline hybrid teaching. It can implement functions such as normal course recording and group interactive teaching, breaking the limitations of physical space and time. Smart Classroom 3.0 focuses on intelligent teaching. Based on the education AI model, intelligent features such as knowledge graph, AI intelligent Q&A, and comprehensive teaching analysis are implemented. AI technologies are used to enable innovative teaching modes, and intelligent functions such as teaching assistants, student assistants, and evaluation assistants are implemented. Intelligently generate course teaching plans based on topics, knowledge points, and outlines to reduce the pressure of teachers to prepare lessons. Student assistance: Build a knowledge map based on the large model, associate teaching resources and exercises, and support students' personalized learning. Assistant evaluation: Front-end perception collects classroom data and refines classroom evaluation through AI analyst behavior and teaching expression. Let teachers teach more accurately, let students learn more actively and efficiently, enjoy the joy of "privately customized" learning.

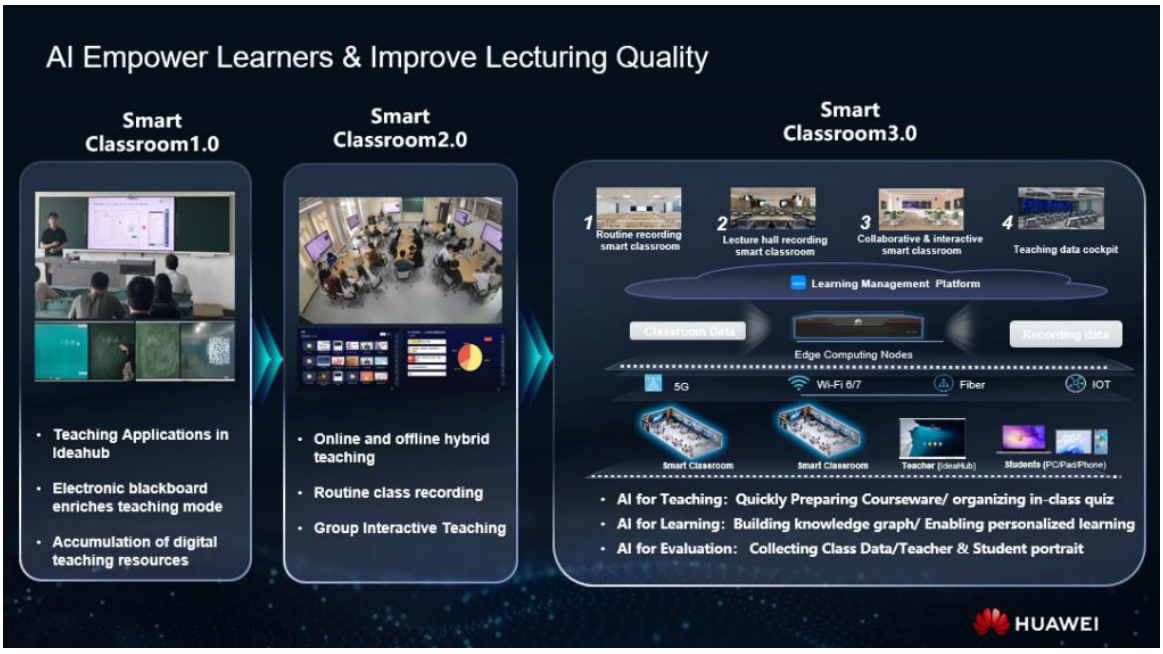

Fig. 2 AI Empower Learners & Improve Lecturing Quality

Project Innovation

In the education sector, in cooperation with Huawei, Southeast University has become the first institution in China to offer full-featured online services powered by DeepSeek to all its faculty and students. Within an hour of the service's launch, the number of concurrent users surpassed one thousand; within a week, it generated over 100 million tokens daily (equivalent to approximately 150 million Chinese characters processed). The University of Science and Technology of China has integrated the Qwen(72B) large model, trained on the school's knowledge base based on this solution, which can automatically answer common questions for faculty and students with real-time accuracy rates exceeding 90%. Zhejiang Shuren University has launched an AI-powered lesson preparation system based on AI agents, capable of generating structured lesson plans and courseware in just three minutes, reducing teachers' preparation time from six hours to 40 minutes. The dynamic question generation engine can produce 20 questions of various types in one minute, and AI can even dynamically adjust teaching focus based on pre-test data, achieving an efficiency that is difficult even for teaching and research teams to match.

Project Impact

Over the past decade, Huawei has been providing digital training solution, smart campus, smart classroom and other solutions and ICT infrastructure that are serving more than 7800 education ministries, education management organizations at all levels, colleges and universities, and research institutes across more than 120 countries and regions.

Till date, Huawei has already partnered with more than 2,700+ universities and colleges around the world to build Huawei ICT academies across more than 110 countries and regions. We now have 11,000+ ICT teachers and trained 1,000,000+ students.

Basic Information of the Institution

Huawei is a leading global provider of information and communications technology (ICT) infrastructure and smart devices. The company is committed to bringing digital to every person, home and organization for a fully connected, intelligent world. In the fields of communications networks, IT, smart devices, cloud services, intelligent automotive solutions, digital power, and more, we provide customers with competitive, secure, and reliable products, solutions, and services. Through open collaboration with ecosystem partners, we create lasting value for our customers and society, working to empower people, enrich home life, and inspire innovation across organizations of all shapes and sizes.

Huawei has set up industry teams to penetrate into industries and scenarios, shorten the management chain vertically, and better respond to customers' intelligent requirements. Horizontally and quickly integrate R&D resources and fully support the intelligent transformation of thousands of industries. We have built more than 200 intelligent solutions for urban, financial, transportation, and manufacturing industries, and have been applied in intelligent projects in more than 20 industries.

In education industry, we believe that technology drives the changes of the industry. In teaching, education intelligence helps improve teaching methods, improve teaching quality, and train first-class talents. We will promote independent innovation in scientific research and technology, serve national strategies and social development. In management, big data helps campus precise governance, improve management level, and shape campus culture. In services, one-stop campus services based on artificial intelligence improve service experience. Leading Infrastructure to Support the University Development Goals.

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7. Tencent Technology (Shenzhen) Co.Ltd

Silver Age Access Program - Dual-Teacher Classroom Solution for Senior Digital Education

Solution Introduction

Function Overview

The "Silver Age Access Program" is a public welfare project for senior digital education jointly initiated by the National University for the Elderly and Tencent SSV Digital Education Lab. It aims to build a comprehensive and full-process senior education digital support ecosystem through "social participation" and "digital empowerment", helping seniors bridge the digital divide and share the benefits of technological development.

This solution addresses three core pain points currently faced in the field of senior education: first, weak grassroots senior education infrastructure and severe shortage of quality course supply; second, shortage of professional teaching staff and uneven teaching quality; third, low digital skill levels among seniors and difficulty integrating into digital life. Relying on the "Penguin Silver Age Digital Academy" product and supporting dual-teacher platform system, the solution accurately delivers quality educational resources to areas with unbalanced resources, effectively improving the universality, accessibility, and convenience of senior education public services.

Functional Module	Core Capabilities	Realized Value
Digital Capability Assessment	Standardized assessment tools covering smart life, health, government services, and other areas	Precisely match learning content and generate personalized learning reports
Tiered and Classified Courses	Three major modules: basic popularization, scenario application, and smart advancement	Meet the learning needs of seniors at different digital capability levels
Dual-Teacher Classroom	Online expert live streaming + offline teaching assistant guidance	Ensure "understandable, learnable, and usable"
Educational Administration Management	Volunteer recruitment, intelligent scheduling, attendance supervision, points incentive	Full-process digital teaching management

Table. 5.1

The solution constructs a complete "assess-learn-practice-evaluate" closed-loop teaching service system: "assess" diagnoses students' digital capability baseline through standardized tools; "learn" provides structured and scenario- based systematic courses; "practice" relies on mini-programs to achieve post-class consolidation and repeated practice; "evaluate" tracks learning effectiveness through learning analytics and achieves continuous teaching optimization.

Technical Highlights or Innovation Points

Online-Offline Merge (OMO) Architecture: The solution adopts an innovative dual-teacher classroom technical architecture, integrating user center, authentication center, messaging system, and unified teaching resource library through "one platform", with underlying technical capabilities such as live/on-demand streaming, knowledge graph, content compliance review, and voice semantic analysis, achieving deep integration of online teaching and offline guidance.

Multi-Terminal Collaborative Work System: For different roles in teaching management, the solution provides four types of terminals: mini-program (student end), Web teaching workstation (instructor end), PC management SaaS (management end), and school teaching all-in-one machine (teaching site end), achieving multi-terminal interconnection and data interoperability.

Big Data Learning Profile: Through data collection and governance technology, construct student learning profiles, achieve learning process tracking, capability development analysis, trajectory recording, and incentive growth management, automatically generating visual learning analytics reports.

AI Intelligent Teaching Assistance: Deeply integrating AI capabilities, teaching seniors to use AI assistants for voice commands, information queries, and life reminders in the smart advancement module, and applying AI technology to practical scenarios such as health monitoring and anti-fraud identification, truly achieving AI empowerment for silver age life.

Application Scenario

Application Environment and Implementation Objects

Application Environment: This solution is implemented relying on 100 offline teaching sites covered by the National University for the Elderly nationwide, and quality teaching resources are freely opened to grassroots through channels such as the National Senior Education Public Service Platform and Tencent Mini programs. Teaching sites are equipped with standardized teaching all-in-one machine equipment, supporting real-time interaction and playback learning in dual-teacher classrooms; students only need smartphones to complete capability assessment, course learning, activity registration, and post-class practice through the "Penguin Silver Age Digital Academy" mini- program.

Implementation Objects: The project targets senior groups nationwide, focusing on serving middle-aged and elderly people in grassroots communities and county areas. Through one year of implementation, it plans to directly train no less than 50,000 seniors, significantly improving their digital life application capabilities. Each teaching site is equipped with 1 professionally trained teaching assistant, totaling 100, responsible for on-site organization assessment, sign-in, equipment debugging, and group practice guidance.

Typical Application Scenario Examples

Scenario 1: Smart Healthcare and Health Management

Addressing the pain points of seniors' difficulty in seeking medical treatment and making appointments, the course systematically teaches online appointment operation procedures, activation and use of electronic medical insurance vouchers, online consultation platform operations, and other skills. In the AI smart advancement module, combined with wearable devices such as smart bracelets and smartwatches, it teaches seniors how to view and understand health monitoring data and use AI assistants for daily health management. The implementation of this scenario enables seniors to independently complete the entire digital operation process from appointment registration to consultation payment, effectively alleviating hospital on-site queuing pressure and improving seniors' medical experience and health management level.

Scenario 2: Smart Travel and Digital Payment

The course covers high-frequency travel scenarios such as one-click taxi calling with ride-hailing apps, navigation map use, and QR code scanning for buses and subways, while focusing on teaching digital payment security knowledge, including basic operations of WeChat Pay and Alipay, and anti-fraud techniques. Through the "dual- teacher classroom" model, online instructors provide standardized explanations and demonstrations, while offline teaching assistants provide hands-on guidance for students to practice operations in real scenarios. After completing the course, students can independently use digital tools to complete daily travel and consumer payments, truly integrating into digital life.

Scenario 3: Government Services and Social Participation

Addressing the problem of seniors' difficulty in handling affairs, the course specifically sets up a government services module, teaching the use of government APPs or mini-programs to handle high-frequency matters such as social security inquiries, eligibility certification, and provident fund inquiries. At the same time, it guides seniors to learn skills such as WeChat group establishment, video account browsing and interaction, and online community participation, helping seniors expand social connections and actively participate in digital social life.

Effectiveness and Cases

Implementation Effectiveness, Evaluation Data, or Practical Experience

The "Silver Age Access Program" was officially launched on September 15, 2025. In the fall semester of 2025, "dual- teacher classroom" teaching pilots were first carried out in Yanqing District, Beijing and Shijiazhuang City, Hebei Province, and successfully completed. Starting from the spring semester of 2026, the project entered a comprehensive promotion stage, simultaneously unfolding in Beijing and Shandong province.

The project has initially built tiered indicators and assessment tools covering areas such as smart life, smart health, and government applications, capable of accurately diagnosing the digital capability baseline of senior students, and continuously tracking learning effectiveness through the learning analytics system, providing data support for course optimization.

Replicability, Sustainability, and Promotion Potential

Replicability: This solution adopts a standardized curriculum system, unified technical platform, and standardized teaching process, which can be quickly replicated and promoted to other regions. The dual-teacher classroom model effectively solves the problem of grassroots teacher shortage, and online quality teachers can serve multiple teaching sites simultaneously, greatly reducing the marginal cost of quality educational resources.

Sustainability: The project has established an instructor operation and management mechanism, forming a sustainable talent supply model. Course content keeps pace with digital development trends and can be continuously iterated and updated according to technological evolution and actual needs of seniors.

Promotion Potential: The solution is based on the realistic needs of China's aging society, responds to policy orientations such as the "14th Five-Year Plan for National Aging Career Development and Elderly Care Service System", and has broad social value and promotion space. The dual-teacher classroom model and digital learning tools can be extended to more fields such as rural education and vocational training.

Typical Case Description

In March 2026, the first batch of pilot units for the Shandong Province "Access Program" public welfare action was officially announced, and Yanzhou Open University was successfully selected and officially launched course implementation work on March 26. As one of the six first batch of pilot units in the province, this teaching site precisely focuses on the digital life needs of senior groups and constructs a full-chain teaching system of "basic popularization - scenario application - smart advancement". The first phase of courses covers three major modules: "Essential Smartphone Skills", "Digital Life Full-Scenario Application", and "AI Smart Application", with content including basic phone operations, WeChat use, digital payment security, smart travel and healthcare, AI assistant applications, and anti-fraud techniques, among other high-frequency practical scenarios. At the training site, the teaching venue was arranged in an orderly manner, and senior students were in high spirits, showing strong interest in the courses. Online professional instructors provided detailed explanations, while offline tutoring teachers provided full accompaniment and guidance. The dual-teacher teaching model allowed senior students to "understand, learn, and use".

During the same period, Beijing Chaoyang Community College, as the first batch of teaching sites in Beijing, launched the first phase of the "Essential Smartphone Skills" course on March 25, 2026, with a total of 5 courses, adopting a fixed time slot teaching method every Wednesday and Friday, providing free digital skills training services for community senior residents.

Basic Institutional Information

Tencent Sustainable Social Value(SSV) is a first-level department established by Tencent in 2021, dedicated to addressing social issues through technological capabilities. The SSV Digital Education Lab enhances the inclusiveness and accessibility of public education services through "social participation" and "digital empowerment," possessing strong technological innovation capabilities and extensive product development experience.

Its core products include the "Penguin Silver Age Digital Learning" mini-program and the dual-teacher platform system, with technical expertise covering live/on-demand streaming, content moderation, and other areas. Rich in experience in AI education applications, the lab has deeply integrated AI capabilities into senior education scenarios.

The National Open University for the Elderly is built upon the foundation of the Open University of China, undertaking tasks such as senior education and teaching, skills training, cultural heritage preservation, social services, scientific research, and international exchanges. It conducts online and offline integrated teaching activities for senior citizens nationwide, providing resource sharing, teaching guidance, and public services to senior universities at all levels across the country, forming a comprehensive educational service system covering branches, affiliated schools, co-construction units, directly affiliated colleges, and study bases nationwide.

The two parties have joined forces to actively respond to national policy initiatives on the development of aging- related undertakings, implementing the spirit of documents such as the "14th Five-Year Plan for National Aging Development and Elderly Care Service System." By fully leveraging their respective advantages in digital technology, authoritative educational resources, and educational networks, they are jointly addressing the "digital divide" faced by the elderly, working together to promote the digital transformation and upgrading of senior education, and helping to build a new paradigm of digitally and intelligently empowered senior education with broader coverage and better services.

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Tencent AI Arena Universal Education Project

Solution Introduction

Function Overview

In response to the National Strategy for Digitalization in Education and the “Belt and Road” Education Cooperation Initiative, and to address the critical issue of regional imbalances in educational resources, the Tencent AI Arena Universal Education Project was established. The project aims to leverage technological empowerment to build an inclusive education ecosystem covering universities globally. With the core objective of promoting educational equity, the project seeks to facilitate the equitable and high-quality development of AI education, providing students with access to the frontiers of AI knowledge.

The implementation of this project is of paramount necessity for bridging existing resource gaps and driving innovation in pedagogical models.

Centered on the core philosophy of "Education Equity," the project provides standardized AI curricula and industrial-quality practical training platforms to higher education institutions (HEIs) free of charge, with strategic priority given to institutions in the central and western regions and under-resourced areas. Based on comprehensive demand analysis, the project has established an integrated "Curriculum-Platform-Practice-Evaluation" pedagogical closed loop.

The specific exploratory practices include:

1. Resource Development and Deployment: A series of courses have been developed and deployed, including General Artificial Intelligence, Reinforcement Learning Algorithms, and Large Model Practice. Complemented by dedicated computing resource support, these offerings effectively address the critical pedagogical "pain points" regarding resource scarcity in partner universities.
2. Platform and Technical Support: Leveraging Tencent’s cutting-edge technologies and real-world industrial scenarios—such as Honor of Kings AI competition, intelligent traffic signal dispatching, and embodied intelligence—the project has built a high-performance practical training environment. By pre-configuring mainstream development frameworks like PyTorch, the platform supports "out-of-the-box" functionality, significantly lowering the barrier to entry for AI learning.
3. Instructional Implementation and Coverage: The project has been successfully implemented across 60 diverse HEIs, including Peking University, the University of Electronic Science and Technology of China (UESTC), Lanzhou University, and Chengdu Neusoft University. For instance, Peking University integrated the Multi-Agent Reinforcement Learning course; Southwest Jiaotong University conducted 48 credit hours of project-based teaching; and UESTC reaches nearly 300 students annually. To date, the project has cumulatively served over 10,000 students.

4. Faculty Empowerment and Training: The project has organized more than 10 philanthropy-based faculty training sessions nationwide, reaching 217 universities and empowering 478 faculty members. This initiative has effectively enhanced the AI instructional and practical application capabilities of university teaching staff.
5. Model Innovation: Innovative competitive mechanisms, such as "Ladder Rankings" and "Baseline Model Comparative Evaluation," have been introduced to stimulate student initiative and enhance teaching efficacy. These innovations have earned high recognition from teaching teams across numerous universities.

Technical Highlights or Innovations

Conceptual Innovation: The project breaks away from traditional educational models by establishing an integrated "Curriculum-Platform-Practice-Evaluation" pedagogical closed loop. By aligning closely with authentic industrial demands, it successfully implements the educational philosophy of "Promoting Learning through Practice and Enhancing Teaching through Competition."
Model Innovation: A "Philanthropy-Commercial" dual-track drive is adopted to ensure long-term operational sustainability. Furthermore, gamified mechanisms such as "Ladder Rankings" are integrated to stimulate learning interest and optimize instructional outcomes.

Technical Breakthroughs:

Rather than developing underlying AI technologies from the ground up, the project achieves breakthroughs in technology integration and the transformation of application scenarios.
The project innovatively converts Tencent's advanced industrial- quality AI technologies—including complex decision-making (Game AI), intelligent dispatching, and Embodied Intelligence—into accessible pedagogical and practical training scenarios for HEIs (e.g., 1v1 intelligent decision-making, access to the Hunyuan LLM, etc.). This provides a successful paradigm for the rapid and cost-effective empowerment of frontline teaching through cutting-edge industrial technology within the context of educational informatization and digital transformation. Its technical application philosophy and level of engineering encapsulation occupy a leading position in the field of educational empowerment.

Breakthroughs in Application and Practice:

The project has successfully achieved cross-level and cross-regional coverage, spanning from top-tier universities to local application-oriented colleges. This validates the high feasibility of standardized inclusive solutions across diverse educational contexts.
It offers a replicable and sustainable "Platform + Content + Service" systemic solution to the long-standing regional imbalances in AI faculty and resources. This established a new practical trajectory for the scalable and high-quality development of AI education in China.

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

Application Prospects:

The project has currently covered 60 Higher Education Institutions (HEIs) and served over 10,000 students, successfully validating the feasibility of its model. Through standardized encapsulation, the project supports rapid deployment and flexible scalability. The integrated instructional management platform is designed to adapt to the diverse needs of HEIs of varying scales.

Social and Economic Value:

Social Value: The project directly facilitates the inclusive sharing of high-quality educational resources, assists in bridging the digital divide, and lays a solid foundation for cultivating future-oriented, innovative digital talent, thereby generating a profound social impact.

Economic Value: The philanthropic model significantly lowers the entry costs for AI education in HEIs. By cultivating a pipeline of qualified talent to the industry, the project creates long-term economic value. Furthermore, its “Philanthropy-Commercial” dual-track drive ensures the project's own economic sustainability.

Demonstration and Leading Role:

The project serves as a benchmark case for technology enterprises empowering educational equity and for industrial technology feeding back into higher education. Its integrated “Teaching-Learning-Practice-Competition-Evaluation” model provides a universal demonstration and leading influence for AI education and other Emerging Engineering Education (EEE) disciplines.

Exhibition materials

Case Awards and Recognition:

CCF Tech for Social Good Annual Case (December 2025): Tencent AI Arena Universal Education Project was selected by the expert committee of the China Computer Federation (CCF) for the 2025 CCF Tech for Social Good Annual Case Collection (Inclusive Education Section). Distinguished from 138 candidates, the project passed a rigorous multi-dimensional evaluation focusing on philanthropy, social impact, innovation, leadership, sustainability, and replicability.

Flagship Events and Competitions:

World University Students' Digital Intelligence Competition Invitational Tournament (July 2023): Co-initiated by Tencent and the Executive Committee of the Chengdu FISU World University Games, the event utilized the Tencent AI Arena open platform as its core carrier. Students from prestigious domestic and international HEIs—including Tsinghua University, UESTC, Xi'an Jiaotong University, USTC, The Chinese University of Hong Kong (CUHK), the University of Toronto, and the University of Melbourne—engaged in innovative algorithmic competitions within the Honor of Kings environment.

Global AI Competition Brand: Since 2020, Tencent AI Arena has hosted annual AI competition series for six consecutive years. It has evolved from a small-scale invitational for top-tier domestic universities into an international brand covering over 530 HEIs across 30 countries.

Basic Institutional Information

Consistent with the introduction of Tencent above.

Chinese Original Technology Icon Connects the World: Weixin Mini Programs Empower AI Education and Youth Development

Solution Introduction

Function Overview

Weixin Mini Programs provide a simple and efficient application development framework and rich components and APIs, offering a practical way to address these challenges. Widely regarded as a hallmark of China's homegrown technological innovation, the platform boasts unique advantages of a low threshold for entry, cross-platform compatibility, ease of sharing, and close integration with daily life. Building on these strengths, Weixin has launched a set of free AI development tools for primary and secondary school teachers and students. These tools lower the barriers to project-based learning by enabling beginners with no prior experience to quickly design, build and share AI-powered mini programs.

The Weixin Mini Program Education Platform is a free AI learning tool for teachers and students to support information technology and AI education, interdisciplinary project-based learning, mini program development, and science and innovation competitions. It helps schools align with evolving curriculum standards while promoting integrated, cross-disciplinary learning.

Piloted in October 2023 for educational use, the platform provides young learners with accessible tools to design and develop mini programs.

①From Learning to Application: Connecting Youth with Technology

Since 2025, the Weixin Youth Joint Project Team has expanded Mini Program education through global competitions, free AI training programs, and collaborative initiatives. These efforts aim to provide students and teachers with practical exposure to emerging technologies and support the integration of AI into education. Notably, Weixin has stepped up its efforts to assist educational reform and the development in the Greater Bay Area, often combining AI education with initiatives to enhance technological literacy among young people.

In the past two years, more than 5,000 schools worldwide have engaged with the platform, with 500+ schools certified to deliver Weixin Mini Program courses. They have been integrated into subjects such as Chinese, mathematics, English, information technology and the arts, helping to address real-world problems through interdisciplinary learning. To date, primary and secondary school teachers and students worldwide have created more than 170,000 mini program projects, many of which have been published and applied in everyday contexts.

② Global Innovation Challenge: Expanding Participation and Creativity

Weixin launched the Mini Program Global Innovation Challenge, a public-interest initiative developed in collaboration with various partners. It provides a stage for students worldwide to apply their knowledge, develop practical solutions, showcase creativity and connect through technology.

Over four editions, the competition has attracted nearly 5,000 student teams and tens of thousands of participants from more than 10 countries.

Fig. 1 Records of the editions

③ Global Exploration Program: Facilitating Educational Collaboration

Weixin has been committed to linking high-quality resources, providing practical platforms for students, teaching materials for educators, and access to advanced technologies for schools.

To date, Weixin Mini Program has established 38 demonstration bases worldwide. These include 25 schools in Chinese mainland, 11 schools in China Hong Kong and Macau, and two overseas bases in UK and Singapore.

Weixin assists interdisciplinary AI integration and helps develop regional teaching models by providing free AI tools.

In 2024, the "Global Exploration Program" was formally launched to support international exchange and innovation in AI education, providing a more creative and open platform for teachers and students to put their ideas into practice.

Case Innovation and Breakthroughs

1) Shanghai Primary School Student's "Timeless China" Promotes Cultural Understanding

'Timeless China' is a Weixin Mini Program designed for short-term visitors to China and overseas audiences interested in Chinese culture. Developed by Wang Ziyu from Shanghai Qingpu World Foreign Language School, the project won the Special Prize in the Hidden Dragon Group of the 3rd innovation challenge. Focusing on intangible cultural heritage and high-quality traditional crafts, it provides immersive experiences through AI-powered interactive features, helping global audiences better understand and appreciate the depth of Chinese craftsmanship.

2) Award-winning "Slow Voice" for Hearing-impaired

Zhou Jingkai, Cai Zhilin and Lin Haoran from Po Leung Kuk No.1 W.H. Cheung College in Hong Kong developed the "Slow Voice" Weixin Mini Program, integrating voice and emotion AI to help people with hearing impairments express speech and emotions more effectively.

The project has received multiple awards, including the First Prize of the innovation challenge, Gold Medal of Hong Kong Science Exhibition, Silver Medal of Hong Kong ICT Awards, and Gold Medal at the 2026 International Exhibition of Inventions Geneva.

3) Finnish Students Develop "Youth Zero-Carbon Assistant" for Sustainable Travel

In Helsinki, Weixin Mini Programs are widely used for everyday services, including ticketing, travel guides and tax refund. A team of Finnish primary and secondary school students developed the "Youth Zero-Carbon Assistant" to encourage low-carbon behaviour through social engagement.

The Mini Program allows users to log their journeys, calculate carbon emissions based on different modes of transport, and earn carbon points after each trip . Results can be shared to encourage wider participation in sustainable travel.

4) British Students Develop "Route Planner" to Optimize Trips

Seventeen-year-old Mu Feng from Robert Gordon's College and sixteen-year-old Jin Lina from Lumen Christie College in Londonderry, Northern Ireland, studied programming at the Cultural and Educational Exchange Consulting Association. They teamed up to create the "Router Planner" Weixin Mini Program in the first innovation challenge.

The application allows users to select any city in England and Ireland as a starting point, add multiple locations, and calculate an optimal route. Initially, the system used an algorithm, which became inefficient as the number of waypoints increased. To address this, they optimized it by adopting the greedy algorithm, enabling faster route calculations.

The "Route Planner" is now used by their peers, helping them save time on travel planning.

5) "Lost & Found AI Platform" from Macau

In the finals of the 2nd innovation challenge, this mini program developed by Zhang Zhaofeng, Zhong Tianjian and Li Yanyi from Pui Ching Middle School, Macau won the Special Prize in the Flying Dragon Group. On the homepage, users can view the latest lost and found notices, while an automated matching function intelligently recommends relevant found items based on users' reported losses.

Promotion Value and Risks

The Weixin Mini Program Education Platform has gradually become one of the most popular STEAM tools for AI education globally. Its widespread adoption across diverse disciplines demonstrates that combining AI with Weixin Mini Program offers a practical and scalable approach to supporting project-based learning.

In the past two years, more than 5,000 schools worldwide have engaged with the platform, with 500+ schools certified to deliver Weixin Mini Program courses. They have been integrated into subjects such as Chinese, mathematics, English, information technology and the arts, helping to address real-world problems through interdisciplinary learning. To date, primary and secondary school teachers and students worldwide have created more than 170,000 mini program projects, many of which have been published and applied in everyday contexts.

The platform maintains rapid iteration, supporting key teaching needs such as teacher and student account management, code package uploads, and assignment review. Meanwhile, the platform supports schools to showcase outstanding student projects. The Weixin team continues to invest dedicated resources in the field of youth education to support ongoing product development and respond to evolving teaching needs.

8. Beijing Netease Youdao Computer System Co.,Ltd

NetEase Youdao: AI empowers education, creating a New Paradigm of Diverse and innovative Teaching

Solution Introduction

Function Overview

Based on NetEase Youdao's self-developed "Ziyue" education vertical large model, it builds a full-stack AI education solution covering the entire process of teaching, learning, practice, evaluation, management, and research, addressing the core pain points in traditional education models such as insufficient teaching efficiency, the absence of personalized cultivation, difficulty in integrating teaching resources, high barriers to cross-language learning, and insufficient depth of industry-education integration.

Build a three-tier landing architecture of "Ziyue large Model base - seven core scenarios - full mode adaptation", based on the core capabilities of the large model such as intelligent question answering, text generation, sentiment analysis, and machine translation, continuously iterate the multimodal interaction technology and educational scenario adaptation capabilities, Incubate more than ten scenario-based products such as Youdao Q&A Pen, AI oral coach Hi Echo, all-subject learning assistant Youdao Xiao P, and all-scenario agent LobsterAI, and provide multiple service models such as public cloud invocation, private deployment, offline adaptation, and scenario-based customized models.

Fig. 1 "Ziyue" Education big model landing Scene Architecture diagram

Covering all educational stages of basic education, higher education and vocational education, and adapting to all scenarios such as classroom teaching, after-school practice, home-school co-education, industry-education integration, and international educational exchange, it can achieve full-process efficiency improvement for teachers' teaching, full-cycle empowerment for students' personalized learning, all-round upgrading of smart campus construction for schools, and help build a new educational paradigm of "teaching students according to their aptitude".

Technical highlights and innovation points

Self-developed large models for educational vertical categories: The "Ziyue" model is one of the first batch of education vertical models in China to be registered with the state. It focuses on high-value scenarios for technological breakthroughs and continuous iteration of application implementation. The "Ziyue" 3.0 minority language model supports real-time translation between 38 languages and has the ability of multimodal deep understanding. The open-source mathematical model covers high-frequency demands of all disciplines. With small parameters, it achieves translation quality and educational scenario adaptation capabilities beyond some larger-scale general-purpose models.

Deep integration of multimodal technologies: By integrating technologies such as ASR/TTS voice engine, computer vision, posture detection, and voiceprint recognition, it achieves 98.5% pronunciation accuracy assessment, 190-dimensional pronunciation diagnosis, and intelligent word lookup in 0.3 seconds per word, creating a closed-loop learning model of "practice - evaluation - correction - re-practice", breaking through the functional limitations of a single tool.

Full-process and full-role empowerment capabilities: Achieve AI empowerment for the entire teaching process from lesson preparation, question setting, marking to answering questions, as well as full-cycle assistance for learning through knowledge point extraction, personalized practice, and real-time answering questions.

Scenario-driven implementation and open source ecosystem: Adhering to the "scene-first, scene-driven" strategy, promoting technology implementation with the "production-model integration" framework, launching the fully open-source desktop-level AI Agent LobsterAI, building an extensible plugin ecosystem and supporting scene-based model customization. At the same time, it provides the industry with a reusable and secondary developable technical foundation.

Global education adaptation capabilities: Deeply integrate the new curriculum standards in China with the international language learning system (CEFR), create international English teaching products, launch overseas applications covering translations in 108 languages, adapt to scenarios such as cross-border academic exchanges and overseas study, and achieve two-way empowerment of the domestic landing and global output of educational technology.

Application Scenario

Application environment and implementation object

Fully covering all educational scenarios such as regular teaching in primary and secondary schools, personalized after-school self-practice, research and teaching in colleges and universities, vocational education, international cultural exchange, as well as educational management and development scenarios such as regional smart campus construction, upgrading of regional teaching and research systems, and digital talent cultivation.

Target audience: Focusing on the concept of lifelong education, core services for teachers and students in the K12 stage, higher education institutions, and vocational colleges worldwide; It has served more than 2,200 primary, secondary and tertiary schools across the country and has begun to be applied in overseas universities, providing "Youdao solutions" for new educational and teaching scenarios.

Typical application scenario examples

1) Smart hardware empowering education and teaching, implementing innovative practices of AI dual-teacher classrooms

NetEase Youdao persists in promoting the "Strong School Program", implementing the "AI for Classroom Teaching" dual-teacher classroom teaching practice, and conducting classroom teaching applications in primary and secondary schools to explore successful experiences in the transformation and implementation of AI in classroom teaching. Through a deep understanding of the core advantages of the Youdao Dictionary Pen, English teachers and research experts in various schools have opened up the imagination space for the Youdao Dictionary Pen to empower classroom teaching, provided new ideas and methods for classroom teaching, and explored effective paths for the transformation and application of artificial intelligence in classroom teaching.

2) The intelligent digital system enhances efficiency across the entire domain and builds a precise teaching system for smart campuses

Under the trend of educational informatization and intelligence development, NetEase Youdao actively promotes digital products such as smart homework system and oral training system to assist in the construction of smart campuses. In terms of the smart homework system, Youdao's smart homework system helps schools achieve precise teaching by introducing AI functions such as "Little P Teacher" and "Essay Intelligent Correction function". The all-subject AI learning assistant "Teacher P" integrates interactive Q&A and interaction functions in various scenarios, achieving significant improvements in knowledge memory, multimodal understanding and logical reasoning, providing Q&A services for all school stages and all subjects, supporting multi-round dialogue and heuristic problem-solving, as well as intelligent functions such as AI word lookup and AI translation, With extended features such as free dialogue and poetry appreciation, it enables students to learn flexibly, conveniently and personally. The essay intelligent correction function evaluates students' essays from multiple dimensions such as grammar, vocabulary, and logic, providing teachers with correction references and improving correction efficiency.

The AI oral coach Hi Echo not only serves as an "oral assistant" for English teachers, providing support for the English classroom teaching process, but also helps students enhance their perception and experience of AI technology through a variety of campus activities, cultivating scientific interest and scientific spirit. For example, in the school's English drama festival, Hi Echo appeared as the host, providing students with a brand-new interactive experience; After class, students can practice speaking on their own in front of the Hi Echo interactive screen, and Hi Echo helps students correct their pronunciation and improve their speaking skills quickly through coherent heuristic dialogue, identifying problems and providing intelligent feedback.

3) AI technology drives the internationalization of education and builds Bridges for cultural exchange and mutual learning between China and the world

NetEase Youdao has deeply integrated AI technology and, in collaboration with Oxford University Press, created Youdao Oxford English, which combines the new curriculum standards with the international language learning system (CEFR) through a dual-teacher, bilingual classroom and ability cycle training model. At the same time, Youdao has launched several language applications for the international market: iRecord, which uses a large language model for high-precision transcribing of audio recordings; lectmate, also known as Youdao Study Abroad Listening Box, provides simultaneous interpretation in classrooms for international students, breaking down language learning barriers; U-Dictionary supports translation in 108 languages, meeting the need for cross-language communication. From cultivating students' English proficiency to international language application services, NetEase Youdao, based on artificial intelligence technology, fully supports the internationalization of education, providing strong support for learners to overcome language barriers and integrate into global learning and communication.

In the context of global cultural integration, NetEase Youdao uses language as a bridge to deeply facilitate cultural exchange and mutual learning between China and foreign countries. With the introduction of the "Global Pronunciation" feature, Youdao Dictionary breaks the boundaries of traditional language learning tools and elevates English learning to a cultural resonance field. It not only includes Internet memes from China and abroad, dialects and slang, and film and television quotes, but also innovatively builds a "meme-playing learning + global co-creation" model. Through this model, the unique charm of Chinese dialects is presented on the world stage, serving as a window for global users to understand Chinese culture and building an interesting cultural exchange channel for young people at home and abroad. In the process of sharing and co-creating fun pronunciations, users bridge language and cultural barriers, enhance mutual understanding, and transform "global pronunciation" from a mere learning tool into an important carrier of cultural exchange.

Results and Cases

Implementation results, evaluation data, and practical experience

NetEase Youdao has implemented services in over 2,200 primary, secondary and tertiary schools across the country, covering tens of millions of users, and has achieved quantifiable and verifiable results in improving the quality and efficiency of education:

In terms of learning efficiency improvement: Through intelligent context recognition technology, the time students spend looking up words is reduced to 0.3 seconds per word, 40% more efficient than traditional methods, and the average daily word lookup time of students using dictionary pens is reduced by 62%; With the help of smart tools, students' attention span in class has been reduced from 15 minutes in traditional classes to 28 minutes.

In terms of language learning improvement: Through the AI cultural annotation function, students' English expression accuracy rate for traditional festivals such as the Mid-Autumn Festival has increased from 53% to 89%; During the use of the AI speaking coach, 78% of students met the new curriculum standard's requirement of "30 minutes of listening practice per week", the number of oral dialogue rounds increased fivefold, the efficiency of correcting common pronunciation errors (such as the last sound being pronounced and the stress being misplaced) increased by 60%, the average weekly oral speaking time of users reached 48 minutes, and the conversation topics were more diverse.

In practice, we have formed the core experience of "education-oriented, scenario-first, technology adaptation, data iteration", always insisting on driving technological innovation based on the real needs of teaching, avoiding the disconnection between technology and educational scenarios, and promoting AI technology from the laboratory to the regular classroom.

Replicability, sustainability and potential for promotion

High replicability: NetEase Youdao adopts an elastic architecture of "base large model + modular scene products", supporting on-demand deployment and customized adaptation. It does not require large-scale campus hardware renovation and can quickly adapt to different education systems, curriculum standards and teaching needs. Whether it is basic education, higher education or vocational education scenarios, it can be quickly implemented.

Long-term sustainability: Built a closed-loop operation model of "technology research and development - scenario implementation - data feedback - model iteration", continuously optimizing the capabilities of the large model and product functions based on tens of millions of user learning situation data; At the same time, through the construction of an open-source ecosystem and in-depth cooperation between schools and enterprises, continuous technological innovation and the continuous expansion of application scenarios are achieved to ensure the long-term vitality of the solution.

Global promotion potential: Mature regional and university-level implementation operation models have been formed in China, which can be exported to countries and regions with different levels of educational development around the world; In overseas markets, mature language translation products have been launched, supporting translation in 108 languages, and a stable user base has been formed in regions such as North America and Southeast Asia, providing a mature foundation for global promotion.

Typical cases

In 2025, NetEase Youdao supported Binjiang District of Hangzhou City, Zhejiang Province, in building an AI "Oral English Buddy" application on "Zhe Li Ban", implementing graded practice based on different levels of primary and secondary school students, creating a learning loop of "practice - assessment - correction - re-practice". It is open to more than 50,000 students in 21 primary schools and 16 middle schools (including nine-year integrated schools) in Binjiang District, helping students speak English anytime and anywhere. The high frequency of students' use has accumulated a large amount of learning situation data, achieving precision and personalization of oral English teaching and significantly improving the overall quality of English teaching in primary and secondary schools in the region.

Basic information of the institution

Introduction to the institution

NetEase Youdao, founded in 2006, is an educational technology company dedicated to serving learners wholeheartedly, with the slogan "Learn Efficiently, Get It right". Relying on its powerful AI technology, Youdao has created a range of products and services that are popular among learners, including a variety of intelligent learning tools such as Youdao Translate and Youdao Dictionary Pen, as well as course platforms covering all educational stages such as Youdao Leading and Youdao Premium Courses. In addition, NetEase Youdao has developed Ziyue, the first large educational model in China, and has taken the lead in implementing it in scenarios such as oral practice and home tutoring. At the same time, NetEase Youdao has also applied AI technology to online marketing, building a marketing matrix that includes performance advertising, global influencer marketing, etc. NetEase Youdao went public on the New York Stock Exchange in 2019.

Experience and qualifications in digital education

The company has deep accumulation and core strengths in the field of digital education: First, the core qualifications are complete. The self-developed "Ziyue" education large model was among the first batch of education vertical large models in China to pass the national filing. As a core contributor, it participated in the formulation of industry large model standards by the Ministry of Industry and Information Technology and the China Academy of Information and Communications Technology, actively participated in the process of promoting the application of industry large models in the country, and contributed to the development of the national large model industry; Second, it has outstanding technical advantages. It has a fully self-developed technical foundation for educational vertical large models, possesses the full-chain capabilities of multi-modal technology integration and full-scenario product development, and has accumulated tens of millions of educational scenario learning situation data. Third, it has extensive experience in implementation, has been deeply involved in the field of educational technology for many years, has created several industry-benchmarking intelligent educational products, and has served more than 2,200 primary, secondary and tertiary schools; Fourth, deeply engaged in AI education popularization, invited to participate in the "Haidian Parents' School · Family Education Lecture Hall" to conduct AI education popularization, continuously promoting the popularization and application of AI education technology.

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9. China Industry and Information Technology Publishing & Media Group (CIITP)

Industry and Information Technology Class — Future Industry and Information Technology Talent Development Program

Solution Introduction

Function Overview

The Industry and Information Technology Class Primary and Secondary School AI Education Service Project is an integrated development platform serving the artificial intelligence education in primary and secondary schools and the cultivation of reserve talents in science and technology. Based on the Group's long-term accumulation of superior resources in publishing, culture and education, the project focuses on the on-campus artificial intelligence education scenario for primary and secondary school students. By fully applying cutting-edge AI technologies, it has built an integrated education empowerment system consisting of an "experiential online virtual AI laboratory + artificial intelligence teaching resources + training for professional AI teachers + assessment and competition achievement exhibition platform". It provides high-quality artificial intelligence education services for local education bureaus and primary and secondary schools across the country, promotes the improvement of students' artificial intelligence literacy and the cultivation of top-notch innovative talents, and contributes to the training of a future talent force for scientific and technological innovation in engineering.

The Industry and Information Technology Class – Future Industry and Information Technology Talent Development Program is committed to guiding young people to explore cutting-edge fields such as scientific inquiry and artificial intelligence. The program covers four stages: universal education, interest cultivation, specialty development and top-notch innovation.Supporting resources including an AI experiment platform, science and technology curriculum resources and intelligent hardware teaching aids have been developed. Pilots have been carried out in 32 provinces and cities nationwide, covering more than 2 million young people, forming a replicable and scalable new model for the cultivation of industry and information technology talents. The architecture diagram of the program is as follows:

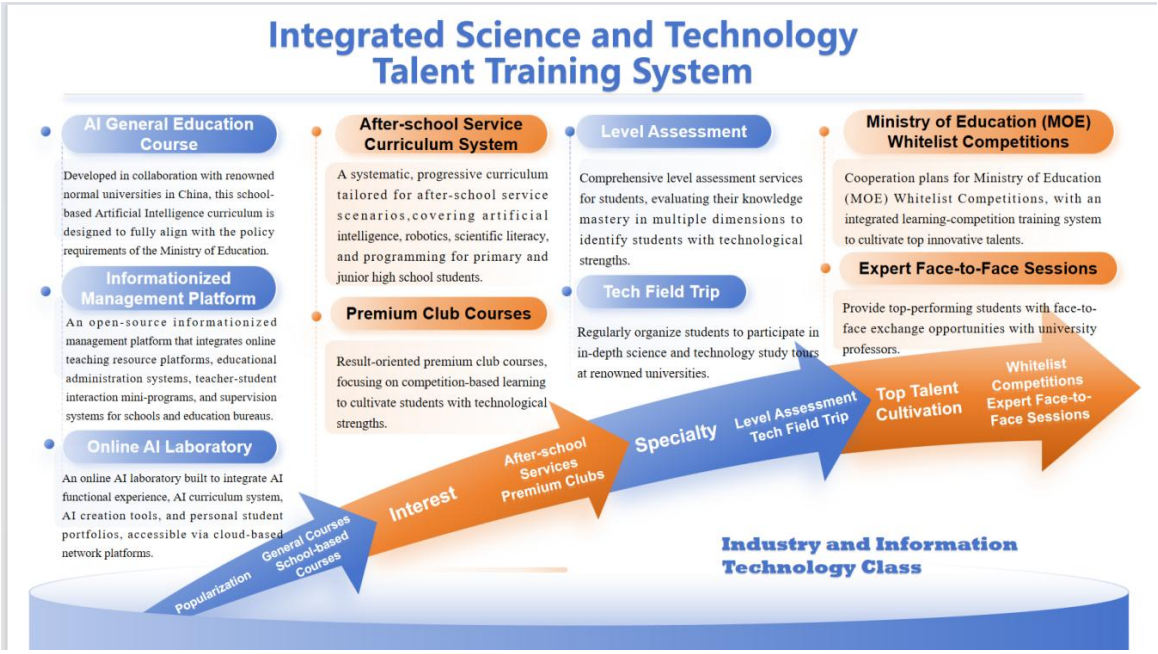

Fig. 1

Technical Highlights or Innovations

The innovations of the Industry and Information Technology Class solution are mainly reflected in content development, technical application and implementation models, as detailed below:

Innovation in Content Development: Curriculum content keeps pace with the development trend of artificial intelligence. The project team has fully investigated the demand of primary and secondary schools for high-quality AI education curriculum systems and services, and actively responded to the requirements of national policies. It organized experts from top universities and worked with its own industry-research team to develop the Industry and Information Technology Class Primary and Secondary School Artificial Intelligence General Education Course.The course is presented in an integrated form of "books + digital curriculum resources + experiential AI laboratory". Students can not only learn and understand the principles of artificial intelligence through books and courses, but also practice and experience artificial intelligence on the digital platform.In addition to general education courses, the solution also covers science and technology education courses such as robotics, programming and science, with more than 1,000 hours of video courses developed and more than ten kinds of printed textbooks published to meet high-quality educational needs with premium content.

Innovation in Technical Application: AI technology embedded in the curriculum platform

Adhering to independent research and development, the project platform has built an experiential artificial intelligence platform, a multifunctional AI education platform integrating interactive AI experience, AI tool creation and AI project practice. It encourages students to conduct AI practice and creation along with the curriculum, deepening their understanding of artificial intelligence.

Innovation in Implementation Model: Excellent user reputation and brand influence

The training program innovates its implementation model in line with policy orientation.First, it has built a diversified business matrix covering teaching resources, teaching platforms, study tour services, assessment and competitions, forming a complete training chain that fully meets the needs of schools and realizes a one-stop solution for artificial intelligence education.Second, with the AI education platform as the core, two implementation modes, namely education bureau-level coordination and school-level practice, have been launched for different regional scenarios. The solution has been implemented across the country, achieving sound social and economic benefits.

Application Scenarios

Application Environment and Implementation Targets

Industry and Information Technology Class — Future Industry and Information Technology Talent Development Program is committed to providing stable and sustained strategic support for the supply of scientific and technological talents for the development of industry and information technology.It is mainly applicable to science and technology education scenarios in primary and secondary schools, such as Artificial Intelligence General Education Courses, featured science and technology school-based curricula, science and technology after-school services, science and technology clubs, etc.The specific application scenarios are as follows:

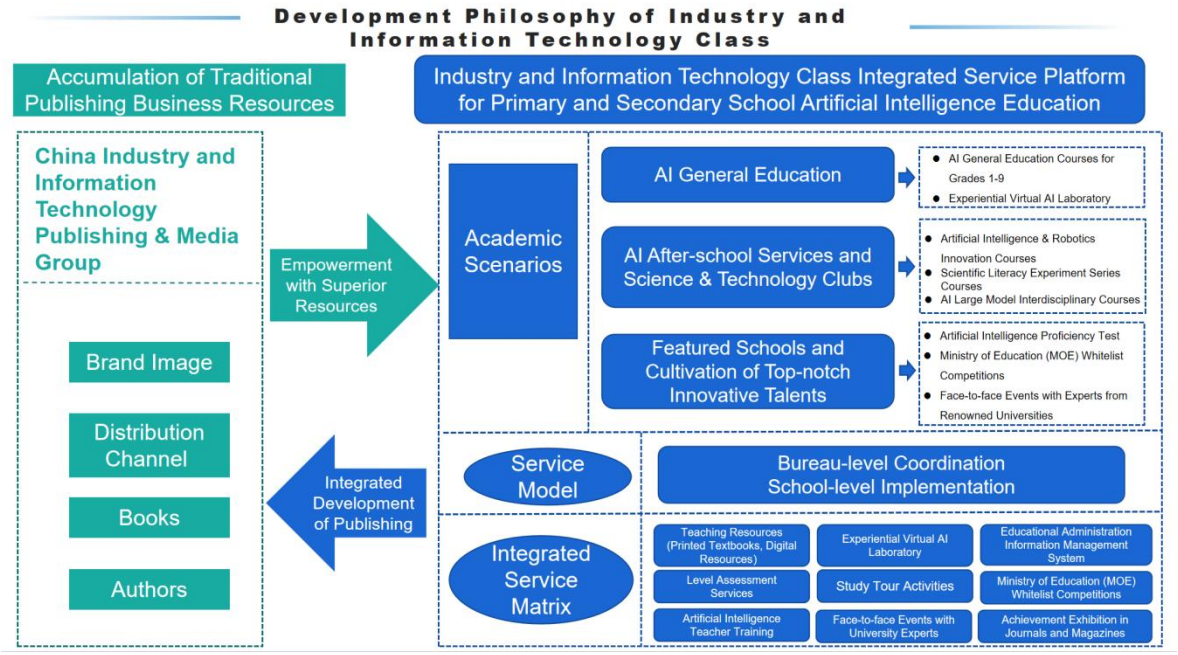

Fig. 2 Specific application scenarios

The target user groups are divided into two categories: C-end users and B-end users.

C-end User Group:The main C-end users served by the Industry and Information Technology Class project are primary and secondary school students.A full-age science and technology education curriculum system from Grade 1 of primary school to Grade 3 of junior high school has been established, covering major science and technology courses such as artificial intelligence, programming, robotics, and scientific literacy.Combined with achievement exhibitions, science and technology study tours, competition services and other contents, an integrated training chain for scientific and technological talents has been formed, providing abundant science and technology education resources for primary and secondary school students.

B-end User Group:In the whole process of providing empowerment services, the B-end users of the solution also include:

provincial and municipal education departments (bureaus) committed to improving regional artificial intelligence education;

primary and secondary schools intending to build featured brands in artificial intelligence education;

training institutions focusing on fostering students' interest and expertise in artificial intelligence.

Typical application scenarios

Appearing on Campus, Embarking on a New Journey of Science and Technology!AI General Education Courses of Industry and Information Technology Class Launched in Shenzhen.The carefully developed primary and secondary school Artificial Intelligence General Education Courses under Industry and Information Technology Class have been officially offered at Lixinhu School in Bao'an District and Huamingxing School in Pingshan District, Shenzhen.This is not merely a curriculum launch, but a key step for the Industry and Information Technology Class K-12 AI education system to shift from "policy response" to "practical implementation".

Amid the wave of educational reform, Industry and Information Technology Class has always been at the forefront of the industry.Following the issuance of the Notice on Strengthening Artificial Intelligence Education in Primary and Secondary Schools by the Ministry of Education, various regions have responded positively and issued local syllabi for artificial intelligence education.Keenly capturing this educational trend and acting quickly in response to policy requirements, Industry and Information Technology Class has relied on its own resource advantages to build a trinity AI general education system of "Curriculum + Platform + Books".

Empowering After-School Services for Quality-Oriented Education with a High-Quality System — Industry and Information Technology Class Enters Hefei Experimental School.Students are enthusiastically building projects from the AI Series K courses of Industry and Information Technology Class.The class is equipped with step-by-step 3D modeling and construction guidance, making the content easy to understand, quick to learn and simple to operate for students.

Amid the cheerful atmosphere of the class, teachers deliver patient, vivid and game-based explanations with gentle guidance, while students immerse themselves in hands-on activities with teaching equipment.From being unskilled at the beginning to completing tasks smoothly, students gradually grow to love building, models and artificial intelligence, internalizing scientific and technological knowledge in a lively classroom environment.The after-school service at the Jiulongwan Campus of Hefei Experimental School has thus opened a brand-new chapter.

Impact and Case Evidence

Implementation Outcomes, Evaluation Data and Practical Experience

Industry and Information Technology Class takes promoting the balanced development of quality-oriented education as its development goal, and cultivating future industry and information technology talents as its mission. It adheres to the correct orientation and achieves sound social benefits. To date, the Industry and Information Technology Class project has covered 32 provinces and municipalities nationwide, served more than 1,000 primary and secondary schools, and cumulatively served over 2 million students.

In September 2025, Industry and Information Technology Class deeply participated in the "Wisdom Enlightens the Future" — Artificial Intelligence Education Enters MIIT Designated Poverty Alleviation Counties (Districts) Public Welfare Initiative, and donated science and technology education curriculum resources and products to Nanchong City, Sichuan Province, to support the balanced development of science and technology education. In January 2026, the project team of Industry and Information Technology Class was awarded the title of "Most Publishing Value · Publishing Model Team" by China Publishing & Media Journal.

Replicability, Sustainability and Promotion Potential

The Industry and Information Technology Class — Future Industry and Information Technology Talent Development Program has built a "1+4" science and technology education curriculum system: with Artificial Intelligence General Education Courses as the entry point, and four advanced featured courses including robotics, programming, scientific literacy, and Artificial Intelligence Generated Content (AIGC) creative design as the curriculum matrix.

The Industry and Information Technology Class AI Interactive Laboratory is the core practice platform supporting the curriculum, integrating "learning, perception, hands-on practice and creation".The platform provides systematic AI curriculum resources and more than 30 fun interactive experiences (such as speech recognition and image generation). It guides students to practice through project workshops, and is equipped with AIGC and intelligent agent creation tools, supporting students to turn their ideas into digital works and realizing a closed loop from principle cognition to application innovation.

The curriculum system is designed to be close to teaching practice, lowering the threshold for course offering. It only requires a basic information-based teaching environment, has low equipment dependence, and features strong replicability.

Typical Cases

Artificial Intelligence Education Improvement Project in Yichang City, Hubei Province:As a Pilot Zone for Comprehensive Reform of Basic Education of the Ministry of Education, Yichang City has actively responded to national calls and fully promoted the development of artificial intelligence education.

To improve teachers' enthusiasm for offering artificial intelligence courses, gain an in-depth understanding of students' programming foundation and the application of the platform in teaching, and lay a solid foundation for the comprehensive popularization of artificial intelligence teaching in primary and secondary schools in Yichang, Industry and Information Technology Class launched the Artificial Intelligence Teaching Improvement Project in Yichang from February to December 2025. The project covers all primary and secondary schools in the city and assisted in building Yichang's featured artificial intelligence education platform and curriculum system.

(4) Exhibition Materials:

Fig. 3 Programming Course Material Kits

Basic Information of the Institution

China Industry and Information Technology Publishing & Media Group Co., Ltd. (hereinafter referred to as the Group) was founded in October 2013.As a publishing and media group established on the basis of Posts & Telecommunications Press and Publishing House of Electronics Industry, it is a central state-owned cultural enterprise directly under the Ministry of Industry and Information Technology (MIIT).

The Group has four wholly-owned subsidiaries, namely Posts & Telecommunications Press, Publishing House of Electronics Industry, Beijing Xintong Media Co., Ltd. and Huaxin Industrial Research Information Consulting (Beijing) Co., Ltd.Its core businesses cover publishing and media services such as book publishing, periodical publishing, digital publishing, science and technology education, exhibition services, and think tank research.

In the field of youth science and technology education, the Group has launched Industry and Information Technology Class — Future Industry and Information Technology Talent Development Program, which has served more than 2 million primary and secondary school students in total.

The Group has extensive experience in development and implementation in the field of digital education.On the one hand, it has integrated more than 70 years of author and expert resources from the two major publishing houses, and gathered a large number of influential experts and organizations in education and technology, providing professional support for its content system.

At the same time, the Group boasts abundant channel resources in project promotion, implementation support and service capacity, with nationwide coverage, enabling it to provide one-stop service and support for education bureaus and schools.

Its successful projects in youth digital education include the Youth Information Technology Training Project — a youth science and technology proficiency level assessment program jointly developed by the MIIT Center for Education and Examination and the CHINA EDUCATION SOCIETY OF ELECTRONICS (CESE).The Group is responsible for its daily operation, providing professional competency certification for primary and secondary school students across the country.Serving hundreds of thousands of students annually, it has become a leading brand in the science and technology assessment industry.

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10. Fujian Huayu Education Technology Co., Ltd.

Construction Solution for an Intelligent Connected Learning Environment Based on Cloud-Edge-Terminal Collaborative Architecture

Solution Introduction

Function Overview

With the rapid advancement of a new wave of technological and industrial transformation, the digitalization of education has become a global consensus. Optimizing learning environments is fundamental to transforming learning paradigms and improving teaching quality. The New Generation Artificial Intelligence Development Plan calls for "integrated learning environments" and learner-centered systems delivering precision education services. Likewise, China's Education Modernization 2035 highlights the use of advanced technologies to reform talent cultivation, integrating large-scale education with personalized learning. The National Key Science and Technology Project on New Generation Artificial Intelligence, titled Research and Application Demonstration of Key Technologies for Intelligent Connected Computing in Learning Environments, is aligned with the strategic deployment of building an education powerhouse and advancing Digital China. It addresses critical bottlenecks such as insufficient dynamic monitoring of learning environments, difficulties in tracking and analyzing learning states, and the low precision of learning support services, through systematic technological research and application demonstration. As a core outcome of this project, this solution presents a cloud-edge-terminal collaborative intelligent learning environment. It establishes an end-to-end data pipeline from environment sensing to instructional services, providing an intelligent foundation for a learner-centered digital education ecosystem.

As illustrated in Figure 1, this solution establishes a three-tier collaborative technical architecture comprising "terminal-side perception, edge computing, and cloud-based scheduling." At the classroom level, multimedia devices, sensing equipment, and computing and storage facilities are deployed to enable real-time collection of data from both the learning environment and instructional processes. At the edge level, regional or central schools deploy edge computing nodes to aggregate multi-source educational data collected from physical classroom spaces and online learning platforms. These nodes perform data cleaning, standardization, and data sharing. Leveraging distributed computing resources, edge nodes invoke cloud-based inference models to analyze teaching data in real time and respond rapidly to instructional needs. At the cloud level, the smart classroom monitoring platform, deployed at Beijing Normal University, operates in coordination with edge and terminal layers. It is responsible for data governance, model training, and the orchestration of intelligent services.

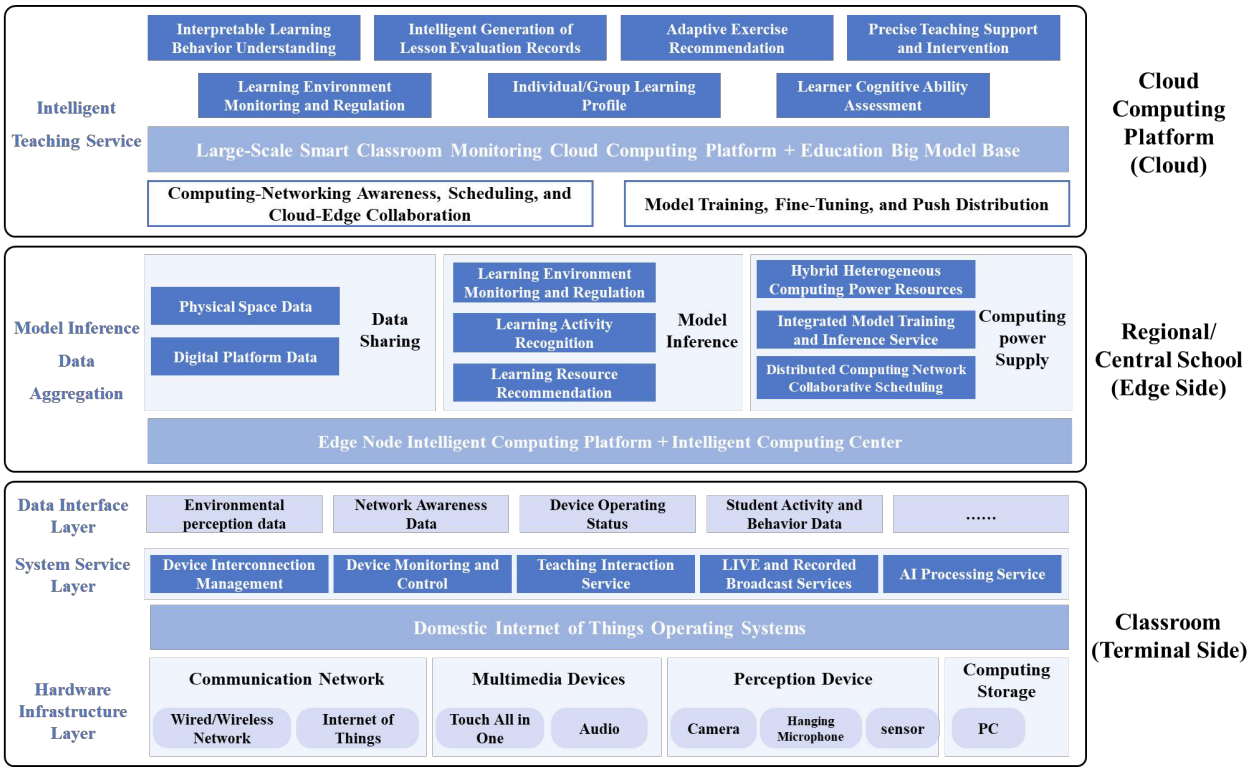

Fig. 1 Technical Architecture Diagram

This solution features the following core functionalities:

① Dynamic Regulation of Learning Environments: To address the dynamic nature of learning environments and the lack of real-time regulation mechanisms, this solution establishes an integrated "sensing–prediction–control" framework. It leverages multimodal sensors to continuously collect environmental, energy, and network data, enabling automated environment assessment. Anomaly detection and time-series forecasting models are applied to identify issues and predict trends, supporting intelligent control of classroom devices such as lighting and air conditioning. A classroom digital twin is further utilized for simulation and strategy optimization prior to execution, ensuring a comfortable, efficient, and stable learning environment.

② Intelligent Analysis of Teaching Processes: To overcome the limitations of traditional observation-based teaching evaluation, including high workload and subjectivity, this solution develops intelligent models for analyzing teaching activities and learning behaviors. It aggregates and aligns multimodal data collected from classroom devices, constructing structured representations of teaching and learning processes. Based on a multi-dimensional evaluation framework, the system assesses instructional organization, interaction quality, knowledge activation, and student engagement, and automatically generates structured classroom analytics reports, enabling data-driven teaching evaluation.

③ Adaptive Learning Intervention: To address the challenges of unmet personalized learning needs and the lack of precise intervention, this solution integrates learning process and outcome data to construct multi-dimensional learner profiles, capturing key characteristics such as knowledge mastery and cognitive abilities. Based on these profiles, knowledge tracing models dynamically recommend differentiated learning resources, while intelligent agents provide real-time feedback and adaptive interventions according to learners' evolving states, delivering highly personalized instructional support.

Technical Highlights or Innovations

① To address the bottlenecks of high latency, high costs, and significant privacy risks inherent in traditional centralized cloud architectures when handling massive inference demands, this solution proposes a cloud-edge-terminal collaborative technical architecture for smart learning environment construction. The resource-intensive advantages of the central cloud and the real-time responsiveness of edge devices form a complementary synergy, meeting the requirements for low-latency response and high-concurrency processing in large-scale smart learning environment monitoring and intelligent teaching services, thereby constituting the technological foundation for teaching quality enhancement.

② Unlike traditional environmental regulation approaches that rely on manual intervention or fixed rules, this solution innovatively constructs dynamic perception and time-series prediction models based on environmental state data streams, enabling intelligent monitoring of environmental anomalies and trend forecasting. Digital twin technology is employed to simulate and preview regulation strategies and optimize parameters prior to execution, achieving precise regulatory intervention in learning environments. This effectively reduces the disruption of environmental anomalies on teaching activities and enhances the teaching experience.

③ Building upon real-time multimodal data perception of the teaching process, this solution constructs automatic recognition models for teacher instructional behaviors and student learning states, providing data support for evidence-based teaching and research, and driving the transformation of teaching evaluation from experiential judgment to data-driven approaches. Simultaneously, it integrates learning process and learning outcome data to construct dynamic learning profiles, enabling precision-oriented learning support. This forms a complete technical pipeline of "data perception–feature extraction–learning state modeling–instructional intervention," resolving the challenge of disconnection between state monitoring and instructional intervention, and effectively empowering differentiated instruction tailored to individual learners.

Application Scenarios

Application Environment and Implementation Targets

① Applicable Scenarios:

This solution is applicable to multiple levels of education, including basic education, vocational education, and higher education. It effectively empowers core application scenarios such as learning environment monitoring, learning modality transformation, teaching process quality enhancement, and educational assessment optimization.

② Software and Hardware Environment:

At the classroom terminal side, deployment is required for intelligent gateway servers, smart central control screens, and perception and acquisition devices (teacher and student cloud-mirror cameras, ceiling-mounted pickup microphones, and environmental quality detectors capable of collecting parameters such as PM2.5, temperature and humidity, CO_2, TVOC, and illuminance), as well as environmental regulation devices (lighting control panels, wireless smart curtain controllers, air conditioning infrared transmitter hosts, and smart circuit breakers and power controllers). For collaborative learning spaces such as seminar classrooms, additional edge interactive terminals and group display screens are required.

At the edge side, AI all-in-one machines, data storage servers, and computing power management and scheduling platforms are required. Large language models such as DeepSeek-R1-7B, Qwen3-32B, Qwen2.5-Math-7B, and Qwen3-VL-8B are deployed on the AI all-in-one machines.

The cloud platform adopts a B/S architecture. The server side implements containerized deployment based on Kubernetes, with SpringBoot as the core development framework, MySQL for business data storage, and integration of Redis and ElasticSearch to support data caching and full-text retrieval, respectively. The client side runs on standard user terminal devices, compatible with mainstream operating systems including Windows, macOS, and Linux, enabling users to access system functionalities via web browsers.

③ Target Users:

This solution primarily serves three categories of core users: education administrators, teachers, and students.

For regional education authorities and school administrators, the comprehensive classroom rating system provides decision-making references for the intelligent upgrading of learning environments and the formulation of relevant policies, while supporting real-time monitoring of environmental conditions and device operational status to enhance operational and maintenance efficiency and teaching support capabilities.

For teachers, the intelligent lesson evaluation module enables comprehensive understanding of student learning states and their own teaching performance, facilitating the transformation of professional development from an "experience-driven" to a "data-driven" paradigm.

For students, the solution collects process-oriented learning data to construct precise user profiles, delivers personalized learning resources, and implements adaptive learning interventions, guiding students to conduct learning activities efficiently across diverse learning scenarios and supporting individualized development.

Examples of Typical Application Scenarios

Scenario 1: Beijing No. 2 Middle School Branch Campus

① Classroom Terminal Side: The solution upgrades standard classrooms in the main campus and seminar classrooms in the west campus of Beijing No. 2 High School Branch Campus. In standard classrooms, environmental sensors, such as temperature and humidity, CO_2, illuminance, and noise sensors, are deployed to enable real-time monitoring of classroom conditions. Cameras and microphone arrays are installed for unobtrusive audio-visual capture of teaching processes. IoT devices, including intelligent circuit breakers, lighting systems, air-conditioning controllers, and smart curtain controllers, are integrated and centrally managed via a smart control panel. Seminar classrooms are further equipped with multi-camera setups, interactive terminals, and group display screens. These enhancements enable real-time collection of group learning process data, providing a foundation for collaborative learning behavior analysis.

② Edge Side: An edge intelligent base was deployed in the school's computer room. Through the integration of data storage servers, multi-source data on school-wide learning environments and learning processes were aggregated. A computing power scheduling and management platform was configured to support on-premises inference of models related to environmental prediction and regulation as well as intelligent lesson evaluation.

AI all-in-one machines loaded with large language models were deployed to provide a technological foundation for various teaching intelligent agents. Concurrently, a school-based knowledge repository was constructed to store teaching resources, instructional data, and practical experiences, providing localized and school-specific knowledge support for teaching intelligent agents.

③ Cloud Side: The Smart Classroom Monitoring Platform deployed at Beijing Normal University is responsible for core functions including edge node management, model training, and iterative optimization. It distributes environmental regulation, learning analytics monitoring, and teaching analysis models to the edge side, while receiving anomaly reports from edge nodes to achieve global monitoring and early warning. Users can access teaching services such as intelligent agent orchestration, intelligent lesson evaluation, and adaptive resource recommendation through the cloud portal, providing precise support and intervention for teachers and students.

Scenario 2: Beijing Normal University

① Classroom Terminal Side: The cloud-edge-terminal collaborative architecture has been deployed in Teaching Building 8 at Beijing Normal University, serving as a model for intelligent connected learning environments. At the classroom terminal side, IoT sensor devices are deployed to collect real-time data on sound, lighting, electricity usage, temperature, and humidity, ensuring the accuracy, timeliness, and completeness of data acquisition.

② Edge Side: Edge computing nodes were deployed to run learning environment perception, prediction, and regulation models, analyzing environmental data to achieve real-time monitoring, anomaly detection, and dynamic regulation of environmental conditions. Simultaneously, a cloud-edge-terminal confidential computing framework based on trusted hardware was deployed, implementing "data usable but invisible" protection through trusted execution environments and secure channels to ensure data and model security.

③ Cloud Side: The Smart Classroom Monitoring Platform deployed at Beijing Normal University aggregates dynamic and static data uploaded from the edge side, forming learning environment datasets covering multiple types of learning spaces, and enabling feature extraction and comparative analysis across different types of learning spaces. It also supports model training and optimization, distributing enhanced model capabilities to the edge side to achieve continuous iterative upgrading of learning environment perception and regulation capabilities.

Impact and Case Evidence

■ **Implementation Results, Evaluation Data or Practical Experience**

In terms of environmental monitoring, the cloud-edge-terminal collaborative architecture has been deployed at Beijing No. 2 Middle School and Teaching Building 8 of Beijing Normal University in China, enabling collaborative computing for multimodal perception data in learning environments. Currently, the cloud platform has integrated multi-dimensional environmental data from approximately 10,000 classrooms across China, covering basic education, vocational education, and higher education. Based on a tiered evaluation framework, environmental conditions are assessed across dimensions including physical environment, sensing devices, communication networks, computing and storage, multimedia equipment, and system services, providing decision-making support for the intelligent upgrading of learning environments.

In terms of teaching support, learning profile analytics and adaptive exercise recommendation services have been provided to 4,663 students and 246 teachers at Songshan Lake North District School, Dongguan, Guangdong Province, China, enabling stratified assessment based on joint knowledge–competency modeling. Intelligent lesson evaluation has also been implemented in Jinzhong, Shanxi Province, China, and Xuzhou, Jiangsu Province, China, effectively supporting teachers in conducting evidence-based teaching and research.

■ Replicability, Sustainability and Promotion Potential

This solution adopts a cloud-edge-terminal hierarchical collaborative technical architecture for learning environment construction, which can be flexibly deployed according to the varying levels of ICT infrastructure across different countries and regions, enabling progressive implementation from environmental perception to intelligent instruction. This ensures strong replicability. The solution supports dynamic expansion and continuous iteration of knowledge bases and model repositories, thereby rapidly responding to emerging scenarios and evolving demands in the digital transformation of education and ensuring long-term sustainable operation. To date, the solution has been implemented across multiple levels of education, validating its cross-scenario adaptability and demonstrating significant potential for broader dissemination.

■ Illustration of a Typical Case

The smart connected learning environment construction at Beijing No. 2 Middle School Branch Campus was initiated in October 2025, and the intelligent renovation of standard classrooms at the main campus and seminar classrooms at the west campus has been completed.

① Classroom Terminal Side Deployment:

Each standard classroom at the main campus is equipped with one smart central control tablet and one intelligent gateway server for unified device management; six ceiling-mounted microphones, one audio processor, and two speakers, along with one teacher cloud-mirror camera and one student cloud-mirror camera, to enable unobtrusive audio and video capture of the teaching process. Additionally, one set each of an environmental quality detector, smart circuit breaker, lighting controller, curtain controller, and air conditioning infrared controller has been deployed to support real-time environmental monitoring and automated regulation. One 86-inch interactive touch display has been installed for instructional presentation, and one PoE switch has been configured to ensure network connectivity.

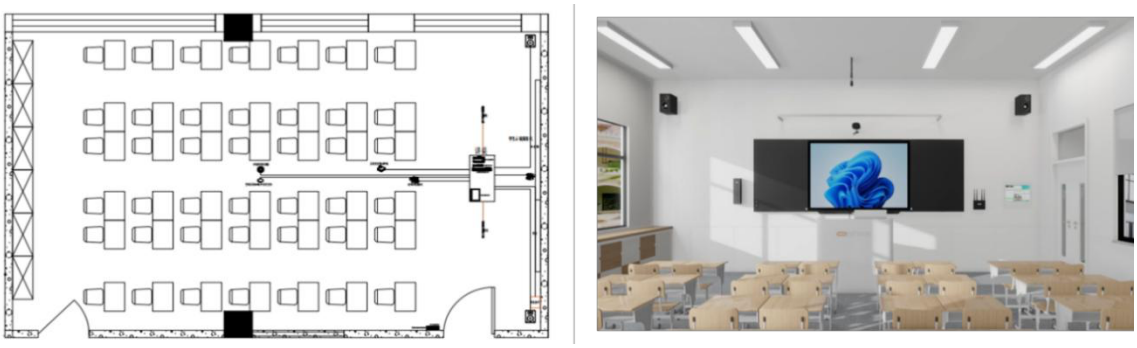

Fig. 2 Rendering of the Upgraded Standard Classroom

Building upon the standard classroom configuration, the seminar classroom is enhanced to support collaborative learning activities. It is additionally equipped with five edge interactive terminals to enable real-time interaction within and between groups, as well as two additional ceiling-mounted microphones, two speakers, four teacher cameras, and four 65-inch group display screens, enabling real-time data collection of the collaborative learning process and facilitating collaborative interaction.

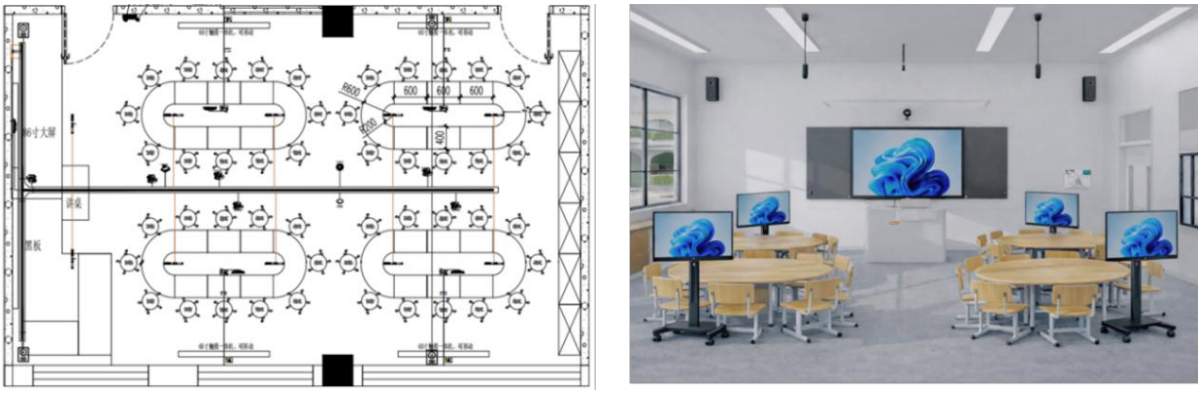

Fig. 3 Rendering of the Upgraded Seminar Classroom

② Edge Side Intelligent Base Construction

Two AI all-in-one machines have been deployed in the main campus computer room to provide GPU computing power for edge-side model inference. One data storage server has been deployed for storing instructional data from classrooms. One computing power management and scheduling platform has been configured to enable dynamic allocation of computing resources.

③ Cloud Platform Integration

The school is connected to the Smart Classroom Monitoring Platform at Beijing Normal University via the campus dedicated network. The cloud platform is responsible for knowledge base updates, model training, and version management, periodically distributing optimized environmental regulation and teaching analysis models to the school's edge side. It simultaneously receives environmental anomaly and device operational data reported by the school, supporting unified environmental monitoring and early warning.

Based on the smart connected learning environment construction, real-time perception and dynamic regulation of learning environment conditions have been achieved, significantly enhancing the stability and comfort of classroom environments. At the school management level, unified monitoring and centralized management of classroom environments and device operational status have been realized, markedly improving operational and maintenance efficiency. Teaching evaluation has shifted from an experience-driven to a data-driven approach, and learning support has transitioned from uniform provision to adaptive delivery, thereby enhancing learning efficiency and teaching quality.

Basic Information of the Institution

Institution Introduction

Fujian Huayu Education Technology Co., Ltd., established in 2010 with a registered capital of RMB 200 million, is the education business sub-brand of NetDragon Websoft Holdings Limited (Hong Kong Stock Exchange code: 777).

In collaboration with Beijing Normal University and other institutions, the company co-established the National Engineering Laboratory for Internet Education Intelligent Technology and Applications. Leveraging cutting-edge technologies and deep industry expertise, it has emerged as a leading force in China's online education and virtual reality sectors. The company specializes in educational software development, harnessing technologies such as VR/AR, artificial intelligence, and the metaverse, with a focus on preschool education, basic education, vocational education, corporate training, and lifelong education across all scenarios, delivering integrated intelligent education solutions. To date, Huayu's education footprint spans 192 countries and regions, serving over 100 million users and more than 2 million classrooms, having established a globally connected K-12 education community network and ecosystem.

Experience or Qualifications in the Field of Digital Education

The company has been deeply engaged in digital education for over a decade, with extensive project experience. In collaboration with the National Center for Educational Technology and Resources Development (Central Audio-Visual Education Center) under the Ministry of Education, it provides technical support for the National Smart Education Platform for Primary and Secondary Schools, serving over 100 million users. The jointly developed national K-12 virtual laboratory has been deployed in 31 provinces and over 20,000 schools, promoting innovation in teaching approaches.

The company has also partnered with the Center for School Planning, Construction and Development of the Ministry of Education to launch the “Guoyu Huayu VR World Laboratory” and establish a provincial-level VR Industrial Technology Research Institute in Fujian, advancing the large-scale application of VR technologies. It has participated in the development of Chinese national and regional standards, including GB/T 43466-2023, GB/T 43438-2023, and DB35/T 2044-2021, contributing to industry standardization.

The company has undertaken multiple national-level key projects, including National Key R&D Program initiatives and projects under the National Development and Reform Commission’s new-generation information infrastructure program (broadband and 5G), as well as 5G+ smart education pilot projects. It has also delivered benchmark projects such as the Henan Provincial AI Education Public Service Platform and the Baoshan Metaverse Digital Twin Campus in Shanghai.

Its technological achievements have received authoritative recognition. The project “Key Technologies and Applications for Intelligent Perception and Precision Services in Multi-Space Learning Scenarios” won the First Prize of the Hubei Provincial Science and Technology Progress Award, while the “VR/AR Core Engine Technology Platform” received the Third Prize of the Fujian Provincial Science and Technology Progress Award.

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11. Wuhan Xingtu Xinke Electronics Co., Ltd.

"Starlight Plan" Regional Education Digitalization Integrated Solution

Solution Introduction

Function Overview

The "Starlight Plan" solution aims to build a new "cloud-edge-device" collaborative digital foundation for regional education, with video artificial intelligence technology at its core. It precisely addresses three key educational pain points: passive and lagging campus safety management, difficulty in sharing high-quality teaching resources across time and space, and the high cost of storing and managing massive teaching video data.

The solution deploys three core hardware devices—the "Edge Computing Gateway," the "View AI All-in-One Machine," and the "Portable Mobile Classroom Equipment"—and integrates them with the upper-layer "Education Intelligent Computing Service Platform" to provide one-stop services for regional education bureaus and schools. Its core value lies in: sinking AI capabilities to the campus edge for real-time warning and handling of safety incidents; rapidly building interactive teaching spaces through mobile, lightweight devices to promote educational equity; and significantly reducing the management cost of digital resources through intelligent video compression technology, making digital applications easier to implement and more sustainable.

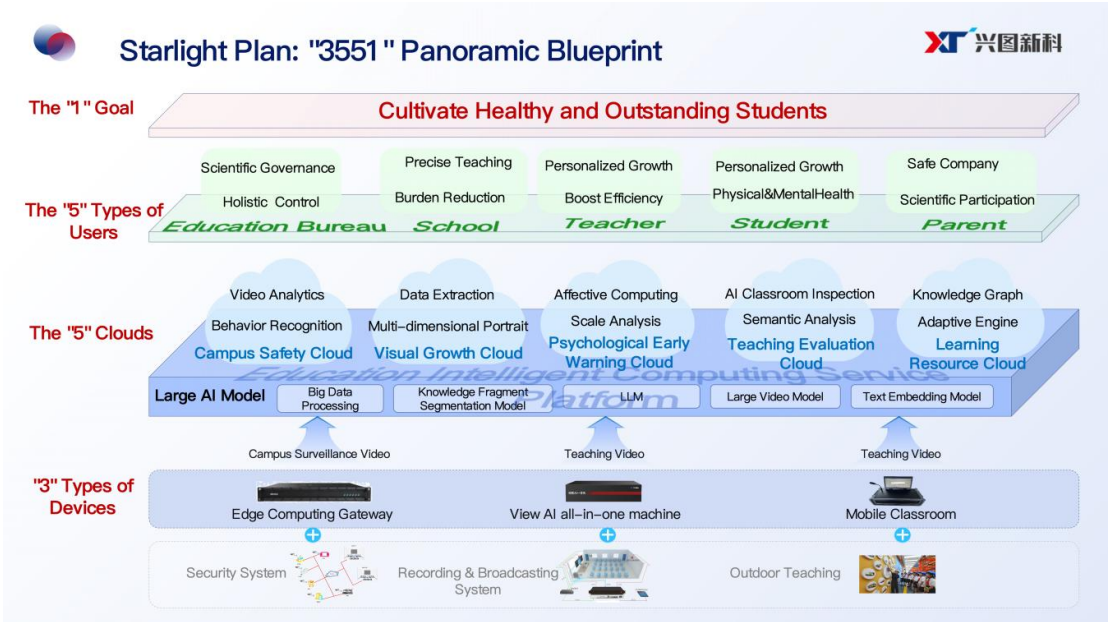

Fig. 1 Starlight Plan: “3551” Panoramic Blueprint

Technical Highlights or Innovations

1. Integrated Innovation of "Edge Intelligence + Video AI": The core device of this solution, the "Edge Computing Gateway," is not a simple network device but an edge intelligent node integrating high-performance AI computing power. It can perform real-time analysis of camera video streams at the campus network edge, enabling millisecond-level identification and local alerts for over 20 types of safety risks such as fence climbing, crowd gathering, and fire detection. It eliminates the need to upload all videos to the cloud, greatly reducing bandwidth dependency and response latency, and ensuring real-time data processing and privacy.
2. Breakthrough in "Full-Scenario Mobile Interactive Teaching": The "Portable Mobile Classroom Equipment" adopts a highly integrated, all-in-one design, featuring built-in intelligent broadcasting, multi-channel signal aggregation, 5G/Wi-Fi dual-mode transmission, and battery power supply. Its innovation lies in breaking the limitations of fixed, complex-to-deploy traditional recording/broadcasting classrooms. It can be set up within 10 minutes in any location—ordinary classrooms, laboratories, outdoor playgrounds, or field trip bases—to create a professional classroom with remote interaction, course recording, and live streaming capabilities. This truly realizes "teaching follows teachers and students," providing a flexible technological carrier for innovative teaching models such as project-based learning and cross-school collaboration.
3. "High-Ratio Lossless Video Compression" Empowers Resource Governance: Addressing the common school challenges of high storage pressure and difficulty in accessing surveillance footage and open-class videos, the solution's video intelligent governance technology can perform up to 4-10 times lossless compression on videos. While ensuring key information is not lost, it reduces storage and transmission costs by over 90%. This technology enables schools to preserve and utilize teaching process data long-term and at low cost, laying the foundation for video-based educational big data analysis.

Application Scenarios

Application Environment and Implementation Targets

This solution is suitable for smart education construction projects promoted by regional education bureaus, as well as digital campus upgrade scenarios for K-12 schools, vocational colleges, and higher education institutions. Hardware devices are compatible with existing campus network environments and connect via standard interfaces; the software platform supports public cloud, private cloud, or hybrid cloud deployment. Primary service targets include: regional education administrators (for area-wide safety supervision and teaching quality assessment), school administrators (for school-based safety governance and teaching management), teachers (for conducting interactive teaching and research), and students (for participating in cross-school interactive classes and personalized learning).

Examples of Typical Application Scenarios

Scenario 1: Regional Campus Safety Joint Prevention and Teaching Quality Enhancement (Hunan Province, China)

In Hunan Province, in collaboration with the local education bureau and education audio-visual publishing house, we innovatively launched a "hardware leasing + platform service" model.

Edge Computing Gateways were deployed in schools across multiple counties/districts to enable intelligent identification and unified alerts for campus dangerous behaviors. Simultaneously, using Mobile Classroom equipment, "master teacher classes" from high-quality schools in the provincial capital were live-streamed to other schools, supporting two-way interaction. The education bureau can monitor the safety status and classroom activity levels of all schools in real-time through the platform, achieving a shift from "human defense" to "intelligent defense" and from "resource silos" to "resource sharing."

Scenario 2: Cross-School Collaboration and Outdoor Field Trip Innovative Teaching (Shenzhen City, Guangdong Province, China)

In Shenzhen Cloud School and Longgang District, we successfully conducted "multi-school + off-site location" tripartite connect classrooms using Portable Mobile Classroom equipment. For example, the host school, participating schools, and a science museum field trip site were interconnected in real-time via mobile devices, achieving multi-dimensional interaction and intelligent switching between the Lead teacher,co-teachers, remote students, and outdoor practice footage. This scenario Verify the equipment's powerful capability in promoting cross-school teaching research and integrating social practice, providing a standardized tool for Shenzhen's exploration of the "weekly half-day plan" curriculum reform pilot under the philosophy of "using everything as teaching material, making the world the classroom."

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

Safety Management Efficiency Improvement: In pilot schools where Edge Computing Gateways have been deployed, the identification accuracy rate for typical risks such as perimeter intrusion and entry into dangerous zones exceeds 95%. The average alert response time has been shortened from the "hour-level" of past manual patrols to "second-level."

Teaching Resource Cost Reduction: Through video compression technology, we helped a middle school with 300 camera channels reduce its annual video storage cost from approximately 150,000 RMB to less than 10,000 RMB, representing a 93% decrease in storage cost.

Interactive Teaching Coverage Increase: In 10 pilot schools in Qiantang District, Hangzhou, the use of Mobile Classroom equipment increased the monthly average frequency of inter-school open classes and remote teaching research activities by 3 times, with teacher satisfaction reaching 90%.

Replicability, Sustainability and Promotion Potential

The solution adopts a "standardized hardware + configurable platform" design. Hardware is plug-and-play, and the platform allows flexible subscription to service modules (such as the "5 Clouds" for safety, teaching, psychology, growth, and learning) based on regional needs, giving it strong replicability. The innovative "leasing model" lowers the upfront investment threshold for schools, while the storage costs saved through video compression can directly cover service subscription fees, forming a good sustainable operation Closed Loop. The solution has been successfully piloted in provinces and cities across China with varying economic development levels. The core pain points it addresses are common issues in global education digitalization, giving it great potential for promotion to "Belt and Road" countries and other international regions.

Illustration of a Typical Case

Case Name: "Shenzhen Longgang Regional Education Digitalization Service Project"
Time of Implementation: November 2024 to present
Location of Implementation: Longgang District, Shenzhen City, Guangdong Province, China
Scale of Implementation: Initially covered over 30 schools, deploying more than 30 Edge Computing Gateways and over 30 sets of Mobile Classroom equipment.
Key Outcomes:
1. Successfully created a replicable regional digital service model of "AI Safety Prevention & Control + High-Quality Course Circulation."
2. Achieved intelligent, platform-based unified management of regional campus safety incidents.
3. Conducted over 100 cross-school "Cloud Classroom" sessions via Mobile Classroom, benefiting more than 3,000 students from other schools.
4. Established a stable business model of "Hardware Leasing + Annual Service Fee," ensuring strong project sustainability.

Exhibition Materials

This solution is highly suitable for physical exhibition. The booth can be designed around two core areas:
1. "Smart Campus Safety Center" Sandbox: A large screen dynamically demonstrates how the Edge Computing Gateway processes multiple campus video streams in real-time and simulates triggering alerts for events like fence climbing and fire, visually presenting the AI-powered proactive prevention capability.
2. "Mobile Interactive Classroom" Experience Zone: A complete set of Portable Mobile Classroom equipment is set up on-site, allowing visitors to play the role of teacher or student. They can personally experience functions like one-click initiation of remote interaction, intelligent screen switching, and outdoor connection,feel the convenience and power of the equipment.
Hardware/Software Configuration: 2 display screens, 1 set of Portable Mobile Classroom equipment (including host, camera, microphone, tablet).
Space Requirements: Approximately 20-30 square meters, requiring stable network connectivity.

Fig. 2 Portable Mobile Classroom Equipment

Basic Information of the Institution

Institution Introduction:

Wuhan Xingtu Xinke Electronics Co., Ltd. (Stock Code: 688081) was founded in 2004. It is a company listed on the Shanghai Stock Exchange STAR Market and a National High-Tech Enterprise. The company positions itself as a "Video Artificial Intelligence" provider and is a leading intelligent system product supplier and integrated solution provider. Its business focuses on the integrated innovation of video, network, and intelligent technologies, with its service scope covering the globe. As a leading enterprise in the field of military video command, the company also deeply applies the "high reliability, low bandwidth, strong resilience" video technology system accumulated in the military industry to the fields of military vocational education and military training, providing technological support for building a modern military education system.

Experience or Qualifications in the Field of Digital Education

The company has deeply cultivated audio-visual technology for over 20 years and strategically entered the education digitalization field in 2018. As an enterprise member of the World Digital Education Alliance (WDEA), we deeply participate in global smart education dialogue. The "Starlight Plan" solution has been successfully applied in over 10 provinces and more than 300 schools across China. We are currently exploring in-depth cooperation based on video-based accompanying data with the Beijing Normal University's national-level "Student Comprehensive Quality Evaluation" project team, committed to promoting education digital transformation with "military-grade quality" technology. Simultaneously, leveraging its mature experience in serving the military, the company adapts military-grade video command, simulation training, and remote collaboration systems for military vocational education scenarios, providing high-security, full-scenario intelligent teaching and training solutions for military academies and training bases, realizing the innovative application of civil-military integration technology in the education field.

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12. Unis Moedu Technology Co., Ltd.

AI+Education Solutions Empowered by Unis MoCLAW

Solution Introduction

Function Overview

This solution is built upon an AI Education Digital Base as its underlying support, with the Unis MoGPT's dedicated problem-solving model and Educational Agents serving as the core technical engine. It deeply integrates software and hardware by linking with Unis Moedu's educational smart terminals. Relying on the Chatbot AI Teaching Assistant for scenario-based implementation, it constructs a comprehensive smart education ecosystem supported by MoClaw Agent, covering the entire spectrum of intelligent support for teaching, learning, research, and management. The platform layer uses the Education Digital Base as a unified foundation, integrating capabilities for data governance, multi-agent orchestration, application interoperability, and an open ecosystem. The technology layer leverages the MoGPT problem-solving model and the educational AI agent development platform to provide capabilities for agent construction, orchestration, and deployment. The terminal layer connects smart classroom devices and AI learning terminals, achieving full coverage of both on-campus and off-campus scenarios. The application layer deeply integrates the Chatbot AI Teaching Assistant into the entire teaching process, offering one-stop services such as AI-assisted lesson preparation, courseware generation, essay grading, personalized exercises, learning analytics, home-school collaboration, and green content management. It provides intelligent support for teachers, students, teaching researchers, and administrators across all roles, processes, and scenarios, promoting the high-quality implementation of education digitalization.

Currently, digital transformation in education presents two types of progressive pain points. The first pertains to fundamental challenges of traditional teaching models—the basic issues that the first phase of AI application needs to address: on the teaching side, teachers are overburdened with administrative tasks, and there is a lack of personalized resource supply, making it difficult to implement the "Double Reduction" policy's requirement for quality improvement; on the learning side, learning paths are homogenized, with a lack of process-based evaluation, leaving students without sufficient support for autonomous growth; on the research side, reliance on manual experience and insufficient data-driven approaches result in low efficiency in translating research into practice; on the management side, fragmented systems and data silos hinder the effectiveness of home-school collaboration and campus management. These issues have been partially alleviated through the preliminary application of general-purpose large language models, marking the first milestone in educational AI development.

The second type involves new challenges arising from the widespread adoption of large models, representing a new bottleneck widely encountered by educators: AI applications are often bolted-on and cannot be deeply embedded into teaching workflows; data barriers remain unbroken, preventing AI from accessing comprehensive, holistic learning data; agents only possess interactive capabilities but lack the ability to execute tasks and orchestrate processes autonomously; the absence of long-term memory and state persistence makes it difficult to ensure teaching continuity; general-purpose models are inadequately adapted to educational contexts, posing risks to subject accuracy and compliance; and highly coupled system architectures make it hard for schools to independently iterate and sustain operations.

This solution, powered by the MoClaw technical framework as its core engine, addresses these dual pain points through a layered approach, achieving a generational upgrade in educational AI from tool assistance to native intelligence. At the foundational value level, it accomplishes the goals of the first milestone in educational AI: reducing teachers' burdens and enhancing their efficiency, providing personalized learning for students, empowering educational research with data, and improving management effectiveness. At the upgraded value level, it constructs a new paradigm for educational AI: upgrading bolted-on AI to native teaching intelligence; upgrading data silos to fully connected, holistic learning analytics; upgrading interactive intelligence to self-executing task and process automation; upgrading short-term interactions to persistent long-term memory; upgrading general-purpose, less controllable models to educational-specific, compliant applications; and upgrading closed systems to an open, iterable digital foundation.

Technical Highlights or Innovations

The technological innovation highlights six major breakthroughs, forming unique advantages through deep integration with educational practices:

- Developing native educational AI agents based on an OpenClaw-like framework, distinct from industry-standard bolt-on AI solutions. These agents autonomously plan and execute full teaching workflows, enabling sustainable classroom integration
- Establishing a closed-loop system for holistic learning analytics, leveraging the Education Digital Base to integrate multi-source data. This achieves scalable implementation of "one-class, one-plan" precision teaching strategy in K12 settings.
- Enabling full-scenario process automation by optimizing high-frequency administrative tasks for teachers. Demonstrated in nationwide deployments, it significantly reduces repetitive workloads.
- Incorporating a long-term memory engine that overcomes the short-term interaction limitations of generic models. This supports whole-cycle student progress tracking, meeting the critical industry need for process-oriented assessment.
- Deeply refining the education-specific MoGPT problem-solving model and compliant dialogue frameworks. It surpasses generic large models in subject accuracy and parent-school communication security, aligning with educational regulations and pedagogical ethics.
- Built on a standardized Education Digital Base, the solution maintains high compatibility with mainstream software and hardware. This open architecture grants exceptional adaptability and replicability, which has been proven in regional digital education projects, resulting in industry-leading deployment capabilities.

Application Scenarios

Application Environment and Implementation Targets

This solution is designed for the entire K-12 education spectrum, serving provincial, municipal, and county-level education departments as well as primary and secondary schools. It is intended for education administrators, curriculum and research staff, teachers, students, and parents, providing comprehensive support for all educational operations across teaching, learning, research, management, and assessment.

The software environment is built on a frame consisting of the Education Digital Base combined with the cloud-based SaaS application. It supports two deployment models: pure SaaS for lightweight deployment and hybrid cloud deployment (foundation on-premises + applications in the cloud). This approach balances rapid implementation with data security and compliance, and is compatible with educational clouds at all levels as well as existing campus systems.

The hardware environment includes Smart Classrooms (smart displays/blackboards, AI recording and broadcasting systems, AI data collection devices, etc.), Student AI Learning Devices (for independent extracurricular study), and Unis AI Smart Study Clubs (immersive AI study rooms for end-users), achieving integrated hardware and software capabilities and seamless data connectivity both on and off campus.

Examples of Typical Application Scenarios

Scenario 1: Precision Teaching and Learning

Leveraging comprehensive learning data—including classroom activities, homework, and assessments—aggregated by the Education Digital Base, teachers can use the Chatbot AI Teaching Assistant to conduct intelligent, data-driven lesson planning. By combining class-wide learning trends with individual student profiles, the system intelligently generates tailored instructional designs, course materials, and tiered exercises for different proficiency levels, driving the shift from experience-driven to data-driven precision teaching. In the classroom, teachers conduct interactive lessons via smart display screens and use the MoScan to collect real-time data from in-class exercises, dynamically monitoring students' knowledge mastery to provide timely, targeted explanations and tiered tutoring.

After class, students can use the AI Q&A tutoring feature to receive professional guidance on problem-solving and insights into solution approaches, enabling them to independently address their weaknesses. Simultaneously, AI-powered live-streaming and recording equipment automatically captures the entire class session. The system uses large language models to intelligently analyze classroom videos, automatically identifying key information such as knowledge point delivery, teacher-student interactions, and teaching behaviors, and generating structured analytical reports. These reports provide objective evidence for lesson case studies, teaching reflections, and school-based pedagogical research, significantly enhancing the precision and effectiveness of educational research efforts.

Scenario 2: Intelligent Management Decision-Making

Unis Moedu's "Smart Data Assistant" leverages the Education Digital Base as its data backbone, integrating multi-dimensional management data—including campus governance, academic affairs, and faculty and student performance—to build an intelligent Q&A service system for administrators.

Managers can conveniently query various educational management data and analysis results through natural language interaction. Whether it concerns teacher academic qualifications, class performance overviews, academic affairs progress, or regional resource allocation, they can quickly obtain intuitive and precise responses. The system transforms dispersed operational data into interactive, understandable intelligent knowledge services, replacing traditional manual query and report aggregation methods. It simplifies management workflows, enhances data utilization efficiency, and provides intelligent support for regional education coordination, refined campus management, and scientific decision-making analysis, driving the evolution of educational management toward greater efficiency, precision, and intelligence.

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

This solution delivers solid application results around core education scenarios. In teaching scenarios, teachers rely on AI-assisted lesson preparation and student learning data support to effectively reduce the burden of administrative work. Many teachers have explored and developed personalized "AI + Teaching" models based on product functions, enabling precise teaching to be truly implemented in the classroom. In learning scenarios, AI Q&A tutoring and personalized learning support help students identify knowledge gaps independently, enhance learning initiative and improve learning effectiveness. In teaching and research scenarios, AI-based classroom analysis breaks the limitations of traditional teaching research that relies on manual observation and subjective judgment. It enables objective and quantitative diagnosis of classroom teaching from multiple dimensions, greatly improving the accuracy and effectiveness of teaching research.In management scenarios, the Smart Data Dashboard provides one-stop intelligent data query. Administrators can quickly obtain decision-making support without cumbersome retrieval and aggregation, significantly improving the efficiency and refinement of educational management.

Replicability, Sustainability and Promotion Potential

Unis Moedu’s integrated "AI + Education" solution has achieved large-scale implementation nationwide, serving hundreds of schools at all levels and of various types, and has formed a mature, stable and rapidly replicable promotion model.Innovative application models represented by "AI + Cloud-based School" align closely with the requirements of building a strong country through education. They establish a new education paradigm with full-scenario AI empowerment, becoming an industry benchmark. These models have attracted many schools and education authorities from across the country to observe and learn, and relevant experience can be directly applied and reused.Meanwhile, the project adopts an international vision, actively promoting China’s successful "AI + Education" practices to go global. Cooperation has been launched with multiple countries and regions including Hong Kong SAR of China, Cambodia and Sri Lanka. The mature smart education model is replicated and exported internationally, providing a implementable Chinese solution for the global digital transformation of education.

Illustration of a Typical Case

Shenzhen Cloud School is a public physical school directly under the jurisdiction of the Shenzhen Municipal Bureau of Education. It was initially established as a nine-year consistent school and will be developed into a twelve-year school covering primary and secondary education in the future. Shenzhen Cloud School has formed a "1+N" school community consisting of one headquarters physical school plus N partner schools. It has pioneered an innovative teaching model featuring regular operation, full-subject coverage, multiple instructors, live-stream interaction and intelligent assistance. It also establishes an autonomous learning model characterized by cross-school class organization, multi-teacher collaboration, optimized learning support, and seamless integration & flexible switching between online and offline scenarios, radiating high-quality teaching resources to partner schools throughout the city.

Adhering to the educational philosophy of "Clouds inspire clouds, souls awaken souls", the school is committed to building itself into:an experimental school for future education reform,a model school for the high-quality and balanced development of basic education,a benchmark school for cultivating new-generation talents,a pioneer school for teachers' collaborative and innovative development,and ultimately into a future demonstration school for socialism with Chinese characteristics.

Shenzhen Cloud School has been officially included in the Outline of the Plan for Building a Strong Educational Country (2024–2035) and has become an important orientation for the digital development of education. Its practical experience has been gradually promoted. Relying on digital technologies such as artificial intelligence, the school has comprehensively facilitated the effective implementation of the new "AI + Education" paradigm, injecting new momentum into educational reform and high-quality, balanced development.

Basic Information of the Institution

Unis Moedu Technology Co., Ltd. is a core enterprise under Unis Co., Ltd. (000938), focusing on multi-domain applications of artificial intelligence, and serves as the core entity of Ziguang's AI+Education ecosystem. Leveraging the profound technological accumulation of Tsinghua Unigroup in chips, cloud computing, big data, artificial intelligence, 5G and other core fields, the company adheres to the core philosophy of "Empowering Educational Digital Transformation with AI Agents", actively responds to the national plan for building a strong educational country, and builds full-chain AI education service capabilities.

In terms of technology R&D, the company bases itself on the independent research and development of core AI agent technologies and adopts an industry-university-research collaborative innovation model. It has joined hands with top domestic education and research institutions including Tsinghua University, Beijing Normal University and Central China Normal University, forming profound technological strengths in algorithm optimization, scenario adaptation, data security and other key fields. It has achieved full-chain R&D capabilities from core technology development to commercialization. The company has obtained more than 50 national patents and nearly 100 software copyrights. It has been recognized as a National High-Tech Enterprise and included in the list of Specialized, Sophisticated, Unique and New Small and Medium-sized Enterprises.

In terms of products and solutions, the company took the lead in launching the Education AI Agent Development Platform in the industry. Built-in with multiple agent applications such as Modou Teacher, test paper generation, teaching and research, Q&A tutoring, and official document drafting, it provides education products and solutions for users at all levels featuring AI-assisted teaching, learning, assessment, education, research and management. It gives full play to the positive role of artificial intelligence in building a strong educational country and a high-quality education system.

In terms of industry standard formulation, the company has deeply participated in the formulation and drafting of a number of national and industrial standards, including:

Guidelines for the Construction and Application of Regional Education Governance Digital Infrastructure (Basic Education),

General Technical Requirements for Low-Code Development Platforms for Systems and Software Engineering,

Guidelines for the Construction of Cloud Schools in Primary and Secondary Schools,

Network Design Specifications for Digital Campuses in Primary and Secondary Schools.

It has transformed its core technological achievements and practical experience in AI agents and digital infrastructure into universal industry standards, promoted the standardized application of advanced technologies in education, provided a unified technical path and implementation framework for educational digital transformation, and led the high-quality development of the education information industry.

The company's AI agent-related products and solutions have been successfully implemented in educational scenarios in many provinces and cities, including Minhang District of Shanghai, Shenzhen, Honggutan District of Nanchang, Xiong'an New Area of Hebei, and Hoboksar County of Xinjiang. Remarkable results have been achieved in regional educational digital transformation, the construction of smart campus model schools, and the improvement of educational governance capacity, winning high recognition from education authorities at all levels.Meanwhile, the company actively participates in the formulation of national and local standards in new education infrastructure, digital transformation and educational AI. Supported by core AI agent technologies, it is committed to building an influential and credible professional brand in the field of AI applications for education.

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13. Zhejiang Hailiang Technology Co., Ltd.

Exploration, Co-creation, Creation: An AI-Inspired Thinking Classroom Reform Solution for Advancing Cognitive Development

Solution Introduction

Function Overview

Drawing on Hailiang Education's 30 years of educational experience and accumulated data, Hailiang Technology has launched the comprehensive "AI-Inspired Thinking Classroom" solution. This approach is guided by the principle of "teaching for thinking, making growth visible," and integrates instructional paradigms, intelligent tools, and resource systems to meet the evolving needs of educational transformation in the modern era.

The "AI-Inspired Thinking Classroom" solution establishes a comprehensive classroom cycle centered around three key stages: "Exploration, Co-creation, and Creation."

Pre-class "Exploration": AI generates guided personalized learning plans, delivers micro-lecture resources, and automatically produces learning analytics reports, allowing teachers to implement a "teaching based on learning." approach.

In-class "Co-creation": A range of interactive tools—including buzzers, random name pickers, group collaboration, student-led presentations, and reward systems—are used to enhance classroom engagement. AI-generated learning maps provide real-time insights into both group-level and individual student performance .

Post-class "Creation": AI automates grading for assignments across all subjects and question types, generating error notebooks and personalized exercises to achieve precision guidance tailored to each student.

Technical Solution

The project has obtained 4 software copyrights and holds 11 core invention patents, covering key areas such as knowledge graph-based learning assistance from question banks, learning path generation, chat content monitoring, teaching material generation, smart education terminal recommendations, and learning monitoring. All six major digital support systems (including Hongru Teaching and Research, Haina Smart Class, Haina Cloud Assessment, Xingweilai, Xingxueban, etc.) are cloud-based, ensuring stable operation and data security without the need for schools to establish their own servers.

Implementation Steps and Timeline

The implementation strategy follows a progressive model of pilot pioneering → radiative diffusion → comprehensive rollout:

Pilot Pioneering Phase (3 months): 46 key teachers were selected from 13 schools within the group to form a "Curriculum Reform Pioneer Team." Through activities such as demonstration school visits, teacher training sessions, and open class competitions, the team introduced the Suzhou-style cooperative learning model and micro-lecture resources from Onion Academy, drew on academic expertise from East China Normal University, and formulated standardized operating procedures.

Radiative Diffusion Phase: Starting with the pioneer teachers, the reform practices were extended to other teachers teaching the same subjects and grade levels. Benchmark schools served as hubs for inter-school exchanges, thereby amplifying the reform's impact.

Comprehensive Rollout Phase: Concurrently, the promotion of the "Xingxueban" smart tablets was advanced under a "tools-first, model-follows" strategy, providing a digital foundation for large-scale classroom reform.

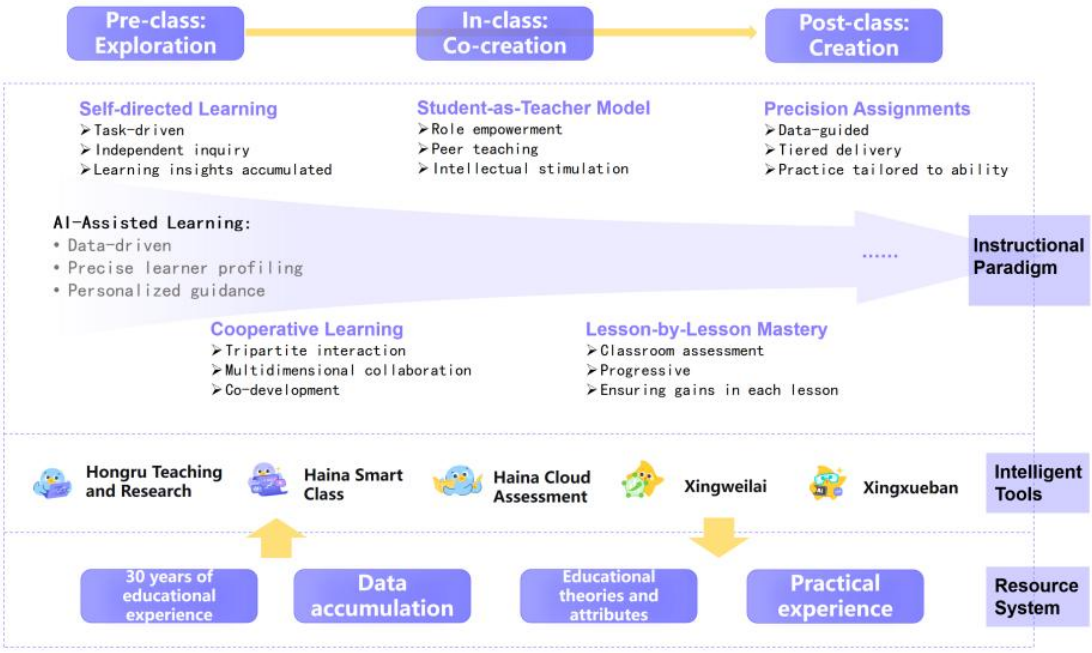

Fig. 1 AI-Inspired Thinking Classroom Reform Solution

Technical Highlights or Innovations

AI is deeply embedded throughout the entire instructional process, from pre-class preparation to in-class activities and post-class evaluations. This seamless integration enables real-time data collection and intelligent analysis of teaching and learning.

The project holds 11 core invention patents, establishing proprietary intellectual property in areas such as knowledge graphs, learning path generation, and intelligent grading.

Mechanism Innovation

Adhering to the philosophy of "originating from practice and applied in practice," the progressive strategy of "pilot pioneering—radiative diffusion—comprehensive rollout" ensures the reform progresses steadily and is highly adaptable. The model is grounded in real classroom practices, offering high potential for replication and scalability.

Philosophical and Practical Innovation

The AI-Inspired Thinking Classroom is not a theoretical project but rather emerged through Hailiang Education's 30 years of educational practice, drawing on the experience of outstanding administrators and teaching research groups from nearly 30 prestigious schools. It has grown out of real classrooms, precisely addressing practical pain points such as teachers' difficulties with lesson preparation, low student engagement, and delayed feedback.

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

The solution has been implemented in 23 schools in Zhejiang Province, reaching over 20,000 teachers and students. Over 34,781 classes have been delivered, with students completing 36,527 hours of pre-class preparation, and AI has graded over 100,000 assignments. Teachers have accumulated 33,092 hours of platform usage, marking a transition from pilot programs to regular practice.

Significant Improvement in Teaching Quality

Hailiang Experimental High School: After one semester of implementation, art stream students in Grade 12 achieved an average score increase of 19 points on the college entrance examination, with the highest individual increase reaching 45 points.

Hailiang Art High School: Following 60 days of school-wide reform, classes that actively participated in the initiative saw average score increases of 2 to 10 points on mid-term examinations, alongside significant increases in student engagement and learning attitudes.

Tianma Primary School: Among the 19 teachers participating in the curriculum reform, 12 saw their classes improve in rankings, with the highest achieving a 13-place increase.

Notable Reduction in Teacher Workload

Mathematics Assignment Grading (40 students/class): Reduced from 2 hours of manual grading to 10 minutes with AI grading, achieving a 12-fold increase in efficiency.

Chinese Essay Grading (40 students/class): Reduced from 10 hours of manual grading to 15 minutes with AI grading, achieving a 40-fold increase in efficiency.

Growing Social Recognition

The AI-Inspired Thinking Classroom case study from Hailiang Foreign Language School was awarded the First Prize in the "2025 AI-Empowered Education and Teaching Typical Cases" by the Zhejiang Private **Education Association.**

In the Beijing News' 2025 "Smart Living" Annual Case Selection, the "AI-Inspired Thinking Classroom" was recognized as the "Annual Digital Intelligence-Empowered Teaching Reform Product."

The Vice Mayor of Zhuji City visited Hailiang Art High School to observe the AI-Inspired Thinking Classroom, summarizing its value with the terms "integration" and "alignment."

Hailiang Foreign Language School has hosted over 10 schools for observation and exchange visits, with its successful experience receiving feature coverage from multiple media outlets.

Replicability, Sustainability and Promotion Potential

Universality and Demonstrative Value

The AI-Inspired Thinking Classroom solution fully considers the differences in actual conditions among various types of schools, including urban, rural, and international schools, offering broad adaptability and flexible configurability. The cloud-based deployment model minimizes the demands on schools' information technology infrastructure, facilitating implementation across different regions and schools with varying operational conditions.

Dissemination Pathways and Localization Adaptation

Regional Replication: The solution is currently planned for implementation in over 70 schools across 15 provinces and cities nationwide, including the Urumqi Economic and Technological Development Zone in Xinjiang and Urad Middle Banner in Inner Mongolia. This will help refine strategies for cross-regional implementation.

Tiered Implementation: Depending on schools' IT's infrastructure, strategies such as "tools-first, model-follows" or "pilot-first, gradual rollout" can be adopted to ensure steady and reliable reform implementation.

Teacher Support: With over 1,100 master's and doctoral researchers and 500 expert educators and renowned teachers, Hailiang Technology provides comprehensive teacher training and ongoing support to ensure effective localized implementation.

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14. Chivox Co.,Ltd.

AI-based Integrated Solution for Multilingual Listening and Speaking Teaching, Examination, Practice and Assessment

Solution Introduction

Function Overview

Based on core technologies independently developed by Chivox,including intelligent speech technology, large models and big data analysis, this solution builds a comprehensive AI-based oral education solution for multiple languages covering the entire process of "Examination, Teaching, Learning, Practice and Assessment". It provides five core capabilities for education authorities, schools of all levels and types, educational publishing institutions at home and abroad as well as the overseas Chinese language education system, namely multilingual oral intelligent assessment, immersive conversational learning, automated listening and speaking examinations, personalized learning diagnosis, and learning situation big data analysis.

It systematically addresses three common pain points that have long existed in the global language education field:

A shortage and uneven distribution of high-quality oral teaching faculty.

High organizational costs for large-scale oral examinations, large errors in manual marking, and difficulty in balancing fairness and efficiency.

Lack of timely feedback, accurate diagnosis and personalized guidance for students in the learning process, leading to low learning efficiency and the easy formation of "mute foreign language" phenomenon.

This solution is applicable to all scenario applications such as national high-stakes foreign language listening and speaking examinations including the senior high school entrance examination and college entrance examination, daily foreign language teaching in campuses, phased academic assessment, independent after-school learning for students, and personalized family tutoring. Through the collection, analysis and application of full-process learning data, it forms a closed-loop intelligent language learning system of "Assessment - Diagnosis - Guidance - Improvement". The solution supports Chinese, English and multilingual expansion; at present, its teaching application for Chinese and English is mature and stable, and it can be quickly adapted to the needs of English teaching, international Chinese teaching, language education in ethnic areas, and foreign language learning in countries along the Belt and Road. Relying on low-cost, highly inclusive and scalable AI technology, it makes up for the gap in high-quality educational resources and builds a new era of the Tower of Babel with AI technology, enabling barrier-free language communication worldwide.

Technical Highlights or Innovations

①Independent intellectual property speech technology with industry-leading assessment accuracyThis solution adopts independently developed and controllable intelligent speech technology of Chivox, which can realize phoneme-level refined scoring and intelligent diagnosis, with multi-dimensional feedback including pronunciation, tone, stress, liaison, fluency and prosody. It achieves fully automatic intelligent scoring for open-ended question types such as picture description, situational Q&A and oral composition, with the consistency between scoring results and expert manual scoring reaching ≥95%, meeting the stringent application standards of national high-stakes examinations. Relevant technologies have been verified in the senior high school entrance examination and college entrance examination in six provinces and municipalities in China, serving over one million test-takers, and meeting the rigid demands of high-stakes examinations such as the senior high school entrance examination and college entrance examination for safety, fairness and high efficiency.

②Four-stage technical system creating a complete learning closed loopRelying on Chivox's original four-stage technical strategy of "Standard Establishment - Personalized Diagnosis - Precise Correction - Intelligent Improvement", this solution breaks the industry bottleneck of traditional speech learning products that "only score, not teach", realizing an upgrade from "passive scoring" to "active guidance". At the same time, it is equipped with multi-modal AI intelligent marking capabilities, deeply supporting the coordinated improvement of oral expression and writing abilities, truly realizing the promotion of learning and teaching through assessment, and greatly improving the efficiency of language learning and teaching effects.

③Multilingual support for global language education collaborationIt supports multiple languages, with extensive application of Chinese and English. It can be adapted to the needs of international Chinese teaching and language teaching in countries along the Belt and Road, making up for the gap in faculty and resources with technological inclusiveness, and providing Chinese solutions for the global spread of Chinese culture and the collaborative development of global language education.

④AI immersive companion learning to eliminate the "mute foreign language" phenomenonCombining high-precision ASR and TTS technologies, it provides students with exclusive AI teachers, supporting high-tolerance free conversations in simulated real scenarios (such as customs and restaurants). It completely solves the pain points of rote memorization and inability to communicate in practical scenarios in traditional teaching.

Application Scenarios

Application Environment and Implementation Targets

①Application Environment: Supports public cloud, private cloud and local deployment; compatible with Windows, Android, iOS, Linux and other systems; adaptable to smart classrooms, multimedia classrooms, family learning terminals, examination-specific computer labs and other environments.

②Service Objects：

*Education authorities: For regional foreign language oral academic level tests, foreign language listening and speaking examinations for the senior high school entrance examination and college entrance examination, and language proficiency monitoring.

*Primary and secondary schools / vocational colleges / higher education institutions: For daily foreign language oral teaching, interactive classroom practice, homework assignment and automatic marking, mock examinations, learning situation analysis, hierarchical teaching and personalized tutoring.
*Educational institutions and publishing enterprises: For empowering intelligent learning products, digital upgrading of teaching content, and developing intelligent platforms supporting teaching materials.
*Global users: Educational institutions in countries along the Belt and Road, overseas Chinese language schools, and schools in ethnic areas, for foreign language teaching, Putonghua promotion, language proficiency improvement and cultural exchange and communication.

Examples of Typical Application Scenarios

Scenario 1: Intelligent Scoring for High-stakes Examinations such as the Senior High School Entrance Examination and College Entrance Examination in China
Participating in the implementation project of English listening and speaking examinations for the senior high school entrance examination and college entrance examination in China, it provides a complete solution for human-computer interaction examinations and intelligent scoring services of English listening and speaking for the college entrance examination and senior high school entrance examination to education examination institutes or education authorities in all provinces and municipalities across the country, including proposition and test paper compilation, examination management, examination system and intelligent marking. This solution can be quickly adapted to the examination syllabi, scoring standards and business processes of different regions, supporting large-scale centralized examinations. It can complete centralized scoring of millions of examination audio files in closed and remote environments, with high security, high stability and high concurrency capabilities, effectively ensuring the fair, efficient, safe and orderly implementation of examinations. At present, it has participated in the intelligent scoring service projects of English listening and speaking examinations for the senior high school entrance examination in 6 provinces and municipalities including Shanghai, Guangdong, Liaoning, Jilin, Hubei and Ningxia.
Scenario 2: Intelligent Platform for Foreign Language Teaching in Schools
This solution provides a complete set of solutions for daily foreign language teaching and listening and speaking exam preparation in schools, meeting the needs of a complete teaching closed loop of "Learning, Practice, Assessment, Evaluation and Examination". It sets up a progressive teaching system covering basic learning, ability improvement and comprehensive application, and provides teachers with efficient teaching tools. It supports classroom explanation and testing, weekly practice, monthly exams, mid-term and final exams, pre-exam mock tests, etc. in schools, as well as pre-class preview, after-class consolidation and extra-curricular extended self-study for students at home. In addition, this solution supports hierarchical teaching and intelligent practice, helping teachers truly realize student-centered teaching and students to achieve personalized learning.

Scenario 3: International Smart Language Education Projects

Facing overseas Chinese language schools, educational institutions in countries along the Belt and Road, and schools in ethnic areas in China, it can provide multilingual oral teaching, personalized learning and intelligent assessment services. The solution can be deeply integrated into the local foreign language teaching system and Chinese language teaching system, flexibly adapting to the needs of all scenarios such as classroom teaching, after-school independent practice, unit testing, mid-term and final assessment, further education exam preparation and proficiency level tests. Through AI technology, it realizes pre-class intelligent preview, in-class interactive practice, after-class automatic marking, accurate analysis of learning situations, and personalized correction and improvement, effectively solving the common pain points in overseas and ethnic areas such as insufficient high-quality language faculty, inconsistent teaching standards, high costs of large-scale assessment, and delayed learning feedback.

Fig. 1 Thailand English Smart Classroom Laboratory Project

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

①Leading scale of technical services: This solution has cumulatively served the listening and speaking examinations for the senior high school entrance examination and college entrance examination in 6 provinces/municipalities directly under the Central Government, supporting the full acceptance of over one million test-takers in high-stakes examinations; it has been connected to the educational resource public service platforms of audio-visual education centers in multiple provinces and municipalities, currently covering more than 300 cities, over 58,000 key regional schools and more than 5 million student users, with high satisfaction in teacher-student interaction, home-school communication, and teaching research supervision.

②Authoritative certification of assessment accuracy: The accuracy of oral assessment reaches ≥98%, and the consistency of comprehensive scoring with experts is ≥95%, reaching the international advanced level.
③Significant improvement in learning effects: The efficiency of students' oral learning is increased by more than 40%, and teachers' workload of oral teaching is reduced by more than 60%, significantly improving classroom interactivity, teaching accuracy and students' learning enthusiasm.
④Verification of international service capabilities: It has successfully launched a number of international education projects, forming mature adaptive capabilities for multilingual, multi-country and multi-system education scenarios. It participated in NetDragon's Thailand vocational education going global project and was successfully selected into the national 2024 "Thousand Sails Going Overseas" Action Plan. In Tokyo, Japan, it serves more than 100 cram schools, building a dual-teacher evaluation system of "AI scoring + human review", covering all-dimensional training of pronunciation, expression and speech, and becoming a standardized training tool for Japanese high school entrance examination-level oral examinations; in Hong Kong, China, it is deeply matched with mainstream teaching materials such as Learn Putonghua Actively and Teaching and Learning Putonghua Well, helping teachers and students in Hong Kong to improve their Putonghua proficiency efficiently and promoting the coordinated development of language education in the Guangdong-Hong Kong-Macao Greater Bay Area.

Replicability, Sustainability and Promotion Potential

This solution adopts a B2B modular output model with mature technology, fast deployment and lightweight operation, featuring strong replicability.
It can be quickly adapted to the foreign language teaching processes and teaching material content of different countries/regions with low localization costs and fast landing speed.
The cloud service model reduces hardware investment, suitable for large-scale promotion in developing countries and resource-weak areas.
Sustainable business model: Diversified income from technology authorization, platform services, examination operation and solution delivery.
Huge global promotion potential: It aligns with the UN's initiative on education digitalization, education cooperation under the Belt and Road, and global language learning needs, and can be quickly launched in Southeast Asia, East Asia, Central Asia, Africa and other regions, promoting cross-cultural communication with technological strength and realizing barrier-free global language communication.

Illustration of a Typical Case

Case 1: Thailand English Smart Classroom Laboratory Project
Project Implementation Time: 2021 to present
Implementation Location: Thailand
Implementation Scale: This solution participated in the pilot of the Thailand English Smart Classroom Laboratory Project, which has been launched in 50 pilot schools in Thailand; it is planned to be scaled up to nearly 1,000 schools in the future, serving hundreds of thousands of primary and secondary school students in Thailand.

Core Achievements:
An integrated platform for English listening and speaking teaching, examination and practice has been deployed for schools, mainly applied to students' daily practice and examinations. Equipped with high-stability and high-precision AI oral assessment capabilities, it brings a more attractive, collaborative and efficient English learning experience for Thai students.
Installed in the language classrooms of schools, the solution provides schools with a classroom teaching system, a mock training system and a unified examination system, supporting automatic scoring of all question types of listening and speaking. It has greatly improved the classroom activity and oral practice efficiency, helping schools realize the regular development of English listening and speaking teaching, digital management of the teaching process and accurate monitoring of learning effects, and significantly enhancing classroom activity, interactivity and oral training efficiency.

Case 2: 2024 Shanghai Senior High School Entrance Examination English Listening and Speaking Test Intelligent Double Evaluation Service Project
Project Implementation Time: 2024
Implementation Location: Shanghai
Implementation Scale: Provided scoring services for the English listening and speaking test papers of 110,000 senior high school entrance examination candidates.

Core Achievements:
The Shanghai senior high school entrance examination foreign language listening and speaking test features flexible proposition, a large number of candidates, rigorous marking processes and serious scoring results, making it the most challenging task among national high-stakes oral examination projects. In 2024, the difficulty of the oral question types in the Shanghai senior high school entrance examination was further increased: the last expression question (Free Talk) no longer provides picture prompts, only a designated theme, requiring at least five sentences to be spoken. To address this highly challenging assessment task, the solution carried out customized development for the new question types in Shanghai, optimized the scoring scheme, and adopted a new information enhancement scheme and multi-model fusion scheme. Finally, it completed the marking and review of more than 1.3 million audio files in about a week, and further optimized the scoring stability, accuracy and efficiency of the solution.

Exhibition Materials

Display Form: AI-based Integrated Solution for Multilingual Listening and Speaking Teaching, Examination, Practice and Assessment.
Software and Hardware Configuration: Touch all-in-one machine, computer, customized noise-cancelling earphones, microphone.
Display Content: On-site English listening and speaking human-computer interaction assessment, examination process demonstration, AI interactive classroom demonstration.

Basic Information of the Institution

Institution Introduction

Founded in 2014, Chivox is a national high-tech enterprise focusing on the research and industrialization of intelligent speech technology. Starting with intelligent speech technology originating from the University of Cambridge, the company integrates various algorithms in the field of natural language processing (NLP) and other artificial intelligence aspects, and has independently developed a series of intelligent speech technologies based on big data and deep learning. Adhering to the development philosophy of "Rebuilding the Tower of Babel in the new era and enabling barrier-free language communication worldwide", Chivox has built a full-chain AI education solution covering "Examination, Teaching, Learning, Practice and Application". Its business covers the whole country and has been successfully launched in Hong Kong China, Macao China, Thailand, Japan, Egypt and other places. It is a leading enterprise in examination-level oral assessment technology in China and a benchmark enterprise for education technology going global under the Belt and Road Initiative.

Experience or Qualifications in the Field of Digital Education

The company has accumulated more than 90 intellectual property rights, of which more than 15% are invention patents, and continues to innovate at an annual growth rate of 10%. Its core qualifications and achievements include: National High-tech Enterprise, Jiangsu Province Specialized and Sophisticated Enterprise, Jiangsu Province Key Software Enterprise; Jiangsu Province Excellent Artificial Intelligence Technology Integration Enterprise, Science and Technology-based Small and Medium-sized Enterprise, Double Software Certified Enterprise; Chivox's English oral expression scoring model was selected as a Suzhou municipal-level cultivated artificial intelligence large model; one of the only two AI examination technology service providers in China that serve the listening and speaking examinations for the senior high school entrance examination and college entrance examination and have passed the acceptance of over one million test-takers; exclusive technical support for the national CNSET Artificial Intelligence Graded Assessment of English Oral Proficiency.

The company has long been deeply engaged in the field of education digitalization, promoting education equity and high-quality development through technological innovation, and is a reliable, replicable and scalable Chinese AI technological force in the global digital education field.

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15. Chengdu Sobey Digital Technology Co., Ltd.

Construction Plan for Smart Education Resource Management Platform

Solution Introduction

Function Overview

The core functions of this solution form a closed loop around the four dimensions of resources, teaching, management, and evaluation, covering four core modules: unified management of full teaching resources, AI-assisted teaching, personalized learning, and smart supervision and evaluation. The platform connects smart classrooms and various teaching applications, breaks down data silos across multiple platforms, and centrally manages digital teaching resources such as recorded courses, high-quality courses, MOOCs, and digital textbooks, realizing full-process coverage of resources from collection, processing, and management to application. Meanwhile, it provides teaching support functions including AI lesson plan generation, homework correction, and digital teaching assistants, combined with personalized learning path planning and a smart teaching supervision and evaluation system, to comprehensively empower the entire teaching process.

Current higher education institutions generally face pain points such as incompatible platforms, disconnected data, scattered resources, as well as difficulties in "finding courses, analyzing teaching, supervising quality, and applying resources". They also struggle with the low of AI applications and the inability to meet the personalized needs of teachers and students. The core value of this solution is to build a unified school-based digital and intelligent infrastructure, convert unstructured teaching resources into efficiently usable structured knowledge units, reduce repetitive work for teachers, meet students' personalized learning needs, promote the transformation of teaching models from "experience-driven" to "data-driven", and help universities achieve the intelligent upgrading of teaching resources and the innovation of talent cultivation models.

Technical Highlights or Innovations

The core differentiated advantage of this solution lies in full-stack independent research and development + in-depth scenario cultivation. Relying on Sobey's accumulated audio and video processing technologies and the computing power support of Huawei Ascend, it has formed three major technical innovations, demonstrating unique value combined with industry practices:

- A full-stack self-developed localized AI capability engine. Based on the Ascend AI server and Kunpeng computing platform, it achieves independent innovative adaptation from hardware to operating system, and constructs a flexibly schedulable localized model matrix.

It can match the optimal model according to different teaching tasks, and also carry out localized fine-tuning based on school-based data to create exclusive AI models with institutional characteristics, solving the problems of poor AI adaptability and high data security risks in traditional platforms. At present, this technology has been implemented at the University of Electronic Science and Technology of China, supporting the construction of a heterogeneous computing power infrastructure and multimodal large models to efficiently serve the teaching of AI general education courses.

- The deep integration technology of "AI + video". Relying on Sobey's advantages in the field of audio and video unstructured data processing, it conducts in-depth processing of original materials such as classroom recordings and courseware through multimodal AI technology, automatically generating knowledge slices, abstracts and tags, realizing value mining and efficient reuse of teaching resources. It solves the pain points of low utilization rate and high processing cost of traditional resources, enabling high-quality teaching resources to be quickly circulated and reused.
- A low-threshold AI application implementation model. It launches ready-to-use innovative teaching applications, including AI teaching assistants, digital human teachers, data dashboards, etc., and supports functional expansion through an agent marketplace. This allows universities to quickly implement AI teaching applications without complex technical deployment, effectively improving teaching efficiency. Compared with the drawback of "overemphasizing technology while neglecting implementation" in similar products, this solution has been practiced in many universities, significantly shortening teachers' lesson preparation time and greatly improving students' learning initiative. It truly realizes the deep integration of technology and teaching scenarios, demonstrating its unique value in the digital and intelligent transformation of universities.

Fig. 1 Architecture of Smart Education Resource Management Platform

Technical Highlights or Innovations

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Application Scenarios

Application Environment and Implementation Targets

In terms of application environment, the hardware is adapted to Huawei Ascend AI servers and Kunpeng computing terminals, and is compatible with existing smart classroom equipment on campus (including recording and broadcasting systems, interactive whiteboards, HD cameras, etc.). It supports two deployment modes: local private deployment and hybrid cloud deployment, and can flexibly adjust computing power configuration according to the scale of universities. On the software side, it is compatible with mainstream operating systems such as Windows and Linux, and supports seamless connection with universities' existing educational administration systems, student management systems, Xuexitong and other applications, eliminating the need for large-scale transformation of the existing software and hardware system and reducing implementation costs.

The implementation targets cover three core groups: first, university teaching institutions, including secondary colleges, academic affairs offices, teacher development centers and information management centers, providing them with integrated support for teaching management, resource construction, supervision and evaluation; second, frontline teachers, including teachers of various disciplines and high-quality course development teachers, helping them prepare lessons efficiently, teach accurately and accumulate resources; third, on-campus students and continuing education students, meeting the personalized learning, after-class review and knowledge expansion needs of students at different levels and majors. At the same time, it provides data-based decision support for university managers, realizing refined and intelligent teaching management.

Examples of Typical Application Scenarios

Scenario 1: Intelligent Teaching Implementation of AI General Education Courses at the University of Electronic Science and Technology of China

As a top university in China, the University of Electronic Science and Technology of China urgently needs to build a digital teaching system suitable for AI general education, solving problems such as a shortage of AI course teachers, scattered teaching resources and difficulties in personalized teaching. Relying on the full-stack self-developed localized AI capability engine, this solution builds an exclusive AI teaching infrastructure for the university, adapts to its Ascend heterogeneous computing power platform, and deeply integrates functions such as AI lesson plan generation and digital human teaching assistants with AI general education courses.

In terms of implementation, the platform is connected to all smart classroom recording and broadcasting equipment of the university to automatically collect classroom teaching videos. Through "AI + video" technology, it generates knowledge point slices and course abstracts, and builds an exclusive resource library for AI general education courses. Teachers quickly generate standardized lesson plans and personalized assignments through the platform, and digital human teaching assistants respond to students' questions 24 hours a day. At the same time, the platform plans personalized learning paths for each student based on their classroom performance and assignment completion.

After the implementation of this scenario, the pressure of insufficient AI teaching staff has been effectively alleviated, teachers' lesson preparation efficiency has been improved, and students' course pass rate has increased. It has become a benchmark case for the digital transformation of AI general education in universities.

Scenario 2: Virtual Teaching Community and Resource Center Project at ShanghaiTech University

As an innovative university, ShanghaiTech University aims to build a smart teaching environment integrating virtual and physical spaces, addressing pain points such as scattered and heterogeneous teaching resources, poor connection between virtual and physical teaching, difficulties in deploying AI teaching applications, and the inability to meet teachers' and students' personalized teaching and learning needs. Based on this solution, a virtual teaching community and resource center has been established to create a digital ecosystem featuring "one-stop smart teaching + resource integration".

In terms of implementation, a combination of on-premises private deployment and hybrid cloud deployment is adopted. Leveraging Sobey's full-stack self-developed localized AI engine, the solution adapts to the university's deployment requirements of localized large models including DeepSeek, and integrates multi-source heterogeneous resources such as classroom recordings, library collections,

open-source codes and software tools. Through the deeply integrated “AI + video” technology, it realizes automatic audio and video transcription, bilingual subtitle generation, knowledge slicing and other functions. Meanwhile, applications including an intelligent course assistant and a knowledge graph construction tool have been developed, enabling teachers to quickly develop exclusive course assistants and build a systematic knowledge system, while supporting students with personalized knowledge retrieval and Q&A services.

The platform is also deeply integrated with the university’s digital twin campus system, achieving seamless connection between physical teaching and virtual learning environments and supporting the implementation of blended teaching. At present, the project has been running stably, aggregating 72,000 course recording resources totaling 60 TB and 780 million library documents, serving teachers and students across all disciplines. It has effectively improved the utilization rate of teaching resources and the teaching and learning productivity of teachers and students, demonstrating the solution’s unique adaptability and value in virtual-real integrated teaching scenarios at innovative universities.

Impact and Case Evidence

Implementation Results, Evaluation Data or Practical Experience

Since its implementation, the solution has achieved remarkable results in many universities and regional education projects with outstanding quantitative evaluation data, while accumulating rich practical experience. In terms of teaching efficiency improvement, teachers’ lesson preparation efficiency has been significantly improved; AI homework correction efficiency is notably higher than manual work; digital teaching assistants respond quickly to students’ inquiries, effectively reducing teachers’ repetitive workload. In resource construction, the platform has greatly improved the processing efficiency of unstructured teaching resources, helped universities accumulate more high-quality teaching resources, significantly increased resource reuse rate, and enabled efficient circulation of high-quality resources.

In terms of teaching quality improvement, students’ mastery of courses in pilot universities has been significantly improved, their enthusiasm for independent learning has increased remarkably, and personalized learning experience has been widely recognized. In terms of management efficiency, it has effectively reduced the workload of university teaching supervision, improved the response speed of data-driven decision-making, and realized the transformation of teaching management from “experience-driven” to “data-driven”. It is concluded in practice that the solution should adhere to the principles of “localized adaptation, low-threshold implementation and regular iteration”, and fine-tune functional modules according to institutional characteristics to better meet actual teaching needs and maximize technical value. Meanwhile, relying on the Huawei Ascend computing power infrastructure, the platform can effectively ensure operational stability and data security.

Replicability, Sustainability and Promotion Potential

In terms of replicability, the solution adopts a modular architecture of “computing power + platform + applications”. Hardware-wise, it is compatible with Huawei Ascend AI servers, Kunpeng computing terminals and various mainstream smart classroom devices. Software-wise, it supports seamless connection with existing educational administration and student management systems without large-

scale transformation of existing software and hardware. It can be quickly adapted to different types of educational scenarios such as public/private undergraduate colleges, vocational colleges and adult colleges. Meanwhile, it supports both localized deployment and hybrid cloud deployment, which can be flexibly adjusted according to educational policies and teaching models in different countries and regions, demonstrating strong adaptability.

In terms of sustainability, a long-term operation mode of "technology iteration + operation services + demand feedback" has been established. Sobey has a professional service team providing 7×24-hour technical support, regular version updates and teacher operation training. Meanwhile, AI models are continuously optimized based on school-based data to ensure the solution always meets the needs of educational digital transformation. A commercial mode of "basic services + value-added services" is adopted to guarantee the long-term implementation of the solution. In terms of promotion potential, the solution conforms to the global trend of educational digital transformation. It can not only meet the digital transformation needs of domestic universities but also adapt to the teaching and management modes of overseas universities, providing low-cost and high-efficiency solutions to promote educational equity and quality improvement worldwide with significant promotion value.

Illustration of a Typical Case

Core Implementation Case: Intelligent Teaching Project of AI General Education Courses at the University of Electronic Science and Technology of China

Implementation Time: Early 2025

Implementation Location: University of Electronic Science and Technology of China, Chengdu City, Sichuan Province

Implementation Scale: Covering teachers and students from multiple colleges of the university; 1 exclusive AI teaching infrastructure and 1 AI general education resource library built, with access to more than 300 smart classrooms.

Key Achievements:

Relying on the solution's full-stack self-developed localized AI capability engine, the "UESTC SEEK" artificial intelligence basic platform has been built for the university, with a heterogeneous computing power infrastructure and multimodal large models established, incubating multiple vertical application scenarios such as iTeach disciplinary intelligent teaching innovation. An exclusive resource library for AI general education courses has been completed, including more than 4,000 knowledge point slices and over 100 sets of standardized lesson plans.

Teachers' lesson preparation efficiency increased by 65%, teaching hours of AI general education courses reduced by 30%, students' course pass rate rose from 82% to 97%, and student learning satisfaction reached 95%.

A replicable digital teaching mode for AI general education has been formed, providing a benchmark reference for the intelligent transformation of AI courses in domestic universities. Relevant practical experience has been adopted by many universities.

Exhibition Materials

This solution is equipped with complete exhibition and demonstration conditions, and can provide standardized design renderings for exhibition. The overall layout follows the logic of “technology exhibition + scenario simulation + achievement presentation”, highlighting technological advancement and application effectiveness.

In terms of software and hardware configuration, a cloud-based environment will be used for on-site demonstration, with only a large display screen and a laptop required as on-site hardware to simulate a real smart classroom environment. The software will run the full-function version of the Sobey Smart Education Platform, demonstrating the operational processes of core modules including resource management, AI-assisted teaching, and personalized learning.

Demonstration Environment Requirements:

A venue area of no less than 30 square meters, equipped with a stable power supply (220V), high-speed network (bandwidth ≥ 100M), and an ambient temperature controlled between 18–25℃, with no direct strong light on the equipment.

The space layout is divided into three zones:

Core Technology Exhibition Zone: displaying software and hardware equipment, demonstrating the AI capability engine and “AI + video” integrated technology;

Scenario Simulation Zone: simulating a smart classroom teaching scenario, presenting the full process of teachers’ lesson preparation and students’ independent learning;

Achievement Exhibition Zone: presenting data of implemented cases, effectiveness comparisons and promotion value via display boards and screens.

The setup will fully demonstrate the application form of the solution in education and teaching, highlighting its demonstration and promotion value.

Basic Information of the Institution

Institution Introduction

Founded in 1997, Chengdu Sobey Digital Technology Co., Ltd. is a leading provider of digital media technologies and solutions in China. With nearly 30 years of deep cultivation in the digital media industry, its main businesses cover smart education, smart radio and television, digital government affairs, AI audio and video processing, etc. Its services cover all provinces and cities across China. Meanwhile, relying on international exhibitions such as IBC, the company has expanded its global presence, with products and services exported to many countries and regions in Europe, Asia and beyond, enjoying high brand influence in the global digital media sector. To date, the company holds 206 patents and 607 computer software copyrights.

The company has been awarded the First Class Prize of the National Science and Technology Progress Award, the IABM Peter Wayne Global Award, the First Class Prize of the Wang Xuan News Science and Technology Award, as well as several ministerial first-class awards. It has led or participated in the formulation of multiple industry standards, initiated the establishment of the National Ultra-High-Definition Video Innovation Center, and is a National Demonstration Base for the Integration of Culture and Technology set up by five ministries and commissions including the Ministry of Science and Technology.

Experience or Qualifications in the Field of Digital Education

Sobey boasts profound experience and core strengths in the digital education field. Relying on its accumulation in unstructured audio and video data processing and AI technology research and development, the company has deeply engaged in the digital transformation scenarios of universities, with full-stack independent research and development capabilities and rich project implementation experience. It owns a number of software copyrights and patented technologies. Relevant projects have been selected as Virtual Reality Pioneer Application Cases issued by five ministries including the Ministry of Industry and Information Technology, and have won honors such as Demonstration Projects for Integrated Cultural and Tourism Innovation and Development.

Past successful projects include the Intelligent Teaching Project of AI General Education Courses at the University of Electronic Science and Technology of China, the Co-construction and Sharing Project of High-Quality Course Resources for Higher Vocational Colleges in Sichuan Province, and the XR Immersive Training Room Project for the cultivation of digital and intelligent cultural tourism talents in Chengdu. With high-quality products and services, the company has won wide recognition from education industry customers, providing a solid foundation for the R&D and implementation of smart education solutions.

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16. OUC Online Education Technology Co., Ltd.

High-Performance Solution for Large-Scale Online Examinations

Solution Introduction

Function Overview

This solution is purpose-built for lifelong learning and large-scale open education scenarios, aiming to establish a one-stop online examination technology platform that is highly reliable, strongly secure, and covers the full process. Addressing the core pain points of traditional offline exams--high organizational costs, supervision difficulties, and limited coverage--as well as the shortcomings of conventional online exam systems--insufficient concurrency capacity, diverse cheating methods, and superficial identity verification--this solution provides an end-to-end closed-loop covering examination administration, question bank management, online testing, intelligent grading, exam integrity monitoring, and data governance.

The core value lies in reshaping educational equity through technology, ensuring large-scale, highly reliable, strongly secure, and fully digital examination capabilities where every examinee enjoys a stable and fair testing environment.

Core Functional Modules:

- Full-Process Digital Examination Administration: Automates the entire workflow from exam planning, session scheduling, paper distribution, score publication to multi-dimensional data export. The system supports unified scheduling and management of millions of examinee records, significantly reducing operational costs.
- Ultra-Large-Scale High-Concurrency Exam Engine: Built on an advanced microservices architecture, the system stably supports 300,000 simultaneous online examinees. Through dynamic resource scheduling and load balancing, it ensures real-time response to answer submissions and smooth page loading throughout the examination process.
- Financial-Grade Identity Verification System: Integrates high-precision facial recognition and liveness detection technology, supporting 1,000 concurrent verifications per second. Employing a dual mechanism of "strict entry verification + in-process spot checks," it effectively identifies and blocks impersonation, photo attacks, video replay, and other cheating behaviors, ensuring identity authenticity.
- Immersive Full-Screen Anti-Cheating Monitoring: The client operates in screen-exclusive mode, monitoring screen switching, unauthorized process launches, and USB device insertions in real time. Upon detecting violations, the system automatically logs and triggers alerts, establishing a robust exam discipline defense.

- Intelligent High-Efficiency Grading System: Objective questions are graded automatically in milliseconds; subjective questions support online assembly-line grading with multiple evaluation mechanisms, greatly improving grading efficiency and accuracy. The system automatically generates multi-dimensional score analysis reports with standardized PDF output.

- Comprehensive Security and Compliance Assurance: End-to-end data transmission encryption, full audit trails, distributed transactions ensuring data consistency, and dual backup strategies — fully compliant with national education data security standards.

■ **Technical Highlights and Innovations**

This solution builds upon industry best practices with architectural redesign and algorithmic innovation, forming significant differentiated competitive advantages:

1. Ultra-Large-Scale Concurrency Architecture Innovation

Breaking through traditional monolithic architecture bottlenecks, the system is built on the Spring Cloud Alibaba microservices ecosystem with elastic scaling. It incorporates Redis multi-level caching for hot data, Kafka high-throughput message queues for peak shaving, and OceanBase distributed database for massive transaction processing. Combined with dynamic data source routing, it successfully supports 300,000 examinees testing simultaneously, with core service availability reaching 99.99%.

2. Sub-Second Facial Liveness Verification Engine

A proprietary deep learning liveness detection algorithm integrating screen re-capture recognition and video frame micro-feature analysis. The engine supports 1,000 concurrent verifications per second while maintaining a false acceptance rate (FAR) below 0.1%. Model quantization optimization specifically targets low-bandwidth environments and low-spec terminals, ensuring millisecond-level response even in remote areas or on mobile devices.

3. "Full-Screen Lock + Real-Time Monitoring" Dual Anti-Cheating System

An innovative combination of client-level full-screen lockdown technology and server-side Netty WebSocket real-time communication. The client layer implements screen-switch detection, behavior monitoring, and forced screen locking; the proctoring dashboard provides real-time visual monitoring. This "edge-cloud collaborative" monitoring model precisely identifies anomalous behavior while serving as a powerful deterrent against cheating attempts.

Application Scenarios

This solution is designed for building a ubiquitous, lifelong learning society, deeply adapted to large-scale, wide-coverage educational scenarios with inclusive access requirements.

■ **Deployment Environment and Target Users**

Applicable Education Scenarios: The solution focuses on higher continuing education, open university systems, modern vocational education, social skills training, and overseas distance degree education. These scenarios share common characteristics: extremely wide geographic distribution of learners, fragmented study schedules, massive examination scales (from tens of thousands to millions), and stringent compliance requirements for exam fairness and security.

Server Environment: Highly flexible deployment supporting both private deployment on Linux or public cloud deployment. Fully embraces Docker containerization and Kubernetes orchestration for elastic scaling and automatic failover, ensuring high availability during exam peaks.
Client Environment: Following a "zero-plugin, full-compatibility" philosophy. PC clients fully support Windows and Kylin (domestic) operating systems without any additional plugins; mobile clients are fully compatible with HarmonyOS, Android, and iOS. This broad compatibility eliminates the digital divide, ensuring examinees in remote areas or using domestic information technology equipment can participate smoothly.
Target Users:

- Examinees: Covering open university students nationwide and overseas, vocational college students, enterprise employees, and social learners, scaling from thousands to millions.
- Administrators: Serving university academic affairs offices, national/provincial examination centers, branch administrators, and local study center managers, providing full-perspective management dashboards from top-level planning to ground-level execution.
- Exam Staff: Including online proctors, assembly-line grading teachers, and course coordinators, providing intelligent assistance tools to reduce workload.
- Institutional Entities: Primarily targeting open universities, applied undergraduate institutions, industry academies, and overseas learning centers.

■ **Typical Application Scenarios**

Scenario 1: Open University of China National Unified Online Final Examinations (Mainland China)
As the world's largest new-type higher education institution, the Open University of China must organize unified final examinations each semester covering over 30 provincial branches, more than 2,000 local colleges, and tens of thousands of study centers. With over 5 million enrolled students, traditional offline exam organization faces enormous challenges including venue shortages, proctoring staff scarcity, high cross-provincial logistics costs, and disruptions from public health emergencies.

Implementation Approach:

A "nationally centralized high-availability cluster" deployment model is adopted. During examinations, the system dynamically allocates computing resources to support 300,000 simultaneous online examinees.
Identity Verification: The facial verification engine processing 1,000 concurrent requests per second performs multiple rounds of "liveness detection + ID comparison" during entry and throughout the exam, completely eliminating impersonation.
Process Control: All examinees use "full-screen anti-cheating" mode, with real-time detection and logging of screen switching, system processes, network traffic, and USB device violations.
Grading Delivery: Intelligent grading pipelines are launched immediately after exams — objective questions scored instantly, subjective questions distributed for flow-line evaluation.

Impact and Case Evidence

Results: Under this scenario, hundreds of course examinations are successfully organized annually, proctoring labor costs reduced by 70%, cheating rates decreased by over 95%, exam organization cycles shortened, and overall efficiency improved 10-fold — truly realizing the vision of "everyone can learn, everywhere can test."

Since deployment, this solution has achieved remarkable quantified results and broad social recognition in the field of large-scale online examinations, setting a benchmark for digital education transformation.

■ Implementation Results and Quantified Evaluation

Data is the ultimate measure of system capability. In actual operation, the solution has demonstrated extraordinary high-concurrency capacity: successfully supporting 300,000 simultaneous online examinees during intensive testing, with the facial recognition engine reaching peak processing of 1,000 verifications per second, achieving zero downtime and zero lag under full traffic load.

In terms of security and fairness, through the dual defense of "facial liveness detection + full-screen monitoring," the incidence of violations including impersonation, screen switching, and video cheating has decreased by over 95%, fundamentally restoring the credibility of online examinations.

Efficiency and cost optimization results are significant: exam organization cycles compressed from 15 days to 3 days; the intelligent grading system improved overall grading efficiency by 80%; nationwide proctoring labor costs reduced by 70%; venue rental, transportation, and paper examination printing costs decreased by 90%.

System stability meets financial-grade standards, with core service availability of 99.99% or higher and annual fault downtime controlled within 1 hour. To date, the solution has cumulatively served over ten million examinee sessions across all provincial-level administrative regions in China, withstanding the rigorous test of large-scale real-world deployment.

■ Replicability, Sustainability, and Scalability

The solution demonstrates strong replicability: based on modular microservices design, the system supports "LEGO-style" rapid deployment and on-demand customization, meeting requirements ranging from national-level million-scale unified examinations to mid-scale scenarios such as university finals, vocational skill assessments, and civil service recruitment.

Regarding sustainability, the solution fully embraces containerization and configuration-driven architecture, with operations systems possessing strong horizontal scaling capabilities, deep compatibility with domestic information technology environments, and support for smooth iterative upgrades, ensuring a technology lifecycle exceeding ten years.

Its scalability potential is immense, highly aligned with global trends in digital education and lifelong learning. For developing countries with large populations and uneven educational resource distribution, as well as Belt and Road countries requiring cross-border credential certification, this solution offers a low-cost, high-efficiency standardized export model, poised to become the preferred technology foundation for open education institutions worldwide.

(3) Representative Case Study

Case Name: Open University of China 2025 Autumn Semester National Online Unified Examination

Implementation Period: December 2025

Location: Over 30 provincial branches across China and multiple overseas learning centers

Scale: Serving 2.86 million registered students; 300,000 simultaneous online examinees at peak; 120 million high-precision facial verifications completed; hundreds of courses covered.

Key Outcomes:

- Full-process paperless: Complete elimination of paper-based exams, achieving end-to-end digital closed-loop from paper assembly to archiving.
- Zero security incidents: Cheating rate decreased by 96% year-over-year, with no major exam leaks or organized cheating events.
- Cost reduction and efficiency gains: Overall exam organization costs reduced by 72%.
- High recognition: Zero major system failures during operation; highly praised by Ministry of Education leadership and provincial branches, hailed as "a model project for new education infrastructure."

Fig. 1 Key outcmomes

Basic Information of the Institution

■ **Institutional Overview**

The Open University of China (OUC) is a new type of higher education institution directly under the Ministry of Education of China. Originally founded in 1978 as the China Central Radio and TV University, it was renamed and inaugurated in 2012. Committed to promoting lifelong learning, the OUC, together with 44 provincial-level open universities and over 3,700 local study centers, has established a nationwide education system covering both urban and rural areas. The university has enrolled over 20.5 million degree-seeking students cumulatively, with its lifelong education platform offering more than 1 million course resources and serving over 60 million learners.

Guided by the philosophy of "openness, responsibility, quality, diversity, and internationalization," the OUC has established 20 overseas learning centers in countries along the Belt and Road Initiative and built partnerships with institutions in nearly 30 countries and regions. It is a member of the Asian Association of Open Universities (AAOU) and the International Council for Open and Distance Education (ICDE).

OUC Online Education Technology Co., Ltd. was founded in 2014 as a wholly owned subsidiary of the OUC, responsible for the development and operation of the university's core information systems. Recognized as a National High-Tech Enterprise and a Beijing "Specialized, Refined, Differentiated, and Innovative" (SRDI) SME, the company has a technical team of over 200 professionals, with business areas covering AI-powered education infrastructure, lifelong learning platforms, credit bank systems, and ITO services.

■ **Experience and Qualifications in Digital Education**

With over a decade of expertise in digital education, OUC Online has built and operated 2 national-level platforms and 5 large-scale online learning platforms, accumulating 14 invention patents and 36 software copyrights. The company has obtained ISO 27001 and ISO 20000 certifications, and in 2025 achieved CCRC information security service qualifications and DCMM Level 3 certification.

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Multi-Agent Collaboration Platform for Lifelong Education

Solution Introduction

Function Overview

Practitioners in lifelong education — researchers, instructors, and administrators — face persistent efficiency bottlenecks. Researchers must switch between multiple databases (Wanfang, Semantic Scholar, arXiv, etc.) for literature searches; complex educational topics require multi-perspective analysis that existing tools cannot provide; substantial time is spent on organizing materials rather than scholarly thinking; and administrative staff lack intelligent assistance for official document drafting and policy review.

Our Multi-Agent Collaboration Platform addresses these challenges by decomposing the general capabilities of large language models into dozens of specialized skills — covering academic retrieval, policy analysis, curriculum design, assignment grading, official document drafting, and regulatory review — coordinated by a central orchestrator that automatically dispatches tasks based on natural language instructions. The overall platform architecture is shown below:

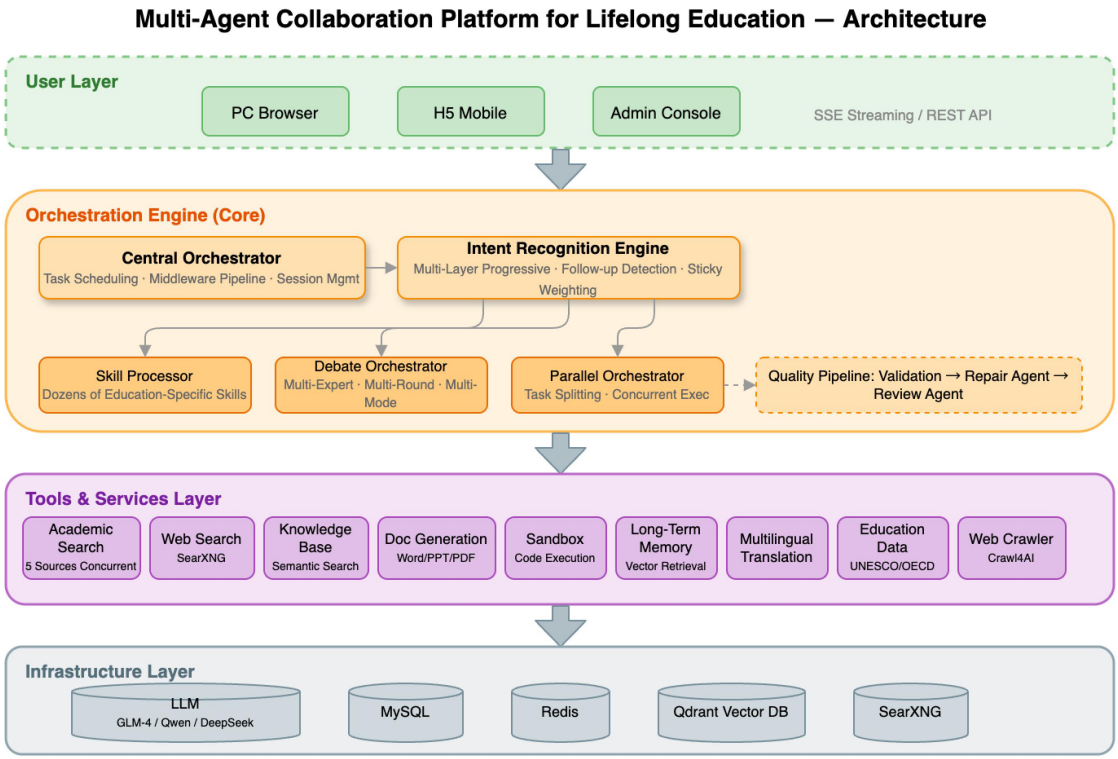

Fig. 2 Overall platform architecture

Key capabilities include: In academic retrieval, the system concurrently queries Semantic Scholar, arXiv, OpenAlex, Wanfang, and CrossRef, automatically deduplicates results and ranks them by source authority and citation count. For multi-perspective analysis, the platform features built-in expert personas (theoretical scholars, policy analysts, frontline educators, etc.) that engage in interactive multi-round discussions on a given topic. For document generation, the platform produces research reports of 10,000+ words with proper citations based on online retrieval, and also covers course syllabi, classroom observation reports, work summaries, and official documents. Additionally, the system includes multilingual translation capabilities and uses a vector database to remember user research preferences, progressively delivering personalized assistance.

■ **Technical Highlights and Innovations**

Hybrid Intent Recognition with Multi-Turn Dialogue Continuity Management. The system employs a multi-layered progressive approach to understand user intent: rapid screening through regex and keyword matching, followed by negative signal down-weighting and exclusivity rules to eliminate false matches, with a lightweight LLM invoked only for ambiguous cases. Most requests are resolved at the rule layer; only a small fraction of ambiguous inputs trigger the LLM. For multi-turn dialogues, the system implements sticky weighting and skill genealogy protection mechanisms that distinguish whether the user intends to revise current results, continue the current task, acknowledge receipt, or switch to a new task — maintaining conversational coherence without frequent interruptions.

Streaming Orchestration with Process Visualization. During skill execution, the orchestrator pushes status updates (reasoning, tool calls, tool results, content generation) to the frontend in real time, using waterfall charts to differentiate LLM thinking time from tool execution time. For complex tasks, the orchestrator can automatically decompose them into concurrent subtasks and aggregate results. The system logs decision traces at both the intent recognition and orchestration stages, enabling operators to review candidate lists and confidence score changes for each recognition event. Generated content undergoes multi-layer quality checks through format validation, repair agents, and review agents, with dedicated detection mechanisms for common academic "hallucinations" in citation review scenarios.

Plugin-Based Skill Management. Each skill is defined by a Markdown configuration file that declares model tier, tool permissions, and system prompts. Adding a new skill requires only writing a configuration file and placing it in the designated directory — no backend code changes needed. Skills requiring code execution (e.g., data analysis, PPT generation) run in container-level sandboxes with restricted permissions and network isolation. The management console supports online editing, audit logging, and one-click rollback.

Application Scenarios

■ **Deployment Environment and Target Users**

The platform is accessible via PC and mobile browsers with no client installation required. The backend consists of multiple containerized microservices, supporting both Docker Compose on-premises deployment and Huawei Cloud CCE (Kubernetes) elastic cloud deployment. LLM integration follows the OpenAI standard protocol, compatible with Chinese models (GLM-4, Qwen, DeepSeek) and major international models, allowing flexible selection based on regional infrastructure and data compliance requirements.

Application scenarios encompass open universities, research-intensive higher education institutions, lifelong education research organizations, and educational administration departments. User groups include: researchers conducting literature searches and review writing; university instructors responsible for curriculum design, exam preparation, and grading; graduate students working on topic selection and data analysis; and teaching administrators handling policy research, official document drafting, and regulatory review. The platform's built-in multilingual translation skills also provide foundational support for cross-language academic collaboration.

■ Typical Application Scenarios

Scenario 1: Literature Retrieval and Multi-Perspective Analysis in Lifelong Education Research

The platform's initial requirements originated from the Lifelong Education Research Institute of the Open University of China. Researchers routinely need to track global policy developments and academic progress in lifelong learning, involving extensive retrieval and organization of Chinese and English literature. With the platform, researchers enter search requirements in the dialogue interface, and the system simultaneously queries multiple Chinese and English academic data sources, returning deduplicated and ranked literature lists within seconds. When multi-perspective analysis is needed, users can activate the multi-expert debate mode, where AI experts with different viewpoints engage in multi-round discussions on the topic. Users can ask follow-up questions or adjust directions at any time, and the system summarizes all perspectives upon conclusion. Building on this, users can further generate research reports with citation annotations. Throughout the process, the system automatically determines whether each step continues current work or switches to a new task, without requiring users to re-describe the background each time.

Scenario 2: Official Document Drafting and Regulatory Review in Administrative Work

The platform has been presented and demonstrated to departments including the Digitalization Department and the Reform and Development Division of the Open University of China, and is currently being piloted for skills such as official document drafting, executive speech writing, and regulatory review. For example, when a user inputs "Help me draft a notice about holiday arrangements," the system generates an initial draft in standard official document format. When a user uploads a regulatory document and requests review, the system checks each clause for compliance and internal consistency, producing a structured issue list with risk-level assessments. The executive speech writing skill generates initial drafts conforming to writing conventions based on occasion type (mobilization, commendation, academic address, etc.) and provided key points. A common characteristic of these scenarios is that users need not learn new software operations — the system understands requirements described in everyday language.

Impact and Case Evidence

■ Implementation Results and Evaluation Data

The platform has been deployed to production and is being promoted for internal trial use. Based on current user feedback, several notable improvements have been observed:

Literature retrieval efficiency has improved substantially. Previously, researchers needed to log into multiple databases separately and manually deduplicate and organize results. Now, a single input yields consolidated cross-database results, significantly reducing time spent on the retrieval process. The multi-expert debate function provides a previously unavailable multi-perspective analytical approach for policy research.

Multi-turn dialogue coherence is another clearly perceived improvement. When users are dissatisfied with generated results, a simple instruction like "make it more concise" achieves the revision without starting over. The system automatically distinguishes between revising current results and switching to a new task.

In administrative work scenario trials, the most frequent user feedback has been "no need to learn new operations" — users simply describe their needs in everyday language, and the system automatically determines whether to invoke official document drafting, speech writing, or regulatory review skills.

■ **Replicability, Sustainability, and Scalability**

Regarding replicability, the system employs a Docker containerized microservice architecture with complete deployment documentation and startup scripts, deployable on a single server. Skill expansion requires no programming — each skill is defined by a Markdown configuration file that domain-knowledgeable educators can write. LLM integration follows the OpenAI standard protocol, compatible with both domestic and international models.

Regarding sustainability, the plugin-based architecture ensures that continuous expansion of new features does not affect existing functionality. The model layer implements a multi-tier selection mechanism without vendor lock-in. The management console provides skill change auditing, intent recognition decision logs, and token consumption statistics as operational tools.

Regarding scalability, the platform's skill architecture enables low-cost adaptation for extending from lifelong education to vocational education, community education, teacher training, and other domains. The built-in multilingual translation capability provides foundational support for international educational cooperation scenarios. Containerized deployment and domestic model compatibility also lower deployment barriers across different regions.

■ **Representative Case Study**

Case Name: Construction of a Multi-Agent Collaboration Platform for Lifelong Education

Implementation Period: 2025–2026 (ongoing iteration)

Location: Beijing, China — OUC Online Education Technology Co., Ltd.

Scale: Serving multiple departments within the Open University of China system; piloted at the Lifelong Education Research Institute, Digitalization Department, Reform and Development Division, and others. A specialized lifelong education knowledge base has been built, with dozens of AI skills deployed.

Key Outcomes: A multi-agent collaboration platform covering research support, teaching assistance, and administrative work has been established. Huawei Cloud CCE containerized deployment has been completed, enabling elastic scaling for a larger user base.

Institutional Background

Consistent with the introduction of OUC Online Education Technology above.

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Smart Learning Platform

Solution Introduction

Function Overview

The Smart Learning Platform adopts an AI-native end-to-end technology architecture, using multi-terminal access as the entry point and an intelligent application and multi-agent hub as the core, to support adaptive learning, AI-assisted teaching, and intelligent assessment. It relies on education-specific large language models and tooling capabilities to provide intelligent reasoning and generation. The underlying layer integrates course and learning data into a unified data resource system, thereby forming a new technology foundation driven by data, empowered by models, coordinated by intelligent agents, and supported by digital competency portfolios. The platform constructs five major learning scenarios: Classical Learning, Problem-Based Learning, Assessment-Based Learning, Self-Directed Learning, and Project-Based Learning, ensuring that every learner has a teaching assistant and a real-time learning companion.

Educational Industry Pain Points:

Knowledge Update Lag: The traditional course update cycle is 3-5 years, while the knowledge half-life in the digital economy field is only 6-18 months, creating a "time gap" between talent development and industry demand.

Unclear Learning Paths: Platforms struggle to automatically generate personalized and actionable learning paths for learners with different backgrounds and goals, leading to inefficient or even interrupted learning processes. When learners encounter difficult knowledge points, they lack on-demand, visual, and explanatory supplementary materials, which can easily cause learning interruptions and frustration.

Missing User Profiles: Adult learners have complex backgrounds and sparse behavioral data, making traditional recommendation algorithms ineffective for new users.

Technical Highlights or Innovations

Business Innovation Points:

1. A plugin-based, flexibly composable learning platform;
2. Rich learning activities meeting diverse personalized learning needs, with extensive AI capabilities assisting teaching;
3. Construction of five major learning modes: Classical Learning, Problem-Based Learning, Assessment-Based Learning, Self-Directed Learning, and Project-Based Learning.

Technical Innovation Points:

1. AI-Native Capabilities Embedded as "Platform-Level Capabilities"

Building an AI-native capability platform that uniformly abstracts model invocation, capability orchestration, cost control, and intelligent collaboration as platform services, enabling reusable, governable, and continuously evolving AI capabilities.

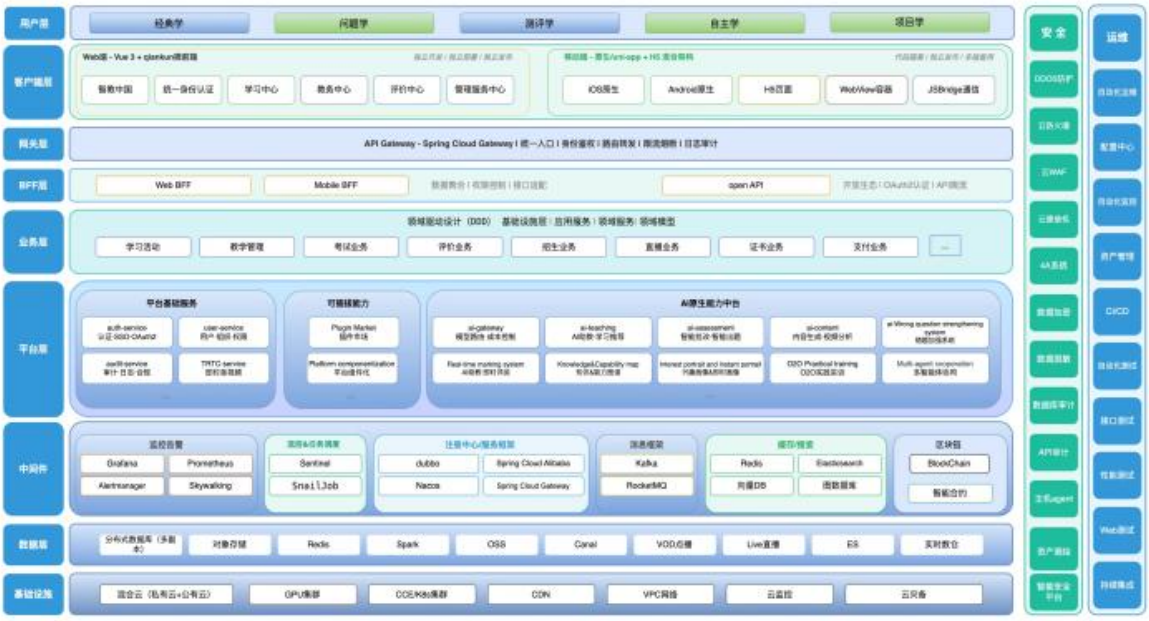

Fig. 3 Architecture Diagram

2. DDD-Driven Business Middle Platform Design

Constructing a business middle platform through Domain-Driven Design (DDD), establishing stable domain models, reducing cross-business coupling, and providing architectural assurance for continuous evolution in complex educational scenarios.

3. BFF + API Gateway Dual-Layer Decoupling Pattern

Through the layered collaboration of API Gateway and BFF, achieving decoupling of security governance and business orchestration, supporting rapid multi-terminal evolution and personalized experiences.

4. Event-Driven + Real-Time Intelligent Feedback Mechanism

Building an event-driven real-time intelligent feedback mechanism to enable instant analysis of learning behaviors and dynamic updating of competency profiles.

5. Component-Based + Plugin-Based Open Capability System for Platform Ecosystem Co-Creation

Through component-based and plugin-based architectural design, building a standardized open capability system and plugin marketplace, enabling plug-and-play extension of platform capabilities and ecosystem co-creation, driving the system's evolution from a "single product" to an "open platform and ecosystem."

Application Scenarios

■ **Application Environment and Implementation Targets**

Targeting diverse educational scenarios in the context of digital transformation, the solution is applicable to higher education, continuing education, vocational education, lifelong education, and corporate training, demonstrating strong cross-scenario adaptability.

Regarding the application environment, the platform is deployed on a cloud-native architecture, supporting public cloud, private cloud, and hybrid cloud models, and is compatible with mainstream operating systems and container environments (e.g., Kubernetes).
Regarding implementation targets, there are three main categories:
Learners (Students/Social Learners): Providing personalized learning path recommendations, AI learning companions, intelligent Q&A, and competency profiling services to enhance learning efficiency and experience.
Teachers/Trainers: Providing AI-assisted teaching tools (lesson plan generation, assignment design, automated grading, learning analytics, etc.) to reduce teaching burden and improve teaching quality.
Educational Institutions/Enterprises: Providing data-driven teaching management, talent development analysis, and decision support capabilities to achieve scalable and refined operations.
Furthermore, this solution is particularly suitable for adult education and lifelong learning scenarios, effectively addressing issues such as fragmented learning time, diverse learning objectives, and significant differences in foundational knowledge.

■ **Typical Application Scenario Examples**

Scenario 1: Digital Upgrade of the Open University of China (OUC)
In the continuing education system represented by the Open University of China, learners come from complex backgrounds with significant differences in their knowledge bases, making it difficult for traditional teaching models to achieve effective differentiation and personalized guidance. This solution constructs a full-process intelligent learning closed loop through the "AI + Multi-Agent" architecture:
Implementation Approach:
Students undergo competency assessment through the AI diagnostic system upon enrollment, and the platform automatically generates personalized learning paths. During the learning process, AI learning companions track learning behaviors in real time, providing knowledge explanations, difficulty analysis, and learning suggestions. Teachers use AI-assisted tools for course design and learning analytics. The platform continuously optimizes learning paths and resource recommendations based on real-time data.
Implementation Outcomes:
Achieving a "one-thousand-faces-for-one-thousand-people" learning experience, significantly reducing the learning dropout rate. Through competency profiles and digital portfolios, supporting credit recognition and competency certification, and promoting the construction of a lifelong learning system.
Innovation Value:
Transforming traditional "standardized teaching" into "data-driven personalized learning," achieving a fundamental shift from "teaching-centered" to "learning-centered."

Scenario 2: Vocational Education and Industrial Talent Development (Industry-Education Integration)
Against the backdrop of the rapid development of the digital economy and emerging industries, vocational education faces issues such as "outdated curricula, insufficient practice, and imprecise competency evaluation." This solution can deeply empower vocational education and corporate training scenarios.

Implementation Approach:
The platform combines industry knowledge graphs and enterprise job competency models to build a "Project-Based Learning (PBL) + AI Tutoring" teaching model. Learners engage in learning around real project tasks, with AI agents providing phased guidance (task decomposition, solution design, code assistance, result evaluation, etc.), and quantitatively analyzing learning outcomes through real-time assessment models.
Implementation Example:
In software development courses, the platform can simulate real enterprise projects (e.g., microservice system development), where learners complete the entire process of requirements analysis, system design, and code implementation with AI assistance. Enterprises can screen talent based on learning data, achieving an integrated "learning-practice-employment" closed loop.
Implementation Outcomes:
Enhancing learners' practical abilities and job-matching accuracy, shortening the talent development cycle. Enterprises participate in curriculum co-construction, improving the relevance and practicality of talent development.
Innovation Value:
Breaking the barrier of "disconnection between teaching and industry," achieving deep integration of the education chain and the industrial chain.

Scenario 3: Enterprise Digital Learning and Talent Development
In large enterprises or organizations, employee training faces issues such as slow content updates and difficulty in evaluating learning outcomes. This solution can build an enterprise-level intelligent learning platform:
Implementation Approach:
Enterprises rapidly build course systems based on job competency models and business scenarios. Employees engage in on-demand learning through AI learning assistants. The platform analyzes learning behaviors in real time and generates competency profiles. Managers use data dashboards to monitor organizational learning progress and talent development trends.
Implementation Outcomes:
Achieving precise training "oriented toward competency enhancement." Driving talent selection and promotion decisions through learning data.

Impact and Case Evidence

■ **Implementation Effectiveness and Practical Experience**

This solution has been piloted in continuing education and vocational training scenarios, achieving remarkable results:
Learning Side: Personalized learning paths increased course completion rates from 52% to 78%, reduced learning dropout rates by 35%, improved knowledge point mastery by approximately 28%, and raised learning satisfaction to 4.5/5.
Teaching Side: AI-powered lesson plan generation and assignment design improved efficiency by 60%. Automated grading and learning analytics reduced teachers' repetitive work by 40%. Teaching feedback was optimized from "weekly-level" to "real-time-level."

Management Side: Competency profile coverage reached 95%+. Teaching decision response efficiency improved by 50%. Course update cycles were shortened from "annual-level" to "quarterly-level."
Practical Experience: A unified data foundation is key. AI capabilities must be embedded throughout the entire teaching process. A "phased, progressive" implementation strategy is more likely to succeed.

■ **Replicability, Sustainability, and Promotion Potential**

Replicability: The platform adopts a component-based and plugin-based architecture, supporting multilingual and localized deployment, and can be quickly adapted to different countries, education types (universities, vocational education, corporate training), and technology environments.
Sustainability: Through the closed-loop mechanism of "data accumulation - model optimization - application iteration," the platform evolves continuously, and combined with the plugin ecosystem and open platform, forms a multi-party co-construction long-term development model.
Promotion Potential: The solution can serve as a national-level digital learning platform foundation, supporting international educational cooperation and SaaS-based output, with the capability for large-scale replication and commercial promotion.

■ **Typical Case Description**

Case: Experimental College of the Open University of China
Period: 2025-2026 Scale: 100,000+ learners, 300+ teachers, 200+ courses
Implementation: Building personalized learning paths, AI learning companions, intelligent Q&A, teaching assistance, and competency profiling systems.
Key Results: Course completion rate increased by 30%+, dropout rate for key courses decreased by 40%, teacher lesson preparation efficiency improved by 50%+, and platform daily active users increased by approximately 2x.
Value: Validated the feasibility of AI-driven personalized learning in large-scale educational scenarios, demonstrating strong exemplary effects.

Basic Information of the Institution

Consistent with the introduction of OUC Online Education Technology above.
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17. Guokai Fanzai (Beijing) Educational Technology Co., Ltd.

Construction and Practice of an Ubiquitous Course Resource Generation System — Ubiquitous Lecture Master

Solution Introduction

Function Overview

Ubiquitous Lecture Master is an intelligent educational resource production platform that aligns closely with the key priorities of "reconstructing the educational ecosystem in the age of intelligence, enabling universal access to high-quality resources, fostering human-AI collaborative education, and enhancing digital literacy." With digital human cloning technology at its core, it incorporates technologies such as image-to-digital-human generation, appearance and voice cloning, lip synchronization, AI-assisted video generation, AI script writing, and multilingual adaptation. It streamlines complex course production workflows into simple, user-friendly processes, providing teachers with a convenient, highly integrated, end-to-end digital tool for creating instructional resources.

The platform addresses the core needs of digital transformation in the education sector, addressing longstanding challenges in traditional course recording: high costs, lengthy production cycles, steep technical requirements, and barriers to cross-language dissemination.

The platform is designed to meet the diverse needs of the education sector. It supports course development for emerging disciplines, enables efficient production of various educational resources, facilitates dynamic course iteration, empowers the development of international courses, promotes the sharing of industry training resources, and supplements resource-scarce rural and under-resourced schools, thereby advancing educational equity through digital means.

Technical Highlights and Innovations

- Multimodal Digital Human Driving Technology

Leveraging cross-modal alignment and joint representation techniques, the system achieves seamless integration among text, speech, facial expressions, and body movements. This approach overcomes the limitations of traditional isolated modalities, significantly enhancing the overall realism and expressiveness of digital humans, particularly in voice and lip synchronization, meeting the high-precision requirements of educational scenarios and providing robust technical support for high-quality digital human video generation.

Fig. 1 System Architecture Overview

- Speech Synthesis and Emotional Transfer Technology

When cloning a voice, the system automatically cleans audio data to remove background noise and interference. It supports flexible control of speech pauses to ensure natural breaks at key points, offers emotionally expressive speech synthesis with multiple selectable emotional states, features intelligent speech rate control for adjusting speaking pace as needed, and provides personalized volume adjustment options to accommodate individual preferences.

- PowerPoint Animation Restoration Technology

By integrating multiple advanced technologies and adopting a modular design approach, the platform enables intelligent processing of unstructured document data. It supports one-to-one animation restoration of uploaded PowerPoint files, with text in the notes pane automatically extracted as the narration script. The original animation logic, transition pacing, and instructional design of the source courseware are fully preserved.

- Human-AI Collaborative Creation Loop

The system establishes a closed-loop mechanism of “AI-assisted creation → human refinement and optimization → data feedback and iteration.” An integrated AI assistant provides functions for script drafting, polishing, expansion, and summarization. Teachers need only focus on quality control and personalized adjustments, forming a collaborative model of “efficient machine processing + deep human creativity” that improves production efficiency while ensuring the quality and professionalism of educational content.

- Multilingual Intelligent Adaptation Engine with Machine Translation Integration

The platform supports real-time conversion and dubbing in more than 39 languages. It maintains translation accuracy while preserving the intonation and emotional characteristics of the original instructional voice, resolving language barriers in the international dissemination of educational

resources and enabling cross-cultural sharing of high-quality course content. It also supports professional terminology management: industry terms, personal names, brand names, and proper nouns can be entered to ensure consistent, accurate multilingual translations and natural, standardized professional pronunciation by digital human avatars.

(6) Lightweight Rendering and Multimodal Video Output

Powered by a proprietary lightweight neural rendering architecture, digital human cloning can be completed in as little as three minutes. While maintaining high-definition video quality, the platform minimizes the generation time for each video, enabling real-time production in an ordinary office environment. This achieves the lightweight application goal of "enabling regular teachers to produce professional-grade course videos using everyday office computers, without the need for high-end hardware." Multiple video formats and resolution options are supported to meet the needs of different devices and platforms.

Application Scenarios

■ **Application Environment and Target Users**

Applicable Educational Scenarios:

Micro-courses / Bite-sized teaching videos: In-depth explanation of key knowledge points and breakdown of difficult concepts—lightweight micro-courses of 5–15 minutes, with one-click generation of digital human lecture videos from PowerPoint files or scripts, eliminating the need for teachers to appear on camera, and enabling batch micro-course production once the digital human avatar is created.

High-quality courses / Demonstration lessons / Open classes: Batch production of standardized, high-quality subject courses, school-based resources, and teaching research outcomes, with support for multilingual and immersive virtual scene presentation.

Dual-teacher classrooms / Standardized teaching and simulation teaching: Multiple digital humans can engage in dialogue, simulating collaborative teaching scenarios between schools and industry experts or standardized instructional interactions between teachers and students.

School-based resource library development: Rapid accumulation of video resources covering subject micro-courses, ideological and political education, safety awareness, and professional conduct, delivered with a consistent style and efficient iterative updates.

Daily meetings / Promotional communications: Using digital humans to deliver presentations, knowledge-sharing short videos, and other scenario-based content.

Software and Hardware Environment:

The technical architecture is highly flexible, supporting diverse deployment options including SaaS deployment and customized deployment models. System integration and data integration can be carried out based on project requirements to meet clients' varying needs for digitalization and data security.

For lightweight individual content creation: the web interface supports text or PowerPoint import, selection and customization of 3D digital human appearances, virtual scene configuration, AI voice and lip synchronization, transition animation settings, and subtitle insertion, with one-click rendering and MP4 export.

The minimum hardware requirement is a standard laptop or desktop computer with a built-in microphone; no professional editing equipment is needed, as all rendering is cloud-based.

Data security measures: The platform utilizes Huawei Cloud OBS storage, while also supporting user-deployed MinIO storage. Course content and user data are stored with encryption, and fine-grained access control mechanisms are in place to comprehensively meet data security and compliance requirements in the education sector.

Target Users:

- Educational institutions

Covering public schools, private educational institutions, and corporate or industry organizations, the platform is aligned with the conference's orientation toward large-scale digital transformation in education. Public schools can leverage the platform to advance resource development and educational equity; private institutions can achieve scalable course production and commercialization; corporations and industry organizations can build a lifelong learning resource ecosystem.

- Education companies

The platform serves course production teams at education companies with standardized, batch digital educational resource production solutions. It supports the rapid conversion of courseware and scripts into high-definition digital human courses, adaptable to textbook digitization, micro-course series development, and supplementary videos for online question banks, significantly reducing content production costs, shortening project delivery cycles, and supporting scalable content production and commercial monetization.

- Teachers

The platform serves teachers across all levels of education, instructors at training institutions, corporate trainers, pre-service teachers, and educational researchers. It enables efficient creation of micro-courses and high-quality courses, reduces teachers' workload through AI teaching assistant support, and facilitates the visualization of teaching and research outcomes.

■ **Representative Application Scenarios**

Course development: The platform has been used in the production of elective courses, model resource projects, and internationalized course adaptation initiatives at the Open University of China, currently covering multiple disciplines including computer science, economics and management, liberal arts, fine arts, and education. Digital human instructors replace on-camera teachers for foundational knowledge explanation, saving 95% of recording time and reducing overall production costs by 70%.

Training and international conferences: The platform has been used to produce videos for international exchange conferences and training resources, creating enterprise-specific digital human training instructors who perform effectively in international exchange events and corporate training settings.

Outcomes and Case Studies

■ **Implementation Outcomes, Evaluation Data, and Practical Experience**

Quantified outcomes:

① Production efficiency improved by over 80%: Under traditional course recording workflows, from courseware preparation and on-camera shooting to post-production editing, completing one lesson video typically takes 3–5 working days. With the platform's AI tools and digital human technology, professional course videos can be generated in minutes. Single-lesson production efficiency has increased by more than 80%, and some users can complete over 50 micro-courses in a single day.

② Production costs reduced by over 80%: Traditional course recording requires filming equipment and professional editing/dubbing teams, with the cost of a single high-quality lesson exceeding 1,000 RMB. The platform requires no additional hardware or personnel investment, as regular teachers can work independently, reducing the cost per lesson by more than 80% and significantly cutting expenditures on venues, equipment, and staffing.

Evaluation data:

The platform's high-realism digital human technology, combined with full-pipeline AI capabilities, enables digital human cloning from source materials within minutes, achieves 99.9% realism, and achieves 99% lip-sync accuracy, surpassing comparable products in realism. It is also complemented by a full-pipeline AI toolkit covering AI audio re-recording, AI video re-shooting, AI video translation, and AI image quality enhancement, enabling all post-production operations within a single platform without switching between tools.

■ **Replicability, Sustainability, and Scalability**

This solution offers high cross-regional and cross-scenario replicability. Built on a standardized cloud-based SaaS architecture and a universal AI digital human engine, the underlying technology is compatible with mainstream operating systems and network environments worldwide. It supports real-time multilingual synthesis and cross-cultural content adaptation, enabling rapid deployment in developed, developing, and least-developed countries alike. No changes to the underlying system are required; by offering a "lightweight cloud edition" or "professional deployment edition" tailored to regional educational standards and network conditions, the solution seamlessly adapts to K–12, higher education, vocational education, and inclusive education scenarios for senior citizens and community learners.

In terms of a sustainable operating model, the platform establishes an integrated model combining three components: "technology subscription + co-development projects + value-added services." Standardized subscription services are offered to individuals and small-to-medium institutions; for national education authorities, open universities, and higher education institutions, a co-development model is adopted to jointly build regional resource repositories and support long-term operations; complementary value-added services, including teacher digital literacy training and custom digital human development, enhance long-term user value and enable a virtuous cycle.

The platform demonstrates strong potential for promotion. Technologically, it reshapes content production paradigms through AI, improving production efficiency and providing accessible infrastructure for global education digitalization. Socially and economically, it helps bridge the digital divide and advances educational equity and the development of lifelong learning systems, contributing to global Sustainable Development Goals. For cultural dissemination, it supports multilingual and cross-cultural digital course creation, providing powerful technological support for the global promotion of local cultures, demonstrating broad strategic and social impact.

■ **Representative Case Study**

During the development of the first cohort of Model Course and Model Resource Demonstration Projects at the Open University of China in 2025, the course "Online Learning Support Services," co-developed with the School of Education, utilized the Ubiquitous Lecture Master platform to produce digital human micro-courses. This course focuses on cultivating job competencies. In the micro-course development phase, Ubiquitous Lecture Master not only enhanced the efficiency of course development but also achieved integration through AI-generated images and AI-animated scenario creation, building an interactive scenario-based learning environment. This represents an exploratory practice in leveraging AIGC to empower model course development. The course successfully passed final evaluation in December 2025 and was officially launched for use within the Open University of China's educational system.

Basic Information of the Institution

■ **Institutional Overview**

Guokai Fanzai (Beijing) Educational Technology Co., Ltd. was established in 2006 as a company specializing in integrated digital learning services for the education sector. The company's business encompasses digital learning resource development, educational software development, comprehensive informatization solutions for academic institutions, and multi-level instructional content training and service delivery, positioning it as an innovative educational technology company.

The company has developed the "Networked Education Resource Center," a national-level public service system for digital learning resources. This system consists of a central hub and 264 sub-centers distributed across 31 provincial administrative regions nationwide, encompassing industry bodies, academic institutions, and training organizations, forming a digital learning resource service network covering the entire country.

Over twenty years of development, the company has accumulated extensive experience in curriculum resource design and production, established a comprehensive course development framework, and implemented professional process standards. It has a pool of over 1,000 subject-matter experts across various disciplines, ensuring the authority and forward-looking nature of course content. The team of course resource designers and producers numbers more than 70, including over 40 instructional designers, providing strong support for teachers in course design and development.

■ **Experience and Credentials in Digital Education**

Core strengths: A digital resource library of over 76,000 open education courses has been built, demonstrating large-scale resource production capability. The company holds more than 60 software copyrights and registrations; its technologies comply with domestic and international education standards, offering full-process integrated solutions.

Relevant credentials: The company holds full compliance qualifications including High-Tech Enterprise certification, dual software certification (software enterprise and software product), and a Radio and Television Program Production License. It is qualified for national-level resource submission and sharing, recognized as a Beijing "Innovative" SME, and listed on industry brand rankings.

Successful projects: The company has been the core builder of national-level projects including the Ministry of Education's National Modern Distance Education Resource Repository and the Networked Education Resource Center. It supports the operation of the platform "Smart Education of China · Lifelong Education," assists with intangible cultural heritage resource collection, and has undertaken multiple Ministry of Education projects including the Chinese Classic Recitation Conference, the "Tongyu Tongyin" program for preschool children in ethnic regions, high-quality courses for online vocational training, the World Vocational College Skills Competition (secondary vocational head teacher competency), and the instructional competency competition of vocational college teachers, serving over 35 million learners across 31 provincial administrative regions nationwide.

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18. Beijing Wenhua Online Education Technology Co., Ltd.

AIEC Smart Teaching Solution

Solution Introduction

Function Overview

The AIEC Smart Teaching Solution is built on Huawei's homegrown digital intelligence infrastructure (ICT infrastructure), combined with large language models and AI technologies, and based on teaching and learning application software and teaching services. It provides educational institutions with an integrated digital transformation solution covering "smart learning space construction, school-based knowledge center construction, teaching and learning AI agent construction, and teacher development. Smart classrooms can be newly built or retrofitted from existing facilities, creating future-oriented learning spaces. Through triadic interaction among teachers, students, and machines (AI), the solution promotes classroom teaching reform. Classroom teaching videos are automatically and non-intrusively recorded and, together with other resources, form a multimodal school-based knowledge center. Combined with AI large models and agent construction, it provides personalized resource recommendations for students and builds subject-specific intelligent agents for teachers – one assistant per course – empowering pre-class, in-class, and post-class teaching and learning. It comprehensively assists teachers in lesson preparation (generating teaching plans, PPTs, and questions based on knowledge points), classroom teaching, intelligent assignment grading, and other scenarios. The solution uses the AIEC Artificial Intelligence Teaching Center as a unified entry point, supports flexible deployment (on-premises or cloud) for educational institutions to choose when needed.

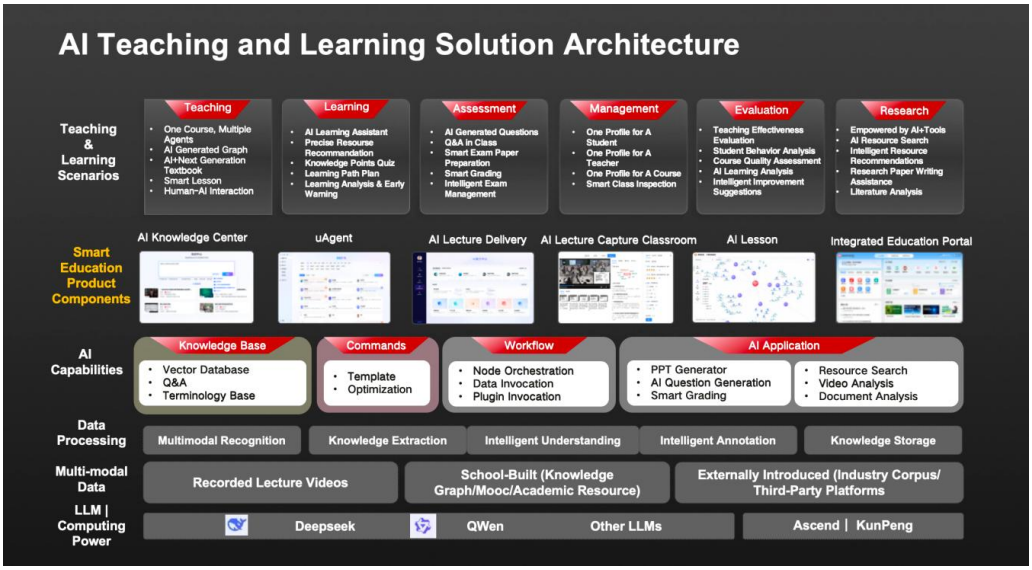

Fig. 1 Solution Architecture

■ **Technical highlights or innovations**

Fully Self-Developed Software & Localized OS Compatibility: All platform software is independently developed and fully compatible with Chinese homegrown and trusted operating systems such as KylinOS, UnionTech UOS, and HarmonyOS, aligning with the education sector's push for localized, secure technology.

Knowledge Endogenization: A proprietary school-specific knowledge construction mechanism enables general large language models (LLMs) to adopt unique institutional characteristics and subject depth. This solves the "last mile" challenge of deeply integrating AI into education while also facilitating the long-term accumulation and effective use of school-based teaching resources.

Proprietary Classroom Teaching Analysis Model: A self-developed model analyzes multi-modal classroom teaching data. It enables deep utilization of school-based resources (e.g., knowledge point recognition and knowledge graph construction) and provides personalized evaluations of different classrooms based on each school's own assessment criteria.

Value-Oriented Guidance: Authoritative values-based content is integrated into the system, naturally embedding moral and civic education elements within intelligent interactions. This achieves a seamless integration of knowledge transfer and character/value development.

Ecosystem Integration (Open Architecture): An open architecture is adopted to ensure maximum compatibility with schools' existing business systems. This protects prior investments, lowers deployment barriers, and accelerates the overall digital intelligence transformation process.

Application Scenarios

Target Users: Higher education institutions, vocational colleges, and primary/secondary schools

Application Environment: All subject areas across the entire teaching and learning cycle, including instruction, learning, management, assessment, evaluation, and research

Application Scenarios: Intelligent lesson preparation, interactive classroom teaching, remote interactive teaching, personalized learning, automated grading, learning analytics, teaching quality evaluation, instructional data analysis, and other core teaching scenarios

Typical application scenario example: Hong Kong Pei Kiu Middle School (PKMS)

The project involves the re-construction of 25 traditional classrooms and 1 school history room into 24 smart digital classrooms, 1 smart recording classroom and smart school history room. Through the introduction of SaaS-based computing power and an AI smart teaching system (comprising an AI agent management system, a recorded lecture/class supervision and resource on-demand system, and a classroom video AI analysis system), and by making smart board investments to replace the traditional classroom whiteboards, the school has realized the digital and intelligent transformation of education and teaching.

Typical scenario 1: One Lesson, One AI Assistant

Leveraging a general-purpose large language model and utilizing Retrieval-Augmented Generation (RAG) for enhanced retrieval, the system enables teachers to build subject-specific or course-specific knowledge bases, thereby reducing hallucinations common in general models. With "one knowledge base per lesson" and "one AI agent per teacher," the AI assistant is integrated into core teaching activities such as pre-class lesson preparation, in-class instruction, and post-class grading.

It precisely focuses on subject or course content for content generation and auxiliary Q&A. As a result, lesson preparation time for a single class has been reduced from three hours to one hour, significantly improving teaching efficiency.

Typical scenario 2: AI-enhanced Supervision and Teaching Quality Evaluation

Traditional manual supervision is costly, offers limited coverage, and suffers from fragmented supervision data and difficult-to-interpret reports. By introducing a recorded lecture and class observation platform, a resource on-demand system, and a classroom video AI analysis system, the school has achieved full coverage of routine classroom teaching evaluation. The AI automatically generates classroom evaluation reports, helping teachers reflect on their instructional practices and enabling the school to comprehensively improve supervision efficiency, thereby driving teaching quality enhancement through data.

Impact and Case Evidence

■ **Implementation outcomes, evaluation data, or practical experience**

Actual application projects (count)	50+	**Largest investment amount (10k RMB)**	1274.114
Largest user scale in application projects (10k students)	20,000+ students	**Largest number of deployment units in application projects(count)**	8

Table 1

■ **Replicability, sustainability, and promotion potential**

This solution has high promotion value and has achieved large-scale application, forming replicable successful experience. In China, it has served nearly 100 higher education institutions and secondary schools, e.g., Tianjin University, Harbin Institute of Technology Business School, Beijing Institute of Technology, Shanghai Jiao Tong University, Zhongnan University of Economics and Law, Ningxia University, Shandong University of Technology, Zhejiang Shuren University, Chengdu Aeronautic Polytechnic, Chengdu Polytechnic, Shanghai Tongchuan School, Hong Kong Pui Kiu Middle School. Internationally, the solution is offered in more than 160 countries and regions, supports more than 10 languages, and through 4 public cloud sites and national education clouds, has served multiple national smart education construction projects for ministries of education, e.g., Iraq, Oman, Seychelles, Uzbekistan, Zambia, Egypt, Malaysia.

Meanwhile, the solution has also generated significant industrial driving effects and international influence. At the industrial level, powered by China’s homegrown computing infrastructure such as Huawei Ascend, it has boosted the sales of hardware industries including China’s homegrown AI chips and servers. In terms of influence, it has shared China's practical experience in the digital transformation of education with over 160 countries worldwide, enhancing China's impact in global digital education. This series of successful practices not only provides a complete solution for the intelligent transformation of the education sector but also offers important reference value for the digital transformation of other industries, thanks to its "full fledged solution which has integrated smart hardware with intelligent software that supports the AI-driven, full loop of teaching and learning innovation.

Typical Case Study: A Middle East Country X's National Smart Schools Project

In response to the challenges faced by a Middle East country X after the war - including large-scale destruction of schools, severe shortages of teaching materials and teachers (with a teacher-student ratio of 1:40), and 35% of teachers never having received formal training - the proposed solution is to build a nationwide unified education system featuring "One Network, One Cloud, One Platform." On the basis of the Ministry of Education's unified platform, ULearning Learning Management System (uLMS) and smart recording classrooms have been deployed to provide teaching and learning resources and support hybrid classroom instruction. This enables the automatic recording, storage, and nationwide sharing of high-quality educational resources, helping war-damaged schools quickly restore their teaching capacity, alleviating the shortage of teachers and textbooks, and providing ongoing teaching support for under-trained teachers.

Phase 1: Constructed 1400 new digital classrooms, 50 smart recording classrooms in 50 middle schools with smart board provided in each classroom, one unified learning management system and recording software systems. With unified portal, the Ministry of Education are able to access to all teaching and learning data, view recorded classroom videos of all schools from macro- and micro perspectives, assign or share digital resources to designated schools. Teachers are able to use the smart board, whiteboard application and classroom interactive system for innovative classroom teaching. Students are able to participate in the classroom activities in real-time, get teacher's feedback in-class, learning quality content after class and do assignments through mobile devices/PC anytime, anywhere.

Phase 2: Introduce cloud-based AI computing power to conduct AI analysis of classroom recorded videos gathered from 50 recording classrooms, MOE is able to conduct the evaluation of classroom teaching efficiency and efficacy.

Phase 3: Deployment plan of digital classroom and recording classroom to 4000 schools and this phase will take place in 5 years. The MOE plans to provide schools with digital classrooms and 1 recording classroom per school, deployment of a national level AI computing power, LLMs and AI applications (AI video analysis of all recorded lecture videos gathered from recording classrooms, knowledge graph, digital human micro-lectures, AI teaching assistant, AI learning companion, classroom diagnostics, and resource management).m, dynamic question generation engine, classroom interaction assistant, learning diagnosis center, resource recommendation system, and micro-lecture production workshop. Supporting all scenarios—pre-class, in-class, post-class, teaching, academic affairs, and research—the project has achieved three major outcomes: one knowledge base per lesson, one AI agent per lesson, and one personalized space per teacher.

Project Outcomes:

Teacher training had been conducted in 4 cities with 200+ project lead teachers in 4 cities. In Phase 1, the digital classrooms, recording classrooms and learning management system will be start using by the 50 schools from June 2026 onwards. The project lead teachers will then train the rest of the 50 schools on digital transformation of education forming a sustainable teacher training mechanism that fits in the local teaching scenarios.

■ **Experience or qualifications in digital education**

Outstanding contributions: The first Chinese educational technology company going global. The first strategic partner of Huawei Global in smart education sector offering international standard Next Generation Learning Space (NGLS) solution that includes smart classrooms, learning management system and Chinese AI educational technology embedded with China's homegrown LLMs such as AI agents for teaching and learning, knowledge graph for personalized learning, AI proctored exam system and alike.

Basic Information of the Institution

Beijing Wenhua Online Education Technology Co., Ltd. is the first education technology company strategically invested by People's Daily Online. It focuses on integrating next-generation information technology with education and teaching, providing three major solutions: Smart Classroom Solutions, AI Smart Teaching and Learning, and Chinese Education Going Global Solution (for collaboration between Chinese and oversea higher educational institutions) . The company is a national high-tech enterprise and a "Specialized, Refined, Distinctive, Innovative" little giant enterprise. Its self-developed "ULearning" platform is among the first to be connected to the "National Smart Education Portal". The company owns the registered trademarks of the "UMOOC" series and holds 13 patents, 183 copyrights, and 196 intellectual property rights in the smart teaching field.

Wenhua Online is also a global strategic partner of Huawei Technologies Co., Ltd. for providing smart teaching solutions worldwide. It has already implemented a number of benchmark users in the Ministry of Education, higher education, K-12 education, TVET education institutions in 160+ countries.

Major achievements: In 2025, its AI teaching application was selected as a Beijing typical case (the only university benchmark in smart education). The China homegrown solution has been implemented in hundreds of universities across 24 provinces in China. The solution has obtained multiple technical certifications from Huawei. It has established a Singapore operations headquarters and multiple regional centers overseas, hosting thousands of overseas users annually from higher education, TVET education and K-12 education institutions, government agencies and corporations.

Industry influence: The AIEC solution establishes an integrated AI-education architecture that serves as a benchmark for the digital and intelligent transformation of education both in China and oversea. It pioneers the total solution of "Smart Classroom + Integrated Teaching Platform + AI System" based on SaaS business model in China. In the international market, it pioneers the country cloud business model helping to set a standard in the education industry ecosystem.

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19. TAL Education Group

"Jiuzhang Aixue": A Multimodal Large Model-Empowered Intelligent Tutoring Solution

Solution Introduction

Function Overview

"Jiuzhang Aixue" , an intelligent tutoring solution empowered by TAL's proprietary multimodal educational large model, targets the after-school self-study scenarios of primary and secondary school students. By tackling mathematics—often considered the most challenging subject in basic education—as its entry point, the system has evolved into an "intelligent learning companion" haracterized by its capacity to perceive, reason, and empathize through real-time multimodal interaction.

This comprehensive solution primarily encompasses four distinct functionalities:

First, it provides an immersive virtual classroom experience. By simulating one-on-one human tutoring, the system creates a highly customized learning environment tailored to primary and secondary students. To accommodate diverse learning scenarios, it features two distinct AI avatars—"Teacher Xiao Si" and "Teacher Xiao Zhi"—each offering a unique instructional mode to meet varying educational demands.

Second, the system facilitates targeted practice. Upon the completion of an explanation, the system automatically recommends pertinent exercises based on the student's performance and their level of knowledge mastery. Furthermore, students can autonomously request synchronized practice aligned with their school curriculum, enabling them to reinforce foundational concepts and enhance their proficiency in accordance with their current academic progress.

Third, it features automated homework assignment and intelligent grading capabilities. Teachers can seamlessly assign tasks with a single click. Subsequently, students can utilize the tool to take photographs of their completed work for immediate grading. Simultaneously, the system continuously aggregates and analyzes learning data, which not only alleviates the teachers' grading workload but also facilitates precise, data-driven instruction tailored to individual student needs.

Finally, the solution integrates psychological counseling. To address the increasing prevalence of psychological issues among students, "Jiuzhang Aixue" incorporates a proprietary, built-in psychological counseling large model designed to offer emotional companionship and psychological guidance. Recognizing the paramount importance of minors' physical and mental well-being, the system employs stringent management measures to ensure that all conversational output remains wholesome, beneficial, and entirely positive.

Fig. 1 An intelligent tutoring solution

Fig. 2 Phycological counseling

■ **Technical Highlights or Innovations**

This project has achieved a series of groundbreaking innovations, detailed as follows:

- Multimodal Robust Educational Data Perception:

The project proposes a robust method for perceiving multimodal educational data. By developing a suite of technologies—including noisy label data representation learning, heterogeneous feature adversarial attack data augmentation, cross-modal alignment mechanisms, and dual-modal stimulus complementarity—it successfully resolves the difficulties associated with annotating raw educational data. Consequently, this innovation achieves semantic comprehensibility in educational scenarios and significantly enhances the generalization capabilities of the system in highly noisy, personalized learning environments.

Advanced Knowledge Representation and Tracing:

It introduces novel methods and techniques for knowledge representation, multi-task modeling, and the interpretability of predictive outcomes within personalized learning models. Furthermore, the project has engineered seven deep knowledge tracing models. These models enable the precise assessment of diverse learners, effectively accommodating individual differences even when students are addressing questions related to the identical knowledge points.

Step-Level Reward Models and ArithmeticGPT Framework:

The project pioneers the application of step-level reward models in mathematical reasoning. Through process supervision or reinforcement learning-based step-level preference alignment, mathematical reasoning performance is significantly elevated. This approach not only facilitates accurate calculations within each individual step but also demonstrates outstanding performance in evaluating the logical consistency of mathematical language. Additionally, the project developed the ArithmeticGPT framework to augment the advanced computational capabilities of Large Language Models (LLMs). This framework enhances the precision and accuracy of LLMs in complex calculations, boosting their advanced operational capacity by 20% to 35%, thereby achieving a proficiency level on par with GPT-4.

- Personalized Intelligent Q&A System Based on Big Data:

Leveraging proprietary educational big data, the project developed a personalized, intelligent Question and Answer (Q&A) system. This system substantially improves mathematical reasoning and computational performance in primary and secondary education. By realizing conversational guidance and providing detailed, step-by-step knowledge explanations within educational contexts, it is capable of delivering fully personalized and highly interactive online AI tutoring services to millions of students simultaneously.

Application Scenarios

■ **Application Environment and Implementation Targets**

The target demographic of this project encompasses learners, educators, and educational platforms within the basic education sector. The solution is universally compatible with a diverse array of digital learning terminals—including smartphones, tablets, and personal computers—and is notably operating system-agnostic, remaining completely unaffected by varying hardware ecosystems.

To accommodate diverse user demands, the solution provides a comprehensive three-tiered service architecture:

- Direct-to-User Applications (B2C):

The project offers the "Jiuzhang Aixue" intelligent companion mobile application and its corresponding WeChat Mini-program. Students can directly utilize their smartphones or tablets during their daily studies to seamlessly access the intelligent learning companion for immediate academic assistance.

- System Integration via APIs & SDKs (B2B):

By providing open Application Programming Interfaces (APIs) and Software Development Kits (SDKs), the system empowers third-party schools, educational enterprises, and digital platforms to embed these advanced AI capabilities into their pre-existing applications. For instance, these functionalities can be integrated into institution-issued smart tablets, subsequently making them accessible to both teachers and students.

- Bespoke AI Super-Agent Customization:

In response to the specific, individualized requirements of third-party clients, the project is capable of tailoring specialized, one-on-one AI "super-agent" services to deliver highly customized educational solutions.

■ **Examples of Typical Application Scenarios**

- Public Sector Services (B2G):

Regarding public sector services, this project has emerged as a pivotal instrument for implementing the "AI + Education" policy and advancing the development of smart campuses across multiple regions in China. Leveraging the project's core technological capabilities, customized applications have been widely deployed and launched on public education platforms across numerous provinces and municipalities. Notably, "Jiuzhang Intelligent Q&A" and "Jiuzhang Intelligent Diagnosis" were introduced as the inaugural AI educational applications on the National Smart Education Platform for Primary and Secondary Schools. Furthermore, the "AI Teaching Assistant" and "AI Learning Assistant" were integrated into the Guangdong Provincial Smart Education Platform. During their pilot program in Guangdong, these tools served tens of thousands of teachers and students daily while maintaining a flawless record of zero complaints. Significantly, these robust capabilities have been recognized as an exemplary application practice, serving as a benchmark case for regional educational intellectualization in Guangdong.

- Institutional Services for Schools (B2B):

In the realm of institutional services, we have established partnerships with hundreds of primary and secondary schools nationwide, including prominent institutions such as Beijing Hongzhi Middle School and Beijing Guangqumen Middle School. Through diverse technological pathways, such as off-the-shelf SDK integration and open API interfaces, our solutions are seamlessly embedded into the schools' existing learning devices. This collaboration facilitates the co-construction of smart classrooms and AI-driven self-study rooms, thereby assisting schools in developing smart campuses and optimizing the scientific allocation of educational resources.

- Enterprise Services (B2B):

In the corporate sector, we have comprehensively integrated the large models and personalized learning technologies developed in this project into the intelligent agents of Xueersi's smart learning machines, providing students with exceptional AI-powered study companionship. Additionally, through open APIs and SDK support, we deliver intelligent Q&A services for primary and secondary education to leading Chinese technology enterprises. This encompasses integration with smart platforms and hardware produced by industry giants such as Lenovo, Huawei's intelligent agents, and E-surfing Smart Education Technology Co., Ltd. (a subsidiary of China Telecom).

- Direct-to-Consumer Applications (B2C):

Furthermore, we independently developed the personalized intelligent learning companion application, "Jiuzhang Aixue," which garnered substantial user attention and acclaim immediately upon its release. This application profoundly integrates multimodal large models with real-world educational scenarios. By utilizing dynamically generated text, voice, and video in real-time, it effectively addresses students' inquiries and resolves challenges they encounter in both their academic pursuits and daily lives.

Impact and Case Evidence

■ **Implementation Results, Evaluation Data or Practical Experience**

Distinguished by its remarkable cost-effectiveness, seamless deployment, intuitive accessibility, rapid efficacy, and an extensive repository of premium learning resources, the achievements of this project have been extensively implemented. To date, these solutions have been integrated into public education platforms across multiple regions in China, adopted by thousands of schools, and successfully deployed on millions of smart learning devices. Consequently, the project currently boasts millions of active users and has positively impacted nearly ten million educators and students nationwide, cumulatively saving hundreds of millions in educational expenditures.

■ **Replicability, Sustainability and Promotion Potential**

- A Paradigm Shift in Educational Models :

This comprehensive solution is not merely a product innovation; rather, it represents a profound paradigm shift in after-school self-study. By targeting mathematics—a universal pain point in primary and secondary education—as its initial breakthrough, the system creates an intelligent agent characterized by its capacity to perceive, reason, and empathize. Consequently, it establishes an AI-native companionship ecosystem that operates entirely independent of human intervention.

- Cross-Regional Replicability and Global Potential:

Regarding cross-regional replicability, the solution demonstrates immense potential for globalization. The universal nature of mathematical logic significantly mitigates the barriers to transnational localization. Coupled with seamless multilingual switching and the cost-effective integration of local curricula, the system effortlessly transcends cultural boundaries. Concurrently, multimodal interaction substantially lowers the threshold for hardware requirements, enabling the system to adapt to students across various nations and cognitive levels while delivering highly individualized instructional strategies.

For instance, in collaboration with the international educational institution Think Academy, we developed a customized tutoring product, Think Matrix (https://www.think-matrix.com/). Designed specifically for AMC preparation, this product assists students in accurately assessing their learning progress and provides targeted consolidation and practice.

- Long-Term Sustainable Operations and Business Model :

In terms of long-term sustainable operations, the minimal marginal costs achieved through zero human intervention constitute its core commercial advantage. The solution flexibly constructs a diversified monetization matrix: value-added subscriptions for families (B2C), system empowerment for schools (B2B2C), and inclusive public procurement for governments (B2G). As usage duration increases, the massive accumulation of learning and emotional interaction data will generate a powerful "data flywheel." This continuous feedback loop will perpetually fine-tune the model, thereby establishing an insurmountable competitive moat based on superior user experience.

- Broad Promotional Value and Social Impact:

Regarding its broad promotional value, the solution yields dual commercial and social benefits. By delivering premium educational resources to underserved markets at a profoundly low cost, it serves as a powerful instrument for promoting the global democratization of education. More importantly, it fills the emotional void left by traditional tutoring tools. By utilizing round-the-clock patient companionship to alleviate students' learning anxieties, and through proactive heuristic interactions, the system fundamentally cultivates the core competencies of independent thinking and autonomous learning.

■ Illustration of a Typical Case

Commencing in the autumn semester of 2025, we forged a strategic partnership with a primary school in Yunnan Province, China, initiating a comprehensive pilot program across 42 classes spanning grades three to six. On a daily basis, educators utilized the "Jiuzhang Aixue" intelligent companion to assign coursework and seamlessly monitor student progress. Concurrently, students employed the mobile application after school to complete assignments and engage in highly targeted practice. During this process, whenever learners encountered challenging problems or obscure concepts, they could directly address their inquiries to the embedded AI Learning Companion within the application.

To cater to diverse cognitive needs, the system features a dual-avatar instructional mechanism. For foundational or moderately difficult problems, the AI avatar "Teacher Xiao Si" employed a Socratic pedagogical approach, meticulously guiding students step-by-step to comprehend the underlying logic and problem-solving methodologies. Throughout these sessions, the application's interface transformed into an immersive virtual blackboard where key concepts were dynamically highlighted, accompanied by real-time transcriptions ofthe AI tutor's verbal explanations.

When confronting highly complex mathematical challenges, or if comprehension remained elusive following the initial guidance, a secondary AI avatar, "Teacher Xiao Zhi," would seamlessly intervene. "Teacher Xiao Zhi" delivered a remarkably concise and efficient instructional style. Rather than providing exhaustive, step-by-step details, the interface exclusively displayed the overarching conceptual framework. This deliberate design compelled students to concentrate on overcoming critical cognitive bottlenecks, thereby fiercely stimulating their capacity for independent thinking.

Crucially, the interaction with these AI educators was entirely fluid and user-centric. Students retained complete autonomy to request repetitions, seek clarification on emerging confusions, or even interrupt the ongoing explanation to pose supplementary questions. Such an interactive paradigm fundamentally shifted the students' role from passive recipients of knowledge to active directors of their own learning experience, significantly enhancing their academic engagement and intrinsic motivation.

Following a full semester of rigorous implementation, the profound efficacy of the pilot was validated during the final examinations in January 2026. Students who consistently utilized this intelligent tool exhibited substantial academic advancement, with over half of the participating cohort demonstrating exceptionally marked improvements in their overall scholastic performance.

Basic Information of the Institution

TAL Education Group (NYSE: TAL) is a technology-driven company based on its capabilities in content and technology, strategically focusing on Science Education, Scientific Innovation, and Science Popularization to empower life-long growth while continuously exploring innovation.

Formerly known as Xueersi, TAL was founded in 2003 and officially listed on the New York Stock Exchange in 2010. Guided by its mission, “To empower life-long growth with love and technology,” TAL is dedicated to being an organization driving continuous innovation. Its brand portfolio includes Enrichment Learning , Xueersi.com , TAL Publishing, Xueersi Smart Devices, MathGPT, Better Me, M School, and Xueersi Hi World.

TAL strategically focuses on the "Three Sciences" to meet people’s needs for life-long growth: **Science Education**: TAL utilizes advanced scientific technologies to support family learning and growth, aiding the industry’s digital transformation. For example, Enrichment Learning and Xueersi.com have launched well-rounded quality education products such as Science, Humanities, and Natural History to enrich learning experiences. **Scientific Innovation**: Through technological advances, TAL develops intelligent learning hardware and software, such as self-researched educational large models like MathGPT, with product-level applications launched in 2023. Brands such as Intelligent Content, Smart Learning, and M School integrate premium learning materials, structured methodologies, and high-touch learning services into devices like learning tablets and Learning-and-Practice tablets, bringing innovation to educational hardware tailored for home-study scenarios. **Science Popularization**: Leveraging platforms like Douyin (TikTok), TAL promotes knowledge dissemination to help users explore, understand, choose, and purchase products more wisely, thereby creating value for more families and users.

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20. Guangzhou AVA Electronic Technology Co., Ltd.

AVA AI Classroom Evidence-Based Solution

Solution Introduction

Function Overview

At present, educators' professional development faces three core dilemmas: teaching and research rely on empirical judgment and lack of objective evidence support; high-quality teachers are scarce and unevenly distributed; traditional listening and evaluation classes are costly and difficult to carry out normally.

The AVA AI lesson evidence-based system directly hits these pain points. By deploying AI data acquisition terminals, the classroom is constructed into a global "perceptual neural network", and the full amount of lesson data such as teacher and student behavior, voice, courseware, and blackboard writing is collected in a non-inductive way. These data are transmitted to the AI teaching brain in real time. After deep learning with a large number of evaluation data, the system has the evaluation ability of senior teaching and research staff. Combined with the localized evaluation scale and syllabus, it generates accurate AI lesson analysis reports for each lesson, and equips each teacher with an exclusive digital teaching and research staff, building a complete closed loop of "perception-cognition-feedback", so as to realize the transformation of teaching and research paradigm from experience-driven to data-driven.

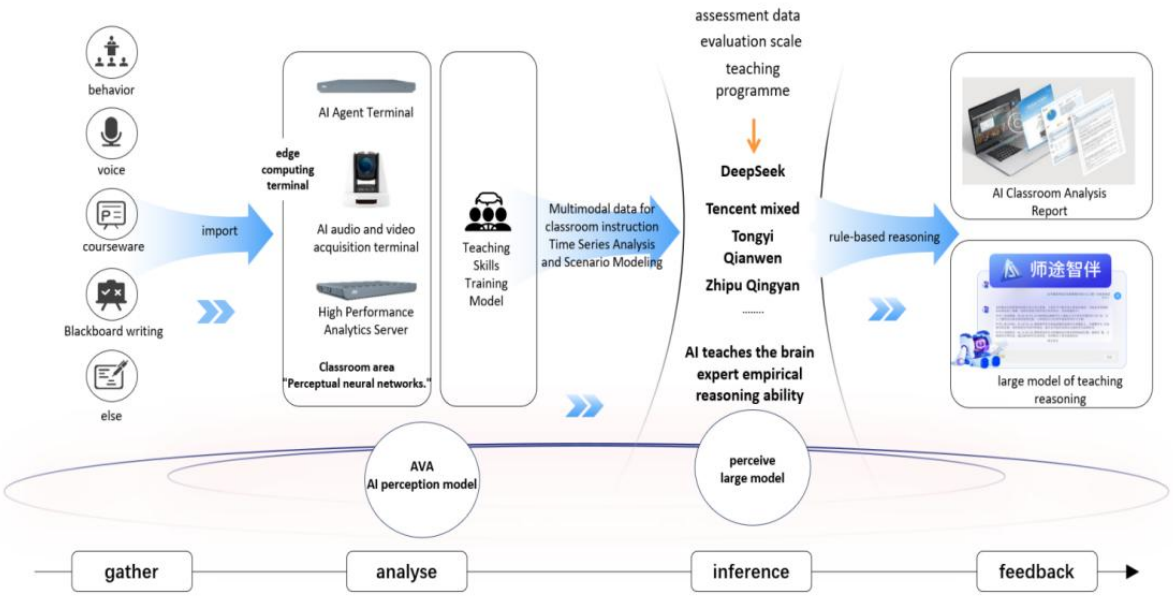

Fig. 1 Flowchart of AI Classroom Evidence-Based System

Function 1: Generate AI lesson analysis report in real time. Collect classroom multimodal data in a non-inductive way, and automatically generate an in-depth analysis report covering basic teaching skills, classroom control ability, implementation of new curriculum standards, teaching consistency comparison and other dimensions one minute after class. It provides operable suggestions based on theoretical framework and changes teaching reflection from "feeling" to "evidence".
Function 2: Provide personalized guidance of AI teaching and research staff. At present, there is no lack of AI tools, but professional partners who stay in school, listen to lessons patiently and guide deep thinking. The "Teacher's Wisdom Partner" listens to the class in real time, accurately captures teachers' professional abilities, provides targeted teaching suggestions for each educator through natural dialogue, and realizes personalized professional development guidance.
Function 3: AI + expert co-evaluation tool. Break the traditional time and space constraints of listening and evaluating lessons, enabling remote experts to view the AI analysis of evidence-based classrooms in real time. The solution supports the collaborative model of "machine capture evidence + artificial focus analysis", which not only ensures the objectivity and accuracy of evaluation, but also integrates the professional judgment of educators, forming the teaching and research model of "AI preliminary evaluation + expert re-evaluation".
Function 4: Teacher portrait for assisting precise management. Based on the accumulation of phased data, integrate data such as lesson teaching behavior, participation in teaching and research activities, and research results, and refer to the ideal teaching ability model to automatically track and record the teacher's professional growth trajectory, providing a scientific basis for regional research and training and accurate evaluation.
The value of the program: Let every teacher have an exclusive AI teaching and research partner. The system has been deployed in more than 70,000 schools across the country, covering more than 400 cities and counties, serving more than 1 million teachers and students, and truly achieving "normalized, large-scale, low-cost" teacher professional development support.

■ **Technical highlights or innovations**

① Non-inductive multi-modal data acquisition – to solve the problem of incomplete data acquisition
A single data source is vulnerable to environmental interference and one-sided information. AVA collects multi-modal data such as visual, auditory, text/image, and paper-pencil interaction. More than 30 kinds of teaching events are cross-validated on the same time axis. Multi-dimensional data are mutually confirmed and complemented to ensure the integrity and objectivity of the data from the source and avoid "partial generalization".
② Edge real-time computing – to solve the problem of "unreliable transmission"
Traditional network transmission leads to coding compression, delay and packet loss, and serious data distortion. AVA adopts the "embodied intelligence" architecture, pre-positions the computing power to the classroom end, and processes the data in a local closed loop. From the physical layer, it eliminates the loss of network coding and the asynchrony of sound and picture, and guarantees the original fidelity of the data source.
③ Educational vertical multi-modal evidence-based big model – to solve the problem of "incomprehension"
The general model lacks educational professional judgment, and the analysis is superficial.

Based on the TB-level education vertical domain data training, AVA has built more than 10 authoritative teaching evaluation models to accurately identify the subtle features of the classroom, so that AI can truly "understand teaching" and output professional conclusions.

④ Traceable evidence-based analysis – to solve the problem of "unbelievability"

AI conclusions lack evidence support, making users dare not believe them. AVA establishes a three-level traceability mechanism of "conclusion-evidence-original data". Each conclusion can be reversely positioned to video clips, original voice texts, and blackboard screenshots, forming a credible and verifiable evidence closed-loop to solve the "AI illusion" problem.

⑤Teaching and research agent – to solve the problem of "inapplicability"

Static reports are difficult to meet personalized needs and also have the problem of being incomprehensible. The agent has the abilities of multi-round dialogue, teaching consistency comparison, personalized teaching guidance and so on. It has evolved from a "one-time tool" to "normalized companionship", so that accurate feedback can be truly implemented in teachers' daily professional development.

Application Scenarios

(1) Adapting to the educational scene

The AVA AI lesson evidence-based system is deeply adapted to basic education, vocational education and higher education.

- In the classroom teaching scene, the system supports the intelligent analysis and evaluation of all types of lessons, such as new teaching lessons, review lessons, experimental lessons and exercise lessons.
- In the educator training scene, it supports diversified training modes such as individual teaching reflection, school-based teaching research, regional teaching research, famous educator guidance, and heterogeneous lesson research.
- In the teaching management scenario, it meets the management needs of school supervision and evaluation, regional educator development monitoring, and teaching quality evaluation.

(2) Hardware and software environment

The system adopts the "cloud-network-edge-end" fusion architecture. The classroom side deploys AI evidence-based terminals and AI cameras with built-in NPU/GPU computing power to achieve uncompressed audio and video transmission and edge real-time analysis; based on the fully connected platform, it provides data storage, model training and agent services. The user side supports multi-form access such as web pages, applets, and PC clients. At the software level, the system is compatible with the domestic "Kun peng + Ascend + HarmonyOS" technology base, and supports multi-model access such as Deep Seek, Tencent HY, and Qwen. It has passed the national third-level network security protection evaluation and meets the requirements of independent innovation and privacy compliance.

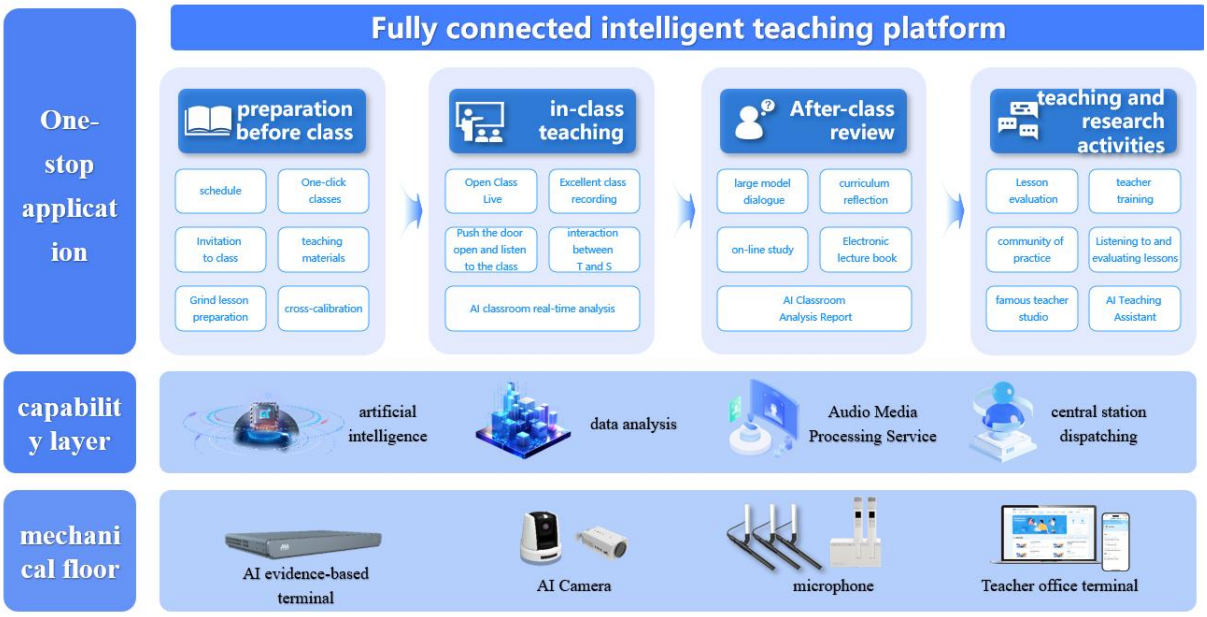

Fig. 2 Architecture Diagram of AI-Powered Evidence-Based Classroom System

(3) Service object

The system has been deployed in more than 70,000 schools across the country, covering more than 400 cities and counties, serving more than 1 million teachers and students. It has deeply participated in the national key development plan of the Ministry of Science and Technology "Intelligent Evaluation of Teachers' Teaching Ability in Rural Areas and Accurate Assistance in Teaching", providing ability evaluation and accurate assistance for 160,000 rural educators.

- Teachers: Obtain AI lesson analysis reports and personalized guidance of "Teacher's Wisdom Partner" to achieve accurate teaching reflection and professional growth.
- Students: The system collects classroom behavior data to assist teachers in focusing on individual differences and optimizing teaching strategies.
- Teaching and research staff: Rely on the AI + expert co-evaluation model to carry out evidence-based teaching and research and accurate listening and evaluation courses.
- Education managers: Based on teachers' digital portraits and group development reports, scientifically allocate resources and formulate research and training policies.

(4) Examples of Typical Application Scenarios: "Normalized Teaching and Research" Based on AI Evidence-Based Data

① Before Class: Online Lesson Polishing & Lesson Preparation and Organization of Observation & Evaluation Activities

Problem Targeting: During the lesson preparation stage, teachers can pre-target the key issues to be focused on in this teaching session by combining feedback from past classroom data.

Collaborative Design: Multiple teachers conduct online collaborative annotation of lesson plans, initiate video discussions, jointly polish teaching designs, and preserve high-quality resources.

Activity Preheating: The teacher (in-class teacher) can invite teaching and research staff and peer teachers from the same school or across schools to participate in AI-enabled observation and evaluation activities.

② During Class: Online Lesson Observation & Evaluation and Multimodal Evidence-Based Classroom Analysis

AI Real-Time Multimodal Data Analysis: "Embodied Intelligence" AI cameras and various sensing terminals capture and identify multimodal classroom data in real time. Cross-analysis is conducted on data covering more than 20 categories of teaching events, over 30 observation points and 80+ analysis dimensions. Through temporal analysis and situational modeling of multimodal classroom data, a comprehensive insight into classroom instruction is achieved.

Online Lesson Observation & Evaluation: Teaching researchers can identify issues synchronously during lessons supported by real-time data, making observation and evaluation evidence-based. Teachers (on-site or remote) can view real-time dynamic AI analytics dashboards (e.g., teacher-student interaction ratio, question type distribution) while watching live lessons. They can also add bookmarks and comments at key moments, realizing a collaborative model of "machine-sourced evidence + human-focused analysis".

③ After Class: Reflection Based on Classroom Data and AI Teaching Research Assistant

AI Empowers Evidence-Based Teaching: Within one minute after class, the system automatically generates a plain-text classroom analysis report, helping teachers quickly grasp the overall classroom situation, provide targeted optimization directions for subsequent instruction, and steadily improve teaching quality. Meanwhile, teachers can hold continuous dialogues with the Teaching and research agent based on specific teaching cases. By deeply analyzing teaching links and improvement paths, abstract classroom data is transformed into practical teaching strategies. This interactive model supports teachers in personalized teaching exploration and promotes the formation of a deeply integrated "teacher-machine-student" teaching application model.

AI Accompanies Teachers Full-Cycle Growth: The system dynamically tracks teachers'professional development data, conducts norm-referenced analysis of individual professional competencies, generates personal digital profiles, and accurately identifies training needs. It assists schools in matching intelligent training resources and improves the precise support system for teacher professional development. In addition, the regional curriculum quality analysis generated by the system provides strong data support for school-based and regional teaching research, making the design of teaching research activities more aligned with teachers' actual needs. It helps regions and schools explore teaching research models with their own characteristics and promotes the construction of high-level teaching teams.

Outcomes and Case Studies

■ **Implementation outcomes, evaluation data, or practical experience**

AVA AI Lesson Evidence-Based Solution performs time-series analysis and contextual modeling on multimodal data, empowering educators to gain comprehensive classroom insights and optimize teaching practices. The system generates daily AI lesson analysis reports and has been deployed in over 70,000 schools nationwide, covering more than 400 cities and counties across multiple provinces, municipalities, and autonomous regions, serving over one million teachers and students. Through participation in the National Key Research and Development Program "Intelligent Evaluation of Teaching Competence and Precision Teaching Assistance for Rural Teachers," AVA has reached 160,000 rural educators.

Its core technologies—including multimodal data fusion analysis, edge computing architecture, and education-specific large models—have completed prototype validation in laboratory environments, with current technological innovation readiness reaching Level 6. The company has filed 10 domestic invention patents, including "Methods for Detecting Teacher Questions" and "Classroom Teaching Analysis Methods." Next steps focus on system integration and real-time feedback capability validation, with demonstration applications planned for at least 200 primary/secondary schools, 50 vocational colleges, and 8 universities nationwide.

■ **Replicability, Sustainability, and Extension Potential**

The solution adopts a core framework of "tiered adaptation, localized implementation, and closed-loop iteration" to build a comprehensive operational service ecosystem covering the entire process. Guided by top-level design principles, it enables localized adaptation to educational policies, regional planning, and implementation strategies across different countries and regions, providing systematic support for educational institutions at all levels from policy analysis to infrastructure planning. Leveraging operational support systems, it establishes role-specific training mechanisms tailored to user groups, complemented by research activity planning and implementation services to ensure rapid deployment and deep integration under varying resource conditions. Through expert collaboration with universities and research institutions, it delivers professional support for developing regional distinctive models and enhancing teacher competencies. Experience sharing mechanisms—including sharing insights from renowned schools and educators, regional partnership programs, and benchmark case studies—facilitate cross-regional and cross-scenario transfer and dissemination of proven practices. Integrated development services support customized application deployment and optimization, flexibly addressing personalized needs of diverse educational systems. By continuously accumulating exemplary achievements and building a sustainable teacher development ecosystem, this approach effectively bridges the gap from isolated technology adoption to systematic educational quality improvement, demonstrating high replicability.

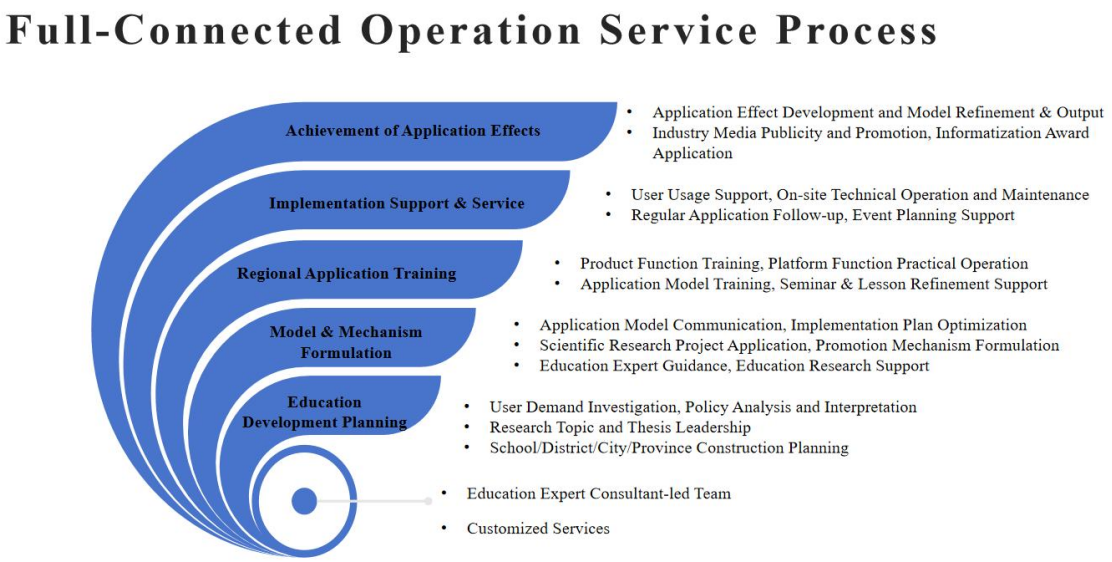

Fig. 3 Full connectivity operation service process

■ **Typical case description**

Since 202 4, Panyu District in Guangzhou has leveraged the collaborative analysis between the National Smart Education Platform for Primary and Secondary Schools and AI evidence-based systems to conduct multidimensional comparison and validation of lesson case data across the district. This approach enables precise identification of teaching challenges and quantified evaluation of improvement outcomes, establishing a closed-loop teaching enhancement cycle of "diagnosis-optimization-validation." The initiative effectively promotes iterative upgrades in instructional design while simultaneously advancing teacher professional development and student learning experiences. To date, daily visits to the National Smart Education Platform have surged from approximately 30,000 to 120,000, with teaching research groups increasing to 843. Online collaborative pedagogical research has become a regional norm. District educators have consistently excelled in provincial competitions for digital literacy enhancement practices on the platform. Notably, Sha wan Hui xian Primary Schools case study titled "Artificial Intelligence Expands Channels: Exploring Cantonese Boat Culture" developed through this model was awarded the "Outstanding Work" title at the inaugural National Smart Education Platform Data Innovation Application Activity hosted by the Central Electric Education Museum.

■ **Display materials**

Fig. 4 AI Evidence-Based Teaching Classroom Spatial Layout

No.	Product	Notes
I. AI Evidence-Based Space		
1	AI Camera	Mandatory
2	AI Evidence-Based Terminal	Mandatory
3	AI Evidence-Based Terminal	Mandatory
II. Adapted Platforms		
1	Fully Connected Smart Teaching Platform	Optional according to actual conditions
2	Evidence-Based Teaching Observation and Evaluation Platform	
III. Large Models		
1	Shitu Zhiban AI Teaching Research Assistant	Optional according to actual conditions

Table 1 Equipment List

Basic Information of the Institution

■ **Institution Profile**

AVA was founded in 2005 and is a wholly-owned subsidiary of China Reform Culture Holdings Co., Ltd, a member enterprise of China National New Industry Group (a central enterprise supervised by the State-owned Assets Supervision and Administration Commission of the State Council). The company's core business focuses on the digitalization of education and teaching. Its flagship product, the "AI Classroom Evidence-Based Teaching and Research System", supports cross-analysis of more than 20 types of teaching events, over 30 observation points, and 80+ analytical dimensions through teaching videos or signals from recording and broadcasting equipment, and automatically generates visualized classroom analysis reports. It is also equipped with the Teaching and research agent, which provides multi-round dialogue Q&A, teaching consistency comparison, and personalized suggestions. In terms of global layout, Ava is actively expanding the overseas digital education market, having participated in international exhibitions such as the 2025 Global Smart Education Conference, Asia Education Equipment Expo, Dubai and Singapore International Education Exhibitions, continuously enhancing its global influence.

■ **Experience or Qualifications in the Field of Digital Education**

AVA has profound professional experience and core advantages in the field of digital education, with the following key strengths:

In terms of hardware R&D, the company possesses full-chain independent capabilities from FPGA chip-level design to embedded architecture. All equipment such as AI cameras and intelligent evidence-based terminals adopts an integrated design, ensuring the system's high stability and long-term reliable operation. The patented "Digital Video One-Wire Connection" technology independently developed by the company enables power supply, control, and uncompressed audio and video signal transmission with a single standard network cable, eliminating image quality loss and audio-visual desynchronization from the physical layer. The "Embodied AI" camera embeds analysis models into the chip, realizing integrated "perception-analysis-output", which greatly improves data collection and processing efficiency.

In multi-modal collection, the system non-invasively synchronously collects four modal data of vision, hearing, text and images, and interaction, and aligns and fuses them on the same time axis, forming a complete digital mapping of the classroom teaching process. In edge computing, the company pre-deploys AI computing power to classroom-side equipment, completing real-time analysis of data in the local area network, generating reports within 1 minute after the end of the lesson, while eliminating the risk of data leakage and reducing the cost of large-scale deployment.

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Deconstructing the Black Box:Physical Perception-Based End-to-End AI Learning and the Construction of K-12 Epistemic Digital Sovereignty

Solution Introduction

Function Overview

In the era of Generative AI, AI literacy has become essential for digital citizenship. However, K-12 AI education often leans towards "instrumentalization"—focusing on prompting and application usage while neglecting the underlying logic of model training, data structures, and statistical inference. Students may operate systems proficiently yet lack the capacity to explain algorithmic judgments or intervene in their outcomes.

As this study emphasizes, without understanding how AI generates conclusions within data constraints and statistical weights, students passively cede their rights of explanation and judgment to "black box" systems. Thus, the critical educational question shifts from "Can you use AI?" to "Do you possess the ability to understand, evaluate, and intervene in AI systems?"

This case defines "Epistemic Digital Sovereignty" as its core objective. Unlike mere tool proficiency, this sovereignty represents the learner's agency to comprehend, explain, and modify data sources, representations, and inference mechanisms, facilitating a shift from "Algorithm Adopters" to "Algorithm Evaluators" and "Builders."

To achieve this, Lead Teacher Yong Di implemented a scenario-driven teaching paradigm at Ningbo Haishu Guangji Central Primary School, China. Utilizing physical computing (HuskyLens 2) and a visual training platform (Mind+ V2), students experienced the full AI lifecycle—from physical collection to labeling, training, edge deployment, and human-in-the- loop verification. The goal was not high recognition accuracy, but making the "black box" transparent through visible errors and controllable iteration.

Implementation Context: The project was piloted by 4 student researchers (Grades 4-5) from the school's PCDC center who conducted core model training, followed by process demonstrations in two regular classes (approx. 80 students). The entire cycle spanned two weeks, utilizing fragmentation time for data collection and training.

All data used in this project consisted of non-personal microscopic images; no biometric or personally identifiable information was collected. The implementation complied with school- level ethics guidelines, and parental consent was obtained for classroom participation.

Implementation Process

- Physical Perception & Data Generation (The Genesis of Sovereignty)

"Perception" is the process of extracting meaning from sensory input. Unlike traditional classes using pre-set datasets, this case started with physical perception. Students used the HuskyLens 2 visual sensor to capture 380 real microscopic images (142 pine stem cross- sections, 159 tapeworm sections, 79 bee legs).

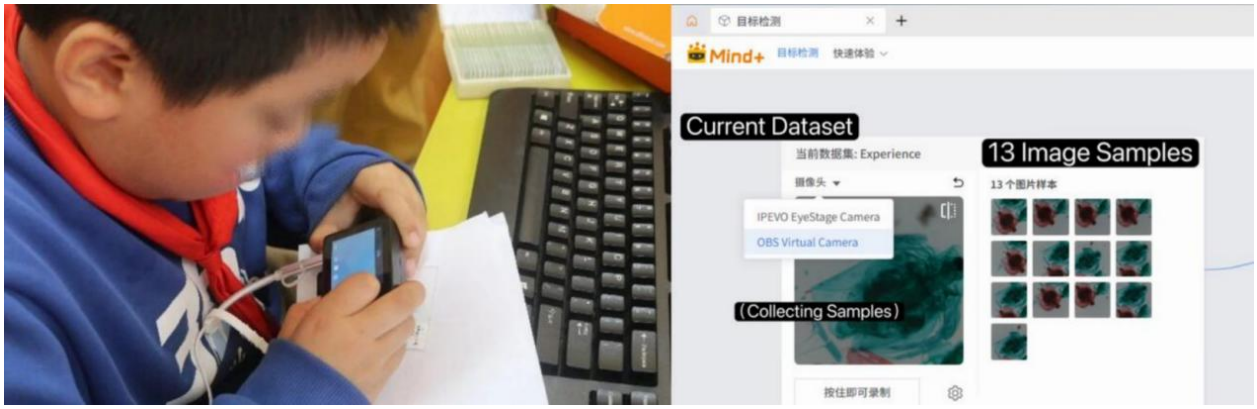

Fig. 1 Physical Data Collection

(Left: A student holding the HuskyLens 2 sensor against a microscope eyepiece to capture raw optical data. Right: The Mind+ V2 interface showing the collection of real-time image samples, illustrating the transition from "physical signal" to"digital data.")

By dealing with real-world disturbances—varying lighting, focus, and field of view—students observed the causal link between data quality and inference. They distinguished "Signal Collection" from "Meaning Generation," realizing data is not a static resource but a tangible, adjustable variable underpinning their digital sovereignty .

- Labeling & Representation (The Translation Key)

Machine learning generates predictions without explicit programming, but the student's "moment of understanding" occurs when translating human knowledge for the machine.

Scaffolding: Before digital labeling, students drew sketches of microscopic structures on worksheets. This "Representational Scaffolding" helped them define recognizable objects and boundaries.

Digital Translation: In Mind+ V2, students transferred these structural understandings into bounding box annotations. They observed how inconsistent labeling standards directly caused model bias, demystifying the black box by revealing that AI learns human-defined representations, not "truth."

- Training & Parameters (Structural Understanding)

Adopting a "Individual Operation + Group Inquiry" approach, students trained models and analyzed the relationship between training epochs, sample size, and confidence levels.

Empirical Evidence: The principle of "Garbage in, Garbage out "was validated through experiments where insufficient samples or poor lighting led to instability.

Cognitive Shift: Students moved from intuitive guessing to structural analysis ("Sample Distribution → Parameter Weights → Model Behavior"), understanding AI as a statistical pattern matcher.

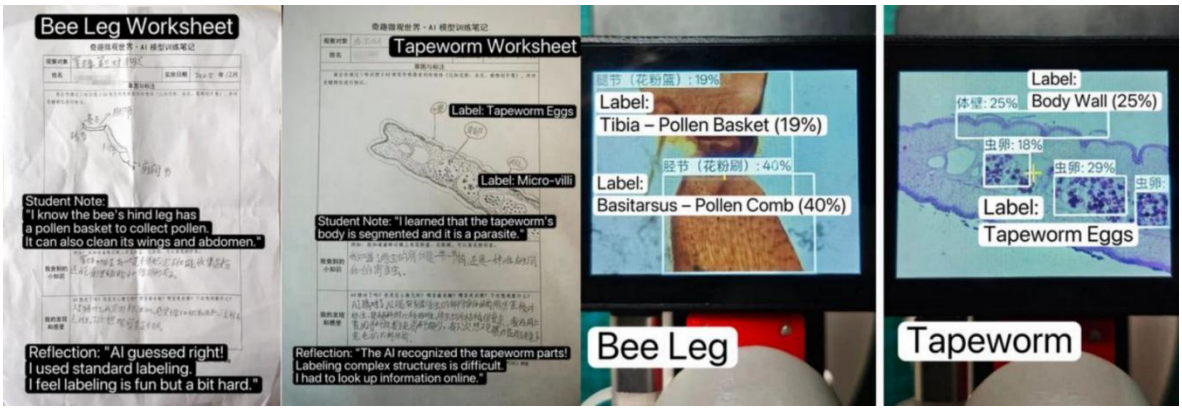

Fig. 2 From Sketch to Labeling
(Left: Two students' hand-drawn worksheets identifying cell structures (Representational Scaffolding). Right: The digital labeling interface where students draw bounding boxes around the structures, translating biological knowledge into machine-readable data.)

- Edge Deployment & Human-Machine Collaboration (The Last Mile)

The trained models were deployed back to HuskyLens 2 for real-time verification. Facing inevitable misjudgments in the physical environment, teachers emphasized the "Skeptic" role.
Human-in-the-Loop: Students cross-verified AI results against microscope views and iterated the model by adding samples or adjusting thresholds. This loop cemented the realization that AI output is a questionable, correctable statistical inference, fully actualizing Epistemic Digital Sovereignty.

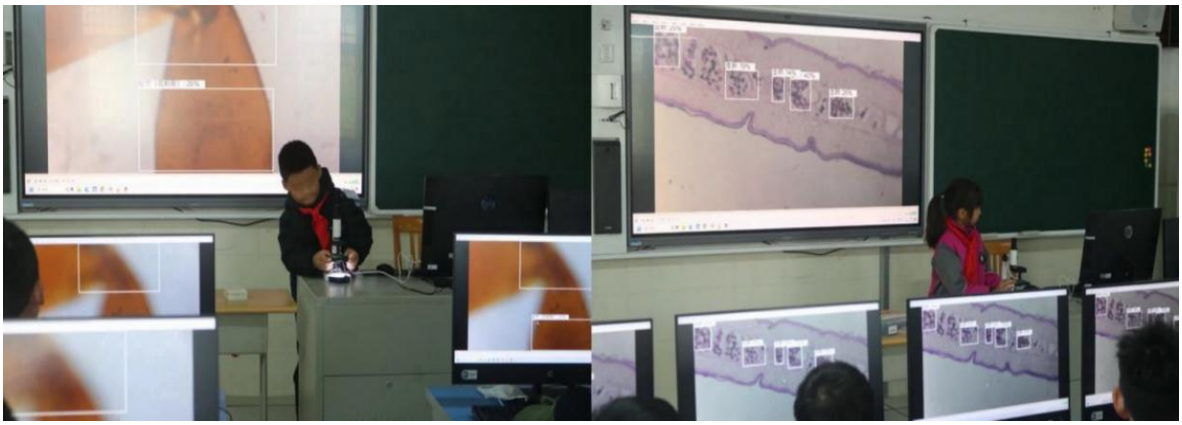

Fig. 3 Edge Deployment & Verification.
(Left: Students working in groups to deploy the trained model. Right: A close-up of the HuskyLens 2 screen performing real-time inference on a microscope slide, verifying confidence levels in a physical environment.)

Innovation Highlights

Paradigm Shift: Moving from "Calling AI" (application-oriented) to "Building AI" (system- oriented), transforming the "Magical Narrative" into a "Mechanistic Narrative."
Error as Evidence: Utilizing misjudgments not as failures but as pedagogical resources to reveal model limitations and probability.
Tangible Pathway: Using physical sensors and edge deployment to make abstract algorithms touchable, verifiable, and correctable.

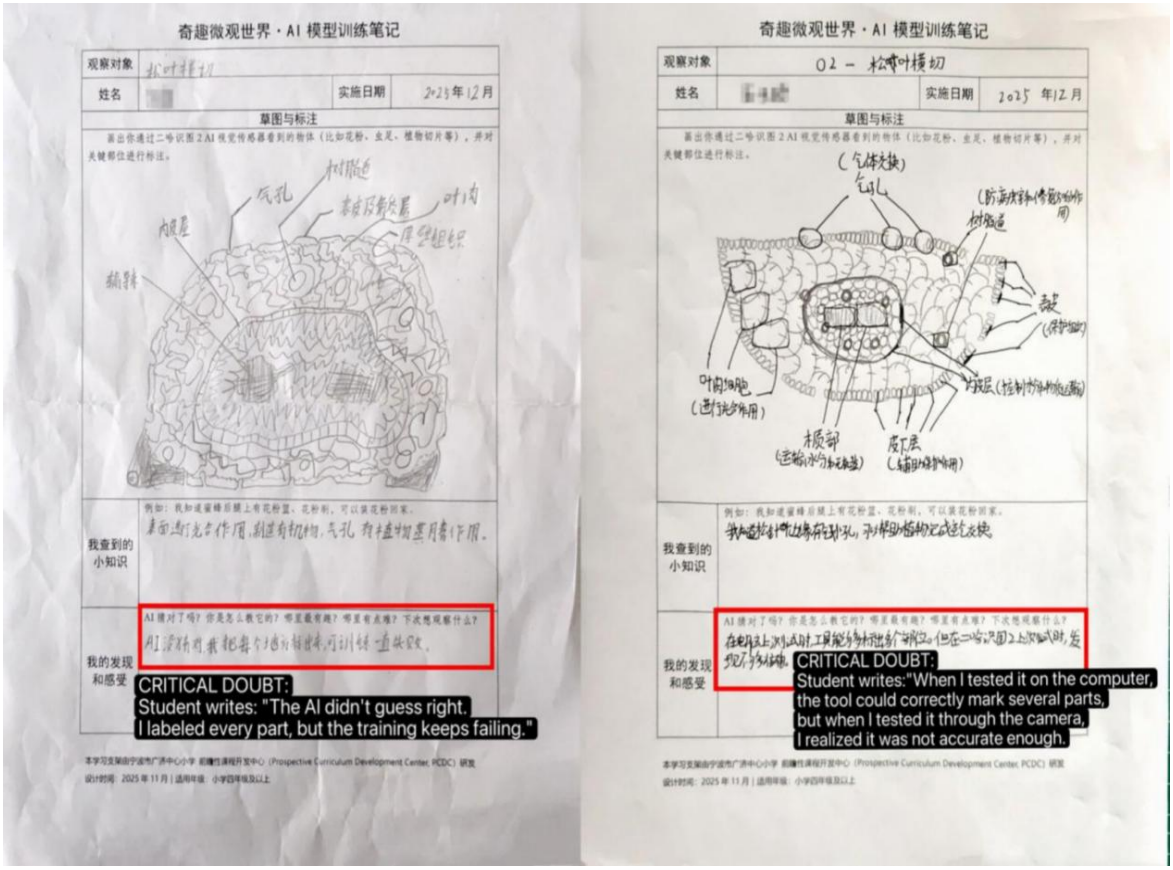

Fig. 4 Students as Skeptics. Student worksheets show critical reflection.
(Notes such as "AI didn't guess right" and red markings indicate areas where students questioned the model's output, demonstrating their role as active evaluators.)

Effectiveness Proof

Evaluations based on teacher questionnaires and classroom observations focused on cognitive structures rather than model precision:

Data Awareness: Students could explain "Garbage in, Garbage out" using statistical language and proactively identified image quality issues.

Mechanistic Understanding: Anthropomorphic descriptions of AI decreased, replaced by discussions on "samples" and "weights."

Sustained Correction: Students demonstrated stable iterative behaviors—proactively supplementing data under different lighting when errors occurred—viewing the model as an optimizable system rather than an authority.

Promotion Plan: A Replicable End-to-End Structure

The replicability of this paradigm lies in its abstractable four-layer structure, not specific hardware: Sensor Layer (Collection) → Training Layer (Labeling/Training) → Edge Layer (Deployment) → Human-in-the-Loop (Iteration).

Institutional Promotion Pathways

To ensure sustainable implementation, we propose a multi-level promotion strategy:

School Level: The paradigm can be embedded into scientific inquiry or Project-Based Learning (PBL) modules, serving as an organizational framework for structural learning pathways rather than isolated technology classes.

Regional Level: It functions as a structural template for designing regional AI literacy curriculum frameworks.

Teacher Training: The training focus must shift from mere "tool operation" to "mechanistic understanding and instructional design."

Curriculum Development: Crucially, this end-to-end structure serves as a competency backbone for AI literacy. It allows for progressive implementation across different grades under a unified structure:

Lower Grades: Emphasize data sources and perception awareness.

Middle Grades: Focus on representation logic.

Higher Grades: Highlight model evaluation and correction capabilities.

This progression aligns with AI4K12 and OECD frameworks (specifically regarding "understanding mechanisms—evaluating outputs—human-machine collaboration"), providing an operational structural path for curriculum standards.

Scalability & Transferability

The framework has been successfully validated in diverse interdisciplinary scenarios beyond biology:

Image Classification: Students used basic development boards to classify daily objects, forming explainable rules.

Physical Education: Using physical perception (Unihiker K10/HuskyLens 2) to capture martial arts poses, training models to score movements via real-time feedback.

Smart Life: A "Smart Vegetable Recognition" project where students trained models to assist in cooking, proving the structure supports complex, life-oriented tasks.

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Intelligent Agent for Finance & Taxation Practical Training

Solution Introduction

Function Overview

The Intelligent Agent for Finance & Taxation Practical Training is a new type of carrier for taxation practical training integrated with cutting-edge technologies such as artificial intelligence and big data. Focusing on the industry pain points in traditional tax talent training, such as rigid teaching models, lack of training resources, and disconnection between theoretical courses and practice, it builds an integrated intelligent training platform of "theory + practice". It provides full-process learning support for core tax courses such as China's tax system, tax law, tax administration, and international taxation, and focuses on creating an integrated workplace training camp of "learning, practicing, evaluating, revising, and testing". It provides a "one-stop" solution for university teaching and training, and delivers compound talents to the tax industry.

Core Functions:

- AI Question Setting: Combined with learning path planning and effect testing, relying on professional tax corpus and industry cases, it generates training questions that meet the needs. It can flexibly adjust the difficulty and scope, integrate inquiry-based learning guidance, and help students take the initiative to seek knowledge.
- AI Practice: Combined with the requirements of training supervision, it simulates real business scenarios and generates personalized training questions for each student. Students conduct practical practice with AI voice robots to quickly master core knowledge and cultivate "demand insight ability".
- Intelligent Retrieval: Relying on the tax policy knowledge base, it accurately locates knowledge through "retrieval - matching", and simultaneously provides interpretation of knowledge points and answers to key and difficult questions, helping students improve their abilities efficiently.
- Intelligent Summary: It accurately records students' performance in practical practice, feeds back the results of learning effect testing, and gives optimization suggestions combined with learning path planning, promoting students to achieve the ability leap from "understanding policies" to "applying policies".
- AI Scoring: With reference to professional tax review standards, it accurately scores students' training and completes learning effect testing, generating reports for teachers to carry out training supervision; at the same time, it relies on data feedback to optimize the ability of the large model, forming a virtuous cycle.

Core Value:

- It promotes tax talents to achieve a three-level leap in abilities of "policy understanding - intelligent analysis and identification - compliance decision-making", builds a digital tax talent training system of "theoretical guidance - digital education - practical training", and realizes "training is actual combat, and graduation is on-the-job".
- It provides a one-stop training solution for university tax teaching, and delivers compound digital tax talents who "understand professional knowledge, master technology, and are good at practice" to the industry.

Fig. 1 Home page interface

■ **Technical Highlights or Innovations**

- Customization of Vertical Domain Large Model: Based on Tongyi Qianwen, it injects professional tax corpus and industry case data, and builds a dedicated "Letax Large Model" for the vertical tax field through supervised fine-tuning. Different from general large models, it is more suitable for professional taxation practical training and scientific research needs, with a retrieval response delay ≤ 1500ms, ensuring the user experience in high-concurrency scenarios.
- "Data + Model + Application" Trinity Technical Architecture: The basic layer builds a compliant data governance system, the technical layer integrates technologies such as AI voice interaction and natural language processing, realizes low-latency reasoning through model quantization and intelligent caching, and the application layer realizes function landing based on the "cloud-end" collaboration model, supporting secondary development and function expansion.
- Full-Process AI Capability Support: It is equipped with standardized components and reasoning interfaces such as policy collection, knowledge annotation, AI question setting, human-machine practice, and automatic scoring, covering the entire scenario of R&D and landing of AI taxation practical training applications. It also supports iframe embedding integration and API interface calling, which can be seamlessly connected with existing university teaching platforms.

- Integration of Software and Hardware: It builds a hardware base relying on the intelligent tax research support engine, which is equipped with a 64-core 128-thread processor, 512GB ECC memory, 8TB local storage and dual gigabit network cards, providing high-performance computing power support for the intelligent agent and realizing in-depth integration of computing power, teaching and training.
- Landing of integration between industry and education technology: Schools and enterprises collaboratively integrate industry resources, integrate cutting-edge business scenarios and policy requirements of the tax industry into model training and training design, realize real-time synchronization of teaching content and industry needs, and solve the problem of disconnection in integration between industry and education.

Application Scenarios

■ **Application Environment and Implementation Targets**

Applicable Educational Scenarios: Classroom teaching, on-campus training and discipline competitions for finance and economics majors such as Applied Economics, Public Finance, Taxation, and Accounting in institutions of higher education; pre-job training and on-the-job continuing education for employees in the tax industry; and professional capacity improvement training for the tax system.

Software and Hardware Environment: Deployed based on the cloud SaaS architecture, it supports multi-terminal access such as computers and tablets, and is compatible with mainstream operating systems such as Windows and MacOS; the hardware relies on the intelligent tax research support engine (single unit ≥ 64-core processor, 512GB memory), which can be deployed on a single machine or expanded in clusters, supporting gigabit network access, and can be interconnected with university smart campuses and laboratory management systems; the minimum configuration requirements are a quad-core processor, 8GB memory, and 100Mbps network, meeting the needs of large-scale universal use.

Implementation Objects: Teachers and students of finance and economics majors in universities, financial and tax practitioners in the tax industry, and staff of government departments such as taxation and finance.

■ **Examples of Typical Application Scenarios**

Scenario 1: Training Laboratory of the School of Public Finance and Taxation, Central University of Finance and Economics

It has been applied in the undergraduate courses "Tax Practice" and "International Taxation" for Taxation and Public Finance majors in the School of Public Finance and Taxation of Central University of Finance and Economics, integrating the Intelligent Agent for Finance & Taxation Practical Training into classroom teaching and after-class training. Teachers generate training question banks that are consistent with the course knowledge points through the AI question setting function of the intelligent agent, and set tax business scenarios of different difficulties (such as enterprise income tax final settlement and cross-border tax planning); students conduct practical practice with voice robots through the AI practice function, simulate real business processes such as tax consultation and tax declaration, and the intelligent agent records students' operations in real time and provides answers to knowledge points through intelligent retrieval; after class, the AI scoring function is used to correct

training assignments and generate personalized learning reports, and teachers carry out targeted supervision based on the reports. This scenario has realized the transformation of the teaching model from "theoretical teaching" to "practical training", covering more than 200 tax majors in the university, and greatly improving students' practical operation ability.

Scenario 2: National University AI+Tax Compliance Knowledge Practical Ability Competition Relying on this intelligent agent, it creates immersive simulation competition scenarios such as enterprise tax service, tax consultation and compliance management, and carries out competitions for students majoring in finance and economics in universities across the country. Participating students complete practical tasks such as tax policy interpretation, tax risk identification and compliance plan formulation through the intelligent agent, and the intelligent agent conducts AI automatic scoring and real-time ranking from the dimensions of policy application, logical analysis and plan feasibility. The competition attracted more than 100 students to participate, and verified the role of the intelligent agent in improving students' comprehensive practical ability through the model of promoting learning and teaching through competition. The relevant achievements were specially reported by China Tax News, becoming a typical model for the training of digital tax talents in universities.

Impact and Case Evidence

■ **Implementation Results, Evaluation Data or Practical Experience**

The Intelligent Agent for Finance & Taxation Practical Training has been applied in Central University of Finance and Economics, serving more than 200 teachers and students of taxation majors in the university, and applied to the practical training teaching of 5 core taxation courses. For students who received training through the intelligent agent, their average scores in the assessment of core abilities such as taxation practical operation, policy interpretation and risk identification were 25% higher than those under the traditional practical training mode, and the students' satisfaction with the training content reached 98%.

At the faculty level, through the automatic question setting and scoring functions of the intelligent agent, the workload of teachers' practical training teaching has been reduced by 40%, allowing teachers to focus more on targeted teaching supervision and scientific research work, and achieving a significant improvement in teaching efficiency. At the same time, the solution provides data and technical support for teachers' taxation scientific research, helping teachers carry out research on topics such as the effect analysis of taxation policies and the digital transformation of tax collection and administration.

■ **Replicability, Sustainability and Promotion Potential**

Replicability: The solution adopts a lightweight cloud SaaS deployment mode, supports iframe embedding and API interface calling, and does not require universities to carry out large-scale hardware transformation, which can quickly adapt to the practical training teaching needs of finance and economics majors in different universities; at the same time, the training content can be flexibly customized according to the taxation policies of different regions and the talent training programs of different universities, and can also adapt to the training needs of enterprises in the taxation industry and tax systems, which is applicable to taxation education and training scenarios in different countries around the world (corpus and models can be customized according to local tax systems).

Sustainability: It adopts a "university + enterprise" school-enterprise collaborative operation model. Universities are responsible for sorting out teaching needs and content iteration, and Hangzhou Weisheng Chaoyun is responsible for technological R&D, computing power guarantee and system maintenance, forming a virtuous cycle of "teaching needs driving technological upgrading, and technological upgrading feeding back teaching and scientific research"; at the same time, the solution relies on the intelligent taxation research support engine to achieve independent and controllable computing power, and the database adopts automatic backup and snapshot recovery mechanisms to ensure the long-term stable operation of the system.

Promotion Potential: Under the background of the digital economy, the digital transformation of the global taxation industry is accelerating, and the demand for compound digital taxation talents is constantly growing. This solution fills the gap in "AI + taxation" education and practical training, and can be widely promoted in finance and economics majors of universities around the world, enterprises in the taxation industry, and tax regulatory authorities, helping the training of digital talents and the improvement of industry capabilities in the global taxation field.

■ **Exhibition Materials**

This solution can provide dual display forms of offline exhibition stand and online demonstration. The offline exhibition stand requires a 20-square-meter standard exhibition space, equipped with 1 server (intelligent taxation research support engine), 4 display terminals (computers), and audio equipment (to realize the demonstration of AI voice practice function); an exclusive online demonstration platform is provided (http://tyzx.zrar.com). The display content includes the full-process demonstration of the intelligent agent's functions, the video of the university landing application case, the display of the discipline competition achievements, and the physical display of the computing power hardware base, which can intuitively present the technological advancement, application effectiveness and demonstration and promotion value of the solution.

Basic Information of the Institution

■ **Institution Introduction:**

Hangzhou Weisheng Chaoyun Technology Co., Ltd. was established in December 2020. It is a technology enterprise focusing on the R&D of vertical application of AI large models and computing power support. It focuses on the digital transformation of industries such as education and taxation, with a professional AI R&D and computing power service team. It has core capabilities such as customized training of large models and R&D of high-performance computing power hardware. Its service scope covers national tax bureaus, universities, and professional taxation service institutions. It is committed to providing digital solutions and computing power support services, and has a number of technological achievements and landing cases in the fields of AI + education and AI + taxation.

■ **Experience or Qualifications in the Field of Digital Education**

The vertical domain large model independently developed by Hangzhou Weisheng Chaoyun Technology Co., Ltd. has passed the in-depth synthesis service algorithm filing of the Central Cyberspace Administration of China and the generative artificial intelligence service registration filing (Filing No.: ZheJiang-TongYiQianWen-20230901), with the qualification for AI large model education application R&D. It has in-depth application experience in large model development platforms and can provide full-process services from large model customization to computing power support; at the same time, it cooperates with multiple universities to carry out the R&D and landing of AI+education solutions, with mature technology and practical experience in fields such as intelligent practical training and digital talent training. The Intelligent Agent for Finance & Taxation Practical Training co-built with Central University of Finance and Economics this time is a typical landing achievement of AI+finance and economics education.

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AR Digital Observation Space

Solution Introduction

Function Overview

The AR Digital Observation Space Solution co-developed by Lingban Technology, Hangzhou Qiuzheng Technology and Zhejiang Normal University integrates AR augmented reality, spatial computing, and multimodal human-computer interaction as its core technologies. Leveraging high-precision spatial positioning, real-time virtual-real rendering, and large-scale scene modeling capabilities, it transforms traditional humanities observation spaces into next-generation immersive hybrid environments that support roaming, interaction, teaching, and management. This solution addresses critical needs in higher education including experimental humanities instruction, comprehensive teaching achievement displays, regional intangible cultural heritage preservation, and innovative educational programs. Through 3D digitization, spatial interactivity, and scenario-based content design, it combines AR+AI technologies with student portfolios and multidimensional presentations of Jinhua's regional cultural heritage, offering immersive experiences. The system features cutting-edge digital capabilities such as omnidirectional navigation, centimeter-level spatial positioning, natural gesture controls, and intelligent voice interaction. It seamlessly integrates Jinhua city's cultural treasures—including Wuyi Opera, Wuzhou Kiln ceramics, Dongyang woodcarvings, and Juyan Tea—into physical spaces through 3D modeling, dynamic demonstrations, craft deconstruction, and real-world overlays. This comprehensive solution supports diverse high-quality applications ranging from professional training and academic presentations to cultural heritage immersion experiences and curriculum-based practical training.

The solution originates from the genuine demands of digital transformation in liberal arts education, systematically addressing long-standing challenges in traditional humanities exhibition halls—including monotonous display formats, abstract cultural content, inadequate practical training experiences, insufficient classroom interaction, high manual interpretation costs, and difficulties in standardized content preservation. Centered on virtual-real integration as its core presentation approach, supported by spatial computing technology, with professional training as educational objectives and intangible cultural heritage displays as distinctive features, it achieves deep integration and innovative breakthroughs between digital technologies and humanistic education, cultural inheritance, and practical training.

By organically combining cultural immersion, knowledge acquisition, interactive exploration, hands-on practice, and teaching management, the solution constructs a modern, digital, and immersive learning environment integrating AR+AI guided tours, digital reinterpretation of intangible cultural heritage, immersive interactive training, and comprehensive teaching outcome showcases. This establishes a new paradigm for liberal arts education digitization that enables visual engagement, interactive learning, replicable teaching models, and scalable implementation, providing exemplary references for innovative experimental teaching and deep AR+AI integration in higher education institutions.

Core functions include:

(1) AR Smart Guide

Leveraging AR spatial positioning and AI-powered natural interaction technologies, this system integrates core capabilities including AI speech recognition, real-time semantic understanding, and anthropomorphic motion control to deliver end-to-end companion-style intelligent interpretation services. The AR handheld holographic map enables visualized spatial navigation, while ground-based AR dynamic arrows provide precise tour route guidance. AI gesture recognition technology ensures real-time response to interactive commands, complemented by lip-syncing and emotional feedback to create an immersive experience that blends virtual and physical environments. This innovative approach delivers digital tours that combine professional expertise with human-like warmth, offering both technical accuracy and emotional resonance.

Fig. 1 AR Smart Guide

(2) AR fusion interaction

Leveraging AR-based 3D reconstruction and AI analysis technologies, we have established a millimeter-precision 3D digital model library. Through disassembly algorithms, intangible cultural heritage techniques are visually presented in step-by-step formats. AR real-scene overlay technology seamlessly integrates virtual exhibits with physical spaces, enabling 360° free rotation viewing, multi-angle zooming of craftsmanship details, and interactive commentary. This creates a new paradigm for digital heritage preservation characterized by "tactility, disassemblability, and traceability," allowing traditional culture to rejuvenate through the fusion of virtual and physical realms.

(3) Spatialized POI Interactive Experience

The center features seven interactive zones including an introduction to liberal arts, student portfolio displays, historical figures from ancient Wu culture, engaging quizzes, and tea culture education. By integrating AR spatial perception and AI-triggered technologies, it delivers an immersive experience with "instant activation upon arrival and seamless interaction." Through AR image recognition for automatic content matching and real-time projection technology that seamlessly overlays virtual information onto physical spaces, the system supports diverse interaction methods: gesture-controlled content switching, voice-command triggered interactions, AI-powered quiz scoring with instant feedback. This creates an immersive experience featuring proximity-triggered activation, automated narration, gesture-based operations, and voice feedback.

Fig. 2 Product architecture diagram

■ Technical highlights or innovations

(1) Innovation in AR+AI-powered intelligent navigation.

By deeply integrating AR spatial interaction with AI-powered intelligent engines, this system incorporates core technologies including AI voice synthesis, real-time lip synchronization, emotion-driven motion control, and semantic understanding. It delivers services such as voice-guided explanations, spatial orientation guidance, AR handheld holographic map navigation, and interactive command feedback. Through AR environment overlay technology that seamlessly blends with physical spaces, it creates interactive experiences that combine professional expertise, cultural depth, and emotional warmth, ultimately establishing distinctive campus cultural branding and fostering profound emotional connections.

(2) Large-scale point cloud + SLAM dual localization stabilization technology

Leveraging AR spatial computing and AI-powered optimization algorithms, this system achieves centimeter-level precision positioning for 200㎡ environments while supporting real-time, drift-free collaboration among 20 devices. Dynamic calibration technology continuously corrects positioning deviations, complemented by large-space point cloud modeling and spatial data supplementation

services, effectively addressing industry pain points such as inaccurate positioning, frequent device loss, and fragmented user experiences in traditional AR systems. Technically, it delivers millisecond-level positioning response latency and adaptive environmental adjustments, ensuring seamless multi-user interaction stability. This cutting-edge solution provides robust technical support for large-scale immersive education programs and group virtual tours.

(3) Three-dimensional visualization-based disassembly teaching system

Perform millimeter-level digital reconstruction of physical content to establish a digital repository for intangible cultural heritage. Utilizing intelligent disassembly algorithms, the system achieves hierarchical visualization of process steps, high-visibility annotation of key techniques, and 360° free rotation viewing. Combined with AR real-scene projection and step-by-step audio narration, abstract and complex content is transformed into intuitive, interactive, and traceable digital teaching materials.

(4) Multimodal Natural Interaction System

We have developed a comprehensive interactive system integrating "AR spatial perception + AI-powered recognition," supporting diverse interaction modes including AR spatial triggers, precise gesture selection, visual-triggered recognition, intelligent voice control, and ray-based interaction. The system delivers accurate responses to complex commands, with voice interaction enabling wake-word-free operation to meet multi-scenario requirements. Featuring zero-learning barriers and low operational thresholds, it is perfectly tailored for diverse user groups such as students, educators, and educational research teams.

Application Scenarios

■ **Application Environment and Implementation Targets**

This solution is designed for educational settings including liberal arts experimental teaching centers, cultural exhibition halls, intangible cultural heritage experience centers, campus achievement showcases, study-travel practice bases, and academic exchange spaces. The hardware infrastructure comprises AR smart glasses, AR headset controllers, intelligent display charging cabinets, and spatial point cloud acquisition devices, while the software ecosystem features an AR navigation system, an intangible cultural heritage 3D content library, and an AR photography mini-program. The system requires minimal spatial requirements, with deployment feasible in approximately 200㎡ indoor areas without complex renovations, enabling rapid implementation.

Service targets include: faculty and students of liberal arts programs at Zhejiang Normal University, students majoring in Cultural Industry Management, and learners specializing in intangible cultural heritage preservation. The services also cover reception scenarios for external visiting delegations, inter-university exchanges, educational evaluation experts, and government-enterprise visitors. Additionally, they provide science education experiences for primary/secondary school study tour groups and cultural enthusiasts, as well as routine teaching environments for curriculum instruction, practical training, achievement presentations, and project exhibitions.

■ **Typical Application Scenario Examples**

Scenario 1: Immersive Academic Discussion Classroom for Liberal Arts. In humanities courses, teachers activate the AR navigation system through a digital artwork appreciation platform. Students wear AR glasses to enter virtual spaces guided by intelligent navigation systems.

They can examine 3D structures of Wuzhou Kiln porcelain, analyze Dongyang woodcarving techniques, and watch Wu Opera performance animations up close. Through gesture-based interactions, students rotate exhibits, explore production processes, and listen to introductions from intangible cultural heritage inheritors. After learning, they enter an interactive quiz zone where random questions are presented. Students select answers via gestures and receive real-time feedback. Teachers can monitor all student screens, pause explanations, assign tasks, and track response accuracy. This transforms traditional theoretical classrooms into immersive, experiential, and measurable practical training environments, significantly enhancing learning engagement and knowledge retention.

Scenario 2: Visitor tours, humanities achievement exhibitions, and intangible cultural heritage experiences. During campus open days, partner institution visits, and government-enterprise exchanges, visitors can independently wear AR glasses to automatically activate guided tours without manual commentary. The system sequentially showcases achievements from the Humanities Center, Jinhua's intangible cultural heritage, historical figures from ancient Wuzhou, and outstanding student works along the tour route. It also supports mobile AR photo-taking, enabling automated navigation, commentary, and interaction—triple-digit improvement in reception efficiency. With standardized content and cutting-edge technology, the platform vividly demonstrates the university's digital transformation achievements and cultural heritage preservation initiatives, serving as a flagship exhibition window and exemplary project on campus.

Impact and Case Evidence

■ **Implementation outcomes, evaluation data, or practical experience**

The project has yielded remarkable practical outcomes upon implementation: Firstly, teaching experience has been comprehensively upgraded. Immersive interactive environments significantly enhance students' learning focus and engagement, facilitate more intuitive knowledge comprehension, and substantially increase participation in practical training. Secondly, reception capacity has been substantially strengthened. The facility can support over 50 annual teaching sessions, practical training programs, visits, and educational tours, with manual interpretation costs reduced by 70%. Thirdly, a systematic digital resource repository has been established, featuring more than 15 3D intangible cultural heritage models, 7 core interactive points, four categories of digital heritage content, and complete tour navigation logic. Fourthly, innovative teaching models have been successfully implemented, achieving "experiential teaching, interactive learning, and data-driven management," thereby creating a replicable and scalable digital training paradigm for humanities disciplines.

■ **Replicability, Sustainability, and Promotion Potential**

This solution exhibits exceptional replicability: standardized hardware, modularized content, proceduralized deployment processes, and templated workflows enable rapid adaptation to humanities centers in universities nationwide, local intangible cultural heritage museums, labor education bases for primary and secondary schools, and cultural tourism science popularization venues, without geographical or cultural theme restrictions.

In terms of sustainability, the system supports cloud-based content updates and a 3-year spatial point cloud service, enabling continuous addition of exhibits, updates to question banks, content replacement, and interaction upgrades to maintain long-term usability and freshness.

In terms of promotion value, the project aligns closely with national strategies such as the Digital Education Strategy, Cultural Power Strategy, and Intangible Cultural Heritage Inheritance Strategy. It can be widely implemented in areas including experimental teaching in higher education institutions, smart cultural tourism, educational tours for primary and secondary schools, and digital cultural heritage preservation, demonstrating nationwide demonstrative significance.

Basic Information of the Institution

■ **Organization Profile**

Lingban Technology (Hangzhou) Co., Ltd. is a leading domestic enterprise in AR spatial computing technology, specializing in the research and development as well as industrial application of AR smart glasses, spatial positioning, and multimodal interaction technologies. Its products are widely utilized in fields such as education, cultural tourism, industry, and healthcare.

Hangzhou QiuZheng Technology Co., Ltd. is an innovative tech company dedicated to empowering educational ecosystems with cutting-edge technologies. It maintains deep collaboration with Lingban Technology (Hangzhou) Co., Ltd., leveraging advanced technologies such as AR, AI, and virtual simulation to develop next-generation intelligent educational application scenarios.

Zhejiang Normal University is a key university under provincial-level development in Zhejiang Province. Its Comprehensive Liberal Arts Experimental Teaching Center is a national-level experimental teaching demonstration center, boasting profound expertise and exemplary status in liberal arts education reform, intangible cultural heritage research, and digital experimental teaching.

■ **Experience or qualifications in the field of digital education**

Lingban Technology: A leading domestic supplier of AR education hardware and spatial interaction technology, with profound technical accumulation and mature implementation experience in digital education, immersive teaching, smart training, and virtual-real integrated classrooms. It has successfully deployed AR smart laboratories, AR digital exhibition halls, immersive intangible cultural heritage training spaces and other projects in many universities.

Hangzhou Qiuzheng Technology: Specializes in AR/VR education digital solutions and AR+AI training laboratory construction. It excels in integrating AR technology with professional teaching, cultural heritage protection and practical training, and has successfully implemented multiple projects in Zhejiang Normal University, Zhejiang Tourism Vocational College and other institutions.

Zhejiang Normal University Comprehensive Liberal Arts Experimental Center: Possesses national-level teaching platform resources, providing teaching requirements, curriculum design, academic guidance and scenario verification for this project to ensure the solution is highly compatible with educational practice.

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24. Beijing Lexiang Yunchuang Technology Co., Ltd.

Mugeda Artificial Intelligence Education Practice Solution

Solution Introduction

Function Overview

The "Mugeda Artificial Intelligence Education Practice Solution" is the core digital education technology solution of the Mugeda platform, focusing on AI education practice and the full process needs of digital teaching. It integrates AI technology output, resource production, curriculum and intelligent lesson preparation and delivery throughout the process, lowers the threshold of AI education application, innovates teaching interaction, and adapts to scenarios such as information-based teaching, AI general courses and new curriculum standard practice. It has been implemented in many schools across the country, as well as local children's palaces and science and technology museums, with remarkable teaching effects.

The specific functions, pain point solutions and core values are as follows:

- Integrated provision of full-stack AI capabilities, solving the teaching pain point of scattered AI tools and high application thresholds in the market. It integrates a variety of mainstream AI large models, covering AIGC capabilities for text, image, audio and video, as well as AI processing capabilities such as handwriting recognition and AI matting. A single universal account provides access to all capabilities , and the experience is designed for education users, effectively lowering the threshold for AI application in teaching.
- One-stop production of multi-type digital resources, solving the pain points of single form and insufficient functionality of digital teaching resources. It provides full-type editors for graphics, H5, short videos, panoramic VR, data charts, etc., integrating media interactions such as audio and video, animation, forms, handwriting, and recording, so that teachers can easily produce interactive digital resources integrated with AI capabilities.
- Integrated full-process management of lesson preparation and delivery in smart classrooms, solving the pain points of fragmented lesson preparation and delivery links, missing teaching data, and difficulty in precise teaching. It builds a lesson preparation and delivery platform integrating curriculum, class, and question bank management, including data collection and learning situation analysis throughout the teaching process, providing data support for improving teaching effects.

The core of this solution is to build a one-stop platform for artificial intelligence education, improve efficiency and innovation for teachers, provide practical carriers for students, and provide low-cost implementation solutions for schools, helping digital education reform and AI education popularization.

■ **Technical Highlights or Innovation Points**

This solution forms differentiated advantages in AI capability application, tool design, teaching integration, deployment adaptation, etc. A number of technological innovations break through the limitations of industry AI education, and its unique value combined with practice is as follows:

- Seamless integration of multi-source AI models and tools, solving the problem of scattered AI resources in the industry. Most platforms in the industry only integrate a single model or a small number of tools, resulting in low efficiency of cross-platform operation for teachers and students; this solution integrates mainstream AI models and more than ten tools, transforming complex technologies into ready- to-use visual tools, realizing "one-stop access to full AIGC capabilities", and greatly reducing usage costs.
- Componentized embedding of AI capabilities into the editor, real-time integration of creation and interaction, breaking through the limitation of traditional AI as a "material tool". Most AI education applications in the industry stay in material production, which is disconnected from resource production and teaching; this solution encapsulates AI into callable components embedded in the editor, allowing teachers and students to call functions such as speech evaluation, handwriting recognition, and face fusion, upgrading AI from a "material tool" to a "teaching interaction carrier", and realizing the deep integration of AI and digital resources.
- Low-code and low-threshold full-type tool design, adapting to teachers' technical foundation. Some platforms in the industry require programming design capabilities for operation, which is difficult to popularize; the tools of this solution are designed with low code, and the operation is in line with teachers' office habits. 90% of teachers can quickly get started without training, realizing large-scale creation of high-quality resources.
- Interconnected data collection throughout the teaching process, building a "teaching-learning-evaluation" closed loop, solving the pain point of fragmented teaching data. In the industry, lesson preparation and delivery, question banks, and learning situation analysis are mostly independent modules, with disconnected data, making it difficult to achieve precise teaching; this solution uniformly collects and analyzes data from all links of teaching through the smart classroom and provides feedback. From test paper composition, answer submission to learning situation analysis, data is linked in real time, providing a scientific basis for precise teaching.
- Three flexible deployment modes, taking into account school information construction and data security needs. For schools with ordinary, medium information construction and high data security requirements, three deployment modes of SaaS, hybrid and privatization are provided, avoiding "one-size-fits-all", meeting the low-cost and high-adaptation implementation needs of schools of different scales and information levels, and improving industry adaptability.

Application Scenarios

■ **Application Environment and Implementation Objects**

This solution adapts to the needs of full-scene digital education and teaching, covering core scenarios such as artificial intelligence general courses, information technology new curriculum standard practice courses, teachers' daily lesson preparation and delivery and learning situation analysis, and campus digital teaching resource construction. At the same time, it can support extended scenarios such as digital resource research and development of regional education and teaching research institutions.

It has strong adaptability to software and hardware environments, no need for schools to invest in special equipment. Teachers and students only need to be equipped with ordinary computers, tablets and other terminal devices, and meet the basic network environment to use; the platform is compatible with Windows, Mac, and domestic operating systems such as Kylin and UOS, runs directly on the web side, no need to install additional plugins, and adapts to the schools' existing IT infrastructure.

The implementation objects cover K12 education subjects, mainly serving primary and secondary school teachers and students. The teacher side covers subject teachers and full-time teachers of information technology/artificial intelligence courses, and the student side covers all school stages from primary school to high school; it provides overall solutions for artificial intelligence education implementation and digital teaching reform for primary and secondary schools, children's palaces, science and technology museums and other educational institutions, and provides technical support for teaching and research institutions to develop future digital resources and conduct teaching practice research.

■ **Typical Application Scenario Examples**

Scenario 1: Implementation of AI-integrated subject interactive teaching

Fig. 1 Ancient Chinese Poetry and Prose Teaching & Interactive Digital Resources for Geography Teaching

This scenario is implemented in a public middle school, which focuses on smart teaching reform and needs to solve the problems of insufficient interaction in traditional classrooms and difficulty in integrating subject teaching with AI technology. The platform adopts the SaaS deployment mode, opens accounts for subject teachers, and completes the implementation application only through one simple operation training.

In ancient poetry teaching, teachers use AI interactive resources integrated with speech synthesis, speech evaluation, and handwriting recognition. In class, students read aloud following the voice through tablets, and the system evaluates the pronunciation in real time. At the same time, students can write new characters of ancient poetry by hands on the tablet, and the system immediately recognizes and judges whether it is correct, realizing the integrated interactive practice of "listening, speaking, reciting and writing" of ancient poetry.

Geography teachers integrate AI speech synthesis, digital human, and panoramic VR tools to produce innovative geographic real-scene digital resources, transforming course scenarios into panoramic VR scenarios, matched with digital human explanations, allowing students to realize "immersive real-scene research and study" in the classroom through terminals, breaking through the time and space limitations of traditional geography teaching.

At the same time, teachers can complete question bank entry and automatic assessment creation through the smart classroom module, organize students to answer questions online, and the platform collects answer data in real time. Teachers carry out targeted explanations based on the distribution of wrong questions, correct rate and other data, realizing a closed loop from "interactive teaching" to "precise teaching".

Scenario 2: Implementation of new curriculum standard practice for information technology in primary and secondary schools.

This scenario is implemented in many primary and secondary schools in Beijing, focusing on the practical project requirements in the new curriculum standard of information technology, and adopts the SaaS service mode to implement the practical project of the new curriculum standard of information technology in primary and secondary schools. The school opens accounts for teachers and students of information technology courses. Teachers release practical tasks through the platform, and students carry out online collaborative creation of digital works in groups: students from Beijing No. 9 Middle School use the graphic editor to produce school introduction works combining graphics and text; students from Beijing Cuihu Primary School use panoramic VR to build a panoramic online exhibition hall of the school; students from Beijing No. 22 Middle School use the H5 editor to produce H5 integrated media works including audio, animation and interaction, realizing diversified creation of the same theme on the same platform. The practical results support intra-school and cross-school display and evaluation. Students master digital resource production skills and AI tool application in the creation process, and schools also quickly complete the new curriculum standard practical teaching tasks with the help of the platform, forming a replicable new curriculum standard practical teaching mode.

Fig. 2 Beijing No.9 High School: graphic format & Beijing Cuihu Primary School: VR format & Beijing No.22 Middle School:H5 format

Effectiveness and Cases

■ **Implementation Effectiveness, Evaluation Data or Practical Experience**

This solution has been implemented in many K12 schools in multiple regions, with remarkable results: teachers use the platform's AI tools and production functions to significantly improve lesson preparation efficiency.

Most teachers can independently create digital teaching resources after simple training, and the output of interactive resources for various subjects has increased significantly; in classroom teaching, the AI interaction mode effectively improves students' participation enthusiasm, changes the traditional one-way teaching form, and classroom participation and knowledge absorption effects are significantly improved, and the teaching effects of multiple disciplines have been improved; students' digital works have a high degree of completion, and most can independently combine AI tools to optimize the presentation of works, and digital practice and AI application capabilities have been effectively cultivated.

The practice of multiple schools has summarized the experience of K12 education implementation: First, AI education technology must closely focus on the core needs of teaching, and the function design is centered on the actual needs of teachers and students to ensure that technology serves teaching and learning and avoids disconnection; second, low-threshold operation is the key to large-scale application. The platform lowers the use threshold through tool-based and visual design, so that teachers and students without technical background can quickly get started, solving the popularization barrier, allowing teachers and students to focus on teaching rather than tool learning; third, data-driven is an important starting point for precise teaching. Through full-process data collection and analysis, teachers can grasp students' knowledge absorption situation, shift from experience-based teaching to targeted teaching, and improve effectiveness.

■ **Replicability, Sustainability and Promotion Potential**

- Replicability: This solution has low requirements for school software and hardware, no need for special equipment, and can run relying on teachers' and students' daily terminals and basic networks; the three deployment modes adapt to schools with different levels of informationization and data security needs, and all types of schools can be implemented quickly. The operation does not require professional technical requirements, and teachers can apply it after simple training, adapting to the global K12 artificial intelligence education popularization and digital teaching reform needs, and overseas Chinese institutions and international K12 schools can also directly apply it.
- Sustainability: Operationally, a market-oriented service model is adopted, ensuring technical iteration, function update and offline services through reasonable charging; the technical level continuously connects with mainstream AI large models and practical tools, synchronously follows the teaching requirements of the new curriculum standard, optimizes functions and resources, and maintains technological advancement and teaching adaptation; the ecological level builds a platform for teachers and students to exchange and share digital works, forming a resource closed loop of "creation-application-optimization-sharing", and enriching platform resources.
- Promotion Potential: The solution is highly aligned with the global popularization of AI education. In China, it can be fully promoted to all types ofK12 schools at all levels, regional education institutions, and youth artificial intelligence education bases; overseas, it can be expanded to Chinese education institutions and international K12 education scenarios; at the same time, it can also be extended to the cultivation of digital literacy and basic AI capabilities in the basic stage of vocational education, adapting to various types of education scenarios, and has broad promotion and application value.

■ **Typical Case Description**

Implementation Time: Spring semester of2024

Implementation Location: A public primary school in Haidian District, Beijing, committed to promoting the in-depth integration of digital resources and subject teaching.

Implementation Scale: The school adopts the SaaS service deployment mode, and organizes student club members to carry out artificial intelligence digital work creation courses.

Core Achievements: Teachers used the platform to produce teaching resources for artificial intelligence digital work creative courses. After AI interactive teaching was implemented in the classroom, students' enthusiasm for class participation increased significantly, and students' works can be shared and displayed inside and outside the school, and won multiple awards in competitions; teachers' lesson preparation and delivery efficiency was greatly improved, and the smart classroom platform realized full digital coverage of courses, question banks, classes and learning situation analysis.

■ **Demonstration Materials**

Software and hardware configuration: Only need to be equipped with conventional computers, tablets, high- definition projectors or display screens and other basic equipment, no special hardware is required; the platform supports direct demonstration and operation on the web side, no additional plugin installation requirements, and adapts to conventional network environments.

Fig. 3 Authentic classroom teaching photos based on this solution

Basic Information of the Institution

■ **Institution Introduction**

Beijing Lexiang Yunchuang Technology Co., Ltd. was established in 2012, with its headquarters in Zhongguancun, Haidian District, Beijing. Since 2009, it has been focusing on the research of HTML5 integrated media content production and data analysis technology, mainly serving the media and education industries. The company's product is the cloud-based intelligent "integrated media +" platform Mugeda (http://www.mugeda.com), which includes 8 integrated media editors, data collection and analysis functions, integrated media cloud classrooms, etc., and has passed the certification of domestic operating systems UOS and Kylin. The platform provides solutions for the mobile advertising and education industries. The service scope covers two major fields of media and education, and has served more than 400 media institutions such as People's Daily and Xinhua News Agency, and nearly 500 colleges and universities.

■ **Experience or Qualifications in the Field of Digital Education**

The company is a " 1+X" integrated media content production certificate training and evaluation organization recognized by the Ministry of Education. It has carried out certificate examinations nationwide for five consecutive years and published seven supporting textbooks. The core advantage is the deep integration of AI capabilities into the editor, and the launch of the Mugeda artificial intelligence education practice platform. The company has high- tech enterprise qualifications and 18 software copyrights, and is the leading unit of the news industry standard "HTML5 Integrated Media News Technical Specification". Past successful projects include: nearly 500 primary and secondary schools, higher vocational colleges, and undergraduate universities have opened courses based on the Mugeda platform; in 2025, the "Jiamu Plan" was launched to donate artificial intelligence general courses to primary and secondary schools for free; it was selected into the artificial intelligence general course module and AI application supermarket of Beijing Primary and Secondary School Smart Education Platform, the artificial intelligence education tool of the National Smart Education Platform, and the smart classroom teacher assistant toolbox of Daxing District, Beijing, etc.

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25. Chengdu Aiyibai Network Technology Co., Ltd.

AI-Enabled Personalized Teaching and Learning Practices in K-12 Education

Solution Introduction

Function Overview

This solution takes artificial intelligence technology as its core and integrates the concept of adaptive learning to build an adaptive learning system suitable for primary and secondary school teaching. Its core functions cover intelligent diagnosis, personalized resource recommendation, accompanying data analysis, visual evaluation, and layered teaching supervision. It enables accurate positioning of learning starting points, dynamic planning of learning paths, and personalized customization of learning tasks. Meanwhile, it provides teachers with data support and teaching assistance, and builds a bridge for home-school communication on student learning status.

The solution directly addresses three major pain points in education:

First, teachers lack initiative in digital transformation, bear heavy burdens of repetitive teaching work, and have no practical pathways to improve their digital literacy.

Second, under the traditional classroom teaching model, unified instruction conflicts with students' differentiated learning needs, making large-scale personalized teaching difficult to achieve.

Third, the collection and application of student learning data remain superficial and generalized, resulting in low efficiency of personalized learning and a lack of scientific methods for cultivating learning quality.

Its core value lies in constructing a new teaching model of "teacher guidance + AI empowerment + student autonomy". On the one hand, it reduces workload and improves efficiency to stimulate teachers' enthusiasm for digital teaching and promote the advancement of their digital literacy. On the other hand, it realizes large-scale personalized teaching in classroom settings to precisely enhance students' subject literacy and independent learning abilities. Furthermore, relying on a data-driven closed-loop system, it deeply integrates learning data into teaching and learning practices, promotes the balanced development of regional education, and provides a replicable and promotable practical model for the digital transformation of education.

Technical Highlights or Innovations

- Theoretical Innovation: Construction of a "Dual Adaptation" Learning Theory System

This solution proposes a "Dual Adaptation" learning theory based on behaviorism and cognitive psychology.

Fig. 1

On the one hand, AI technology is used to reconstruct student profiles in real time and dynamically plan learning paths, achieving personalized adaptation of the platform to students. On the other hand, students are guided to independently optimize their learning strategies and attitudes through platform data analysis, realizing students' active adaptation to the platform. This promotes two-way human-machine collaboration, highlights student-centered active learning, and provides a new theoretical support for the deep integration of artificial intelligence and education. Meanwhile, it innovates the theory of teaching students in accordance with their aptitude under the traditional class teaching system, combining AI with tiered instruction to turn large-scale personalized teaching from an idea into an operable teaching model.

- Technological Application Innovation: Building a Contextual Data-Driven Closed Loop

Relying on big data and AI technologies, this project constructs a closed-loop system for contextual data collection and application. It collects behavioral data in real time throughout the entire learning process, accurately identifies knowledge gaps through knowledge graph analysis, and converts data into visual learning reports and progress trajectories. This provides precise data support for teachers' instructional intervention, students' autonomous learning, and parents' home-school supervision. Furthermore, the system continuously optimizes learning paths based on students' progress, making data the core driving force of teaching and learning rather than a mere statistical tool.

· Practical Model Innovation: Establishing a Replicable Progressive Model and Application System

A "Technology Application – Competence Transformation – Digital Literacy" model is constructed, transforming artificial intelligence from a mere teaching aid into a core driving force for teachers' professional development. By reducing teachers' repetitive workload and providing standardized teaching procedures, the model enables teachers to quickly master digital teaching methods, breaking through the industry dilemma of "emphasizing theory over practice" in teachers' digital training. Intelligent scenarios including intelligent assessment, error correction, practice-while-learning, and unit-based learning are designed and applied to preview, review, and knowledge gap remediation. The solution is adaptable to public, private, rural, and ethnic minority schools. It has been widely promoted and verified in more than 1,300 primary and secondary schools nationwide.

· Teaching Effect Innovation: Achieving Dual Improvement of "Subject Literacy + Learning Quality"

On the basis of improving academic performance, this solution cultivates students' learning qualities in the digital era — including time management, resource application awareness, and reflective ability — through personalized task design, visual evaluation incentives, and autonomous learning guidance. It also promotes the transformation of teachers' roles from knowledge transmitters to learning companions and motivation facilitators. Teaching thus achieves not only positive growth in academic levels but also comprehensive improvement in students' core subject literacy and lifelong learning abilities. For example, the relative improvement rate of academic performance in pilot classes at Chengdu Xinjin Experimental High School reached 16.2%, and pilot classes at Aba Xiaojin Middle School achieved a significant performance turnaround.

Application Scenarios

■ **Application Environment and Implementation Targets**

Educational Scenarios: Suitable for the full process of mathematics teaching in all grades of primary and secondary schools, covering pre-class, in-class and post-class sessions, academic diagnosis, advanced learning and remediation for underachievers. It can be implemented in class teaching, tiered instruction, personalized tutoring and other teaching modes. Meanwhile, it meets the teaching needs of different types of schools including urban and rural primary and secondary schools, schools in ethnic minority areas and private schools, helping promote the balanced development of regional education and the improvement of school teaching quality.

Hardware & Software Environment: Supports general terminal devices such as computers and tablets, with no need for special customized hardware.

Implementation Targets: Students:Mathematics learners at all primary and secondary school levels, especially those with weak foundations and those in need of advanced training and remediation, to support their personalized learning and improvement of subject literacy.

Teachers: Primary and secondary school mathematics teachers in urban, rural and ethnic minority areas, helping reduce their repetitive teaching workload, improve digital teaching capabilities and precision teaching efficiency.

Schools & Education Authorities:Public and private primary and secondary schools across the country, schools in ethnic minority areas, and regional education departments, providing solutions for mathematics teaching reform, education quality improvement and balanced regional education development.

■ **Examples of Typical Application Scenarios**

Scenario 1: Targeted Improvement in Mathematics for Primary and Secondary Schools in Ethnic Minority Areas(Aba Xiaojin Middle School, Sichuan Province)

In 2021, Xiaojin Middle School in Aba Prefecture introduced this solution, focusing on borderline students and experimental classes for advanced and remedial mathematics teaching. Relying on the Pingcexue adaptive learning system, the platform diagnosed students' knowledge weaknesses through intelligent assessments and customized personalized learning paths for students of different levels. With the error-clearing function, it established exclusive error archives for students and intelligently recommended variant exercises and micro-lecture resources to target knowledge gaps. Teachers carried out offline tiered supervision and precise teaching based on real-time accompanying data from the platform. After implementation, the average mathematics score of pilot classes continued to rise and surpassed high-level parallel classes within one year. The number of students admitted to undergraduate programs exceeded 100 for three consecutive years, making it a typical model for improving mathematics teaching quality in ethnic minority areas.

Scenario 2: Balanced Improvement of County-Level Mathematics Education in Primary and Secondary Schools (Fengyang County, Chuzhou, Anhui Province)

In 2023, Fengyang County implemented this solution under the model of "school voluntary application + education bureau filing and guidance", selecting 12 classes of Grade 5 and Grade 7 from 3 pilot schools for mathematics teaching practice. The county education department promoted the project in a coordinated way, realizing the inter-school sharing of high-quality mathematics teaching resources through the adaptive learning platform. Teachers in pilot schools conducted daily teaching and after-school tutoring following the standardized process of "plan formulation – lightweight task assignment – data analysis – precise intervention", combined with the "unit-based learning while practicing" scenario. The platform collected students' learning data in real time across the county, providing academic analysis reports for teaching and research institutions to guide regional mathematics teaching reform. After one year of practice, mathematics scores in pilot classes improved significantly, and the application scope was gradually expanded, providing a replicable path for the balanced development of county-level mathematics education.

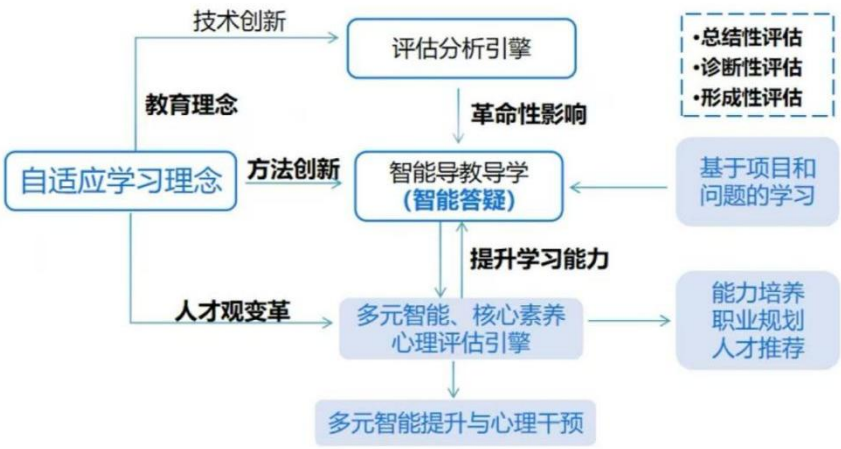

Fig. 2

Impact and Case Evidence

■ **Implementation Effectiveness, Evaluation Data and Practical Experience**

Quantitative Data:The program has covered more than 1,300 primary and secondary schools nationwide, with a total of 2,714,322 student and teacher participations. At Chengdu Xinjin Experimental High School, the relative academic performance of the pilot classes improved by 16.2%. The average score of 22 students weak in mathematics rose from 48 to 71.6. At Chengdu No.11 Middle School, over 80% of students in the pilot classes achieved better-than-expected academic improvement. At Xiaojin Middle School in Aba, pilot classes outperformed the top parallel classes of the same grade. At Mizhi Middle School in Shaanxi, simultaneous implementation across all subjects led to remarkable improvements in academic performance.

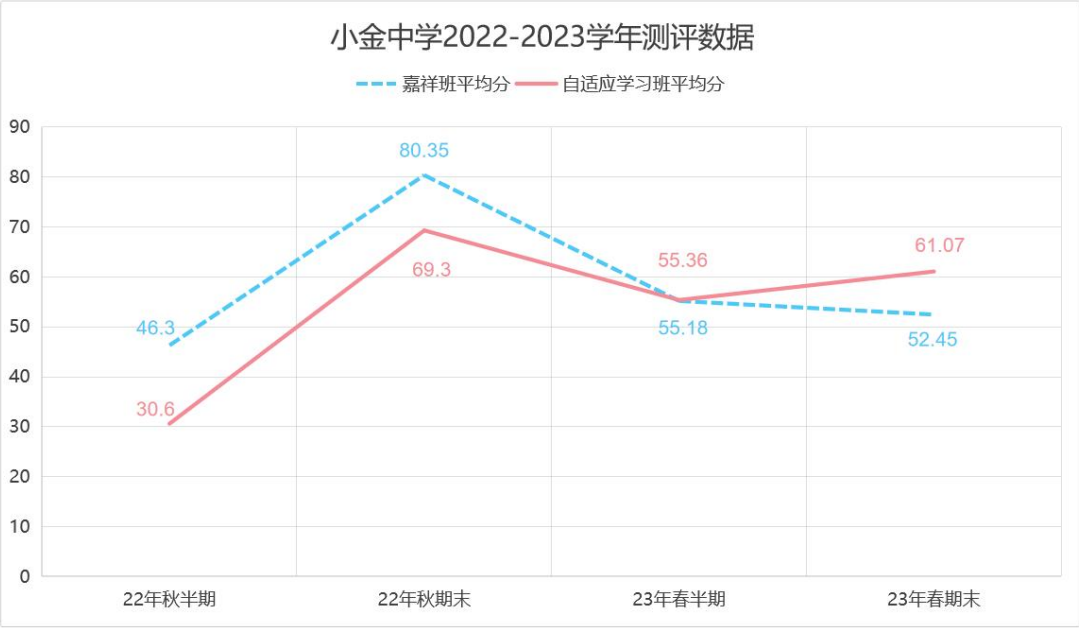

Fig. 3

Practical Effectiveness and Experience:Students' disciplinary literacy has been significantly enhanced, and their learning qualities such as autonomous learning ability and information literacy have been comprehensively improved. Teachers' teaching efficiency has increased, and their digital literacy has advanced. Teachers in rural and ethnic minority areas have received provincial and municipal awards for their teaching and research achievements. Regional educational equity has been improved, with overall teaching quality elevated through regional promotion in Shanxi, Fengyang of Anhui and other areas. A standardized adaptive learning process and application scenarios have been established, centered on teacher task guidance, enabling precise teaching through accompanying data analysis. A hybrid "teacher + platform" teaching model has been formed, connecting home-school collaborative education data feedback channels for dynamic supervision of the learning process.

■ **Replicability, Sustainability and Promotion Potential**

Replicability: The program is adaptable to all grades and subjects in primary and secondary education. It can be implemented using general computers or tablets and existing adaptive learning platforms,

with no need for customized hardware or software. With standardized operating procedures, it can be directly applied to scenarios including pre-class preview, after-class review, basic improvement, and key & difficult point breakthroughs. It suits different types of schools – public, private, rural and ethnic minority schools – and poses no technical barriers to cross-regional promotion.

Sustainability: Through 20 years of exploration, a “dual-adaptation” learning theory system has been developed, supported by 11 national, provincial and municipal research projects and 2 monographs. The operation model of “platform iteration + teacher training” is adopted. More than 2,000 core teachers have been trained through over 120 provincial and municipal training sessions, forming a normalized teaching, research and promotion mechanism.

Promotion Potential:It aligns with the global trend of digitalized and personalized education development, and can be extended to mathematics teaching in primary and secondary schools worldwide. It is especially suitable for large-scale personalized instruction in regions with uneven educational resources. Recognized by the World Internet Conference and the Ministry of Education of China, it enjoys extensive social influence, bears both public welfare and market-oriented promotion value, and can be expanded to other subjects.

Typical Case Study

Case Name: Practice Project of Mathematics Adaptive Learning Under Artificial Intelligence at Xiaojin Middle School, Aba Prefecture

Implementation Period: 2021–2022

Location: Xiaojin Middle School, Ngawa Tibetan and Qiang Autonomous Prefecture, Sichuan Province

Implementation Scale: 1,778 students selected as the core pilot group, including borderline admission students and experimental classes for targeted improvement; covering junior and senior high school mathematics.

Key Outcomes: The average mathematics score of pilot classes kept rising and surpassed that of top parallel classes in the same grade within one year. Students’ autonomous learning ability improved significantly. The number of students admitted to undergraduate programs exceeded 100 for three consecutive years. A teaching model of adaptive learning for ethnic minority areas has been established, serving as a demonstration case for improving education quality in underdeveloped regions. Relevant research projects have been approved as special ethnic education projects by the Sichuan Provincial Institute of Education.

Basic Information of the Institution

■ **Company Profile**

Date of Establishment:September 17, 2012

Main Business and Service Scope:

① Core Business:The company provides adaptive learning systems and smart campus solutions for public primary and secondary schools nationwide, covering the entire teaching process including lesson preparation, instruction, academic performance analysis, and home-school collaboration. It supports large-scale personalized instruction and the balanced development of regional education. Outside schools, it empowers more than 2,000 off-campus training institutions to explore new models of off-campus adaptive learning.

In 2025, it launched the “Heima Ben” C-end operation business, forming a synergistic and multi-line complementary business model covering both on-campus and off-campus scenarios.
② Service Scope: Technical development of educational software;Technology promotion;Research and experimental development in natural sciences;Education consulting (excluding overseas study consulting and intermediary services);Computer system services;Basic software services; Organization of cultural and artistic exchange activities; Conference services; Exhibition services.

■ **Experience and Qualifications in Digital Education**

- Industry Experience: With more than 20 years of deep cultivation in the field of AI-driven adaptive education for primary and secondary schools, the company began research on mathematics adaptive learning in 2007. It has evolved through the eras of traditional education, information technology education, and artificial intelligence education, completed 11 national, provincial and municipal research projects, and established a mature adaptive learning strategy and practical system. Its programs have been implemented in more than 1,300 primary and secondary schools across China.
- Core Advantages: Pioneered the “Dual-Adaptation” learning theory to achieve two-way human-machine adaptation; Solved the challenge of personalized instruction under whole-class teaching and created a new paradigm for large-scale precise teaching; Adapts to diverse learning scenarios and forms a closed loop driven by accompanying data; Realizes deep integration of technology and teaching practice.
- Relevant Qualifications and Awards: The company has successively received numerous honors, including: 2019 Excellent Smart Education Campus Solution; Chengdu Teaching Achievement Award; Excellent Smart Education Case; Practice Base for Research Projects; Excellence Award for Digital Education Innovation Achievement by the Chinese Society of Educational Technology
- Previous Successful Projects:

①Adaptive Mathematics Learning at Xiaojin Middle School, Aba Prefecture:
Pilot classes outperformed top parallel classes in the same grade. The number of students admitted to undergraduate programs exceeded 100 for three consecutive years, making it a demonstration case for improving education quality in ethnic minority areas.
②Targeted Intervention at Chengdu Xinjin Experimental High School:
The average score of 22 mathematically underperforming students increased by 23.6 points. The number of students meeting the effective score threshold rose from 0 to 10, and overall class academic performance improved by 16.2%.
③Pilot Program at Chengdu No.11 Middle School:
Over 80% of students in experimental classes achieved better-than-expected academic improvement.

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26. Jiangsu Zhitu Education Technology Co., Ltd.

Zhitu Haoke — AI-Native Smart Course Learning Platform

Solution Introduction

Function Overview

Zhitu Haoke is an original smart course platform reconstructed based on Generative AI technology. Through the deep integration of over 100 teaching agents into the entire process of teaching, learning, management, evaluation, and assessment, it achieves an organic fusion of AI and courses (Course × AI), rather than a simple tool superposition (Course + AI).

Core Functional Matrix:

- AI-Automated Course Preparation: Completes course construction within hours, reducing the traditional 1.5-month cycle to just 6-10 hours.
- AI-Generative Teaching & Research: A personal teaching research workstation for teachers, supporting multi-turn conversational course design.
- AI Homework Grading & Personalized Guidance: Supports multimodal assignment types, including mathematical formulas, handwritten answers, and experimental images.
- Scenario-based Educational Agents: Supports 100+ innovative teaching scenarios such as debates, role-playing, and simulated consultations.
- Whole-Process Teaching Evaluation: Data-driven normalized quality monitoring.
- Inquiry-based Learning: Advanced capability cultivation through PBL tasks, AI code training, AI scenario simulation, etc.

Educational Pain Points Addressed:

① Heavy burden of repetitive work on teachers (homework grading and repetitive Q&A consume 80% of energy), making it difficult to carry out personalized guidance.

② Insufficient student learning interaction; difficult questions cannot be answered in time; learning anxiety is prevalent.

③ Low AI utilization rate in traditional smart courses; ineffective results; becoming "zombie platforms."

④ Difficulty in ensuring teaching quality consistency in large-scale teaching; significant grade differences between parallel classes.

■ **Technical Highlights & Innovations**

① AI-Native Architecture: Based on educational large models, 100+ teaching agents dynamically serve a single course, covering all scenarios including lesson preparation, teaching, homework, and evaluation. AI actively participates rather than being passively called.

② Guided AI Teaching Assistant: Unique three-step guidance method (Inspire → Guide → Summarize). AI does not give direct answers but guides students to think, inheriting the teaching methods of renowned teachers.

③ High-Precision Multimodal Recognition: Supports intelligent grading of multimodal assignments including mathematical formulas, handwritten answers, experimental images, and code sandbox verification, with accuracy reaching industry-leading levels.

④ G-RAG Technology (Graph-Retrieval Augmented Generation): Precise Q&A based on school-based knowledge bases. Every answer has a source, traceable to textbook page numbers or video timestamps, greatly reducing AI hallucinations and ensuring teaching rigor.

⑤ Continuous Optimization Service: Professional teaching and research teams continuously optimize agents based on actual teaching feedback, ensuring AI becomes more accurate with use, avoiding "freezing upon completion."

⑥ Human-Machine Collaboration Mode: AI preliminary review + teacher re-examination liberates teachers from 80% of repetitive labor, while final scoring authority remains in teachers' hands, balancing efficiency and quality.

Application Scenarios

■ **Application Environment & Implementation Targets**

Adaptable Environment: Supports public cloud deployment and localized deployment, compatible with mainstream browsers and mobile devices, supports Xinchuang environment adaptation.

Implementation Targets:

• Smart course construction projects coordinated by university academic affairs offices/graduate schools

• Curriculum reform projects independently constructed by secondary colleges

• Teaching innovation experimental projects initiated by individual teachers

Service Objects:

• Frontline Teachers: Reduce work burden, improve teaching effectiveness, obtain AI teaching super assistant

• Students: Obtain personalized learning support, 7×24 hour companion-style tutoring

• Teaching Managers: Achieve teaching quality monitoring and data-driven decision support

■ **Typical Application Scenario Examples**

[Scenario 1] Large-Scale Teaching of Public Basic Courses (Taking Advanced Mathematics at Shanghai Jiao Tong University as an Example)

Background: Under the "large class teaching + small class tutoring" model, teaching content is divided into two parts: basic content for large classes and in-depth expansion for small classes. Large classes: 310-430 students, 112 class hours, emphasizing knowledge commonality; Small classes: 30-60 students, 48 class hours, emphasizing personalization.

Application Effects:
• AI completed 560,000 homework reviews, achieving next-day feedback (originally required 1-2 weeks)
• Each student receives personalized comments and targeted guidance suggestions
• The average score gap between parallel classes narrowed to 2-3 points, proving AI effectively ensures teaching quality consistency
• Teachers are liberated from repetitive grading to focus on instructional design and student emotional guidance

[Scenario 2] Medical Practical Teaching (Taking Health Assessment at Army Medical University as an Example)
For nursing majors, establish a structured medical record database. AI simulates high-altitude pulmonary edema case manifestations of different populations (young people, elderly, women, children) to train students' differentiated handling capabilities.
Innovations:
• Students can ask questions to AI instructors at any time and receive intuitive guidance combining text and images
• Solves the problems of insufficient practical opportunities and limited case resources
• Supports repeated practice in a risk-free trial-and-error environment

[Scenario 3] Full-Process Assistance for Laboratory Courses (Taking Circuit Experiments at Shanghai Jiao Tong University as an Example)
Before Experiment: AI tests preview effectiveness through scenario simulation dialogues
During Experiment: AI teaching assistants embedded in key steps answer operation questions in real time to avoid equipment damage
After Experiment: AI grades experiment reports and generates personalized comments, pointing out improvement directions
Replication: This model has been replicated to pharmaceutical chemistry experiments, engineering training practice, and other courses.

[Scenario 4] New Engineering Specialty Construction (Taking Quanzhou Ocean Institute as an Example)
Scale: 4,000+ courses, 80,000+ teachers and students, monthly average of 500 million Token consumption
Effectiveness:
• Achieved full coverage of AI-enabled courses across the entire school
• Teacher course construction efficiency increased by 10x+
• Student monthly activity rate reached over 85%

Effectiveness & Cases

■ **Implementation Effectiveness & Quantitative Data**

[Core Indicators]
• AI Homework Grading Volume per Class: 560,000 times (Advanced Mathematics at Shanghai Jiao Tong University, Fall 2024 semester)

• Regularly Active Students: 2,000+ (Shanghai Jiao Tong University)
• Teaching Quality Consistency: Average score gap between parallel classes narrowed to 2-3 points (Tongji University)
• Homework Feedback Timeliness: Improved from 1-2 weeks to next day, efficiency increased by 10x+
• Course Construction Efficiency: Shortened from traditional 1.5 months to 6-10 hours online
• Cooperation Scale: Collaborated with 200+ universities nationwide in 2025 to build 1,000+ smart courses
• Platform Activity: Monthly average of 500 million Token consumption (Quanzhou Ocean Institute)
• Teacher Satisfaction: 92% of teachers reported significant reduction in work burden
• Student Satisfaction: 88% of students believed learning effectiveness significantly improved
[Quality Improvement]
• Course Resource Completeness: Increased from 60% to 95%+
• Student Homework Submission Rate: Increased from 75% to 92%
• Teacher-Student Interaction Frequency: Increased by 3-5 times
• Learning Anxiety Index: Decreased by 35%

■ **Replicability & Promotion Potential:**
Zhitu Haoke has successfully landed in multiple disciplines including mathematics, English, medicine, experiments, economics & management, and engineering, forming standardized discipline construction plans.
[Rapid Adaptation Capability]
• Platform adopts "Standard Agent + Configurable Strategy" architecture for rapid adaptation across disciplines
• Provides continuous optimization service; professional teaching and research teams optimize agents based on actual teaching feedback
• Supports localized deployment to meet data security requirements
• Standardized implementation process: 1-week training + 2-week pilot + 1-month promotion
[Sustainable Operation Model]
• Clear business model: Initial construction fee + annual operation service fee
• Annual service fee covers AI token consumption and continuous upgrades, ensuring sustainable development
• Supports multiple subscription models: by course, by college, by school

■ **Typical Case Descriptions:**
[Case 1] Smart Advanced Mathematics Course at Shanghai Jiao Tong University
Implementation Period: September 2024 to present
Location: Shanghai Jiao Tong University
Scale: Covers classes of 600 students; over 2,000 students using it regularly campus-wide
Core Achievements:
① AI completed 560,000 homework reviews with instant feedback
② Original "Three-Step Guidance" AI Tutor: Focuses on method summarization rather than giving direct answers

③ Narrowed the grade gap between parallel classes to 2-3 points, promoting educational equity
④ Teachers liberated from repetitive grading to focus on pedagogical innovation

[Case 2] Public Course of Advanced Mathematics at Tongji University
Implementation Period: September 2024 to present
Scale: 2,800 students per semester
Core Achievements:
① Achieved consistency in teaching quality across 12 parallel classes
② Reduced student failure rates by 15% in final exams
③ Reduced teacher preparation time by 70%

[Case 3] Campus-wide Deployment at Quanzhou Ocean Institute
Implementation Period: March 2024 to present
Scale: 4,000+ courses, 80,000+ teachers and students
Core Achievements:
① Achieved full coverage of AI-enabled courses across the entire school
② Monthly average of 500 million Token consumption, high-frequency use by teachers and students
③ Became a benchmark for digital transformation in regional vocational education

(4) Display Materials:
① Platform demo account and operation videos
② AI homework grading samples and learning analysis reports
③ Course architecture diagram and technical white paper
④ User testimonial videos (teacher evaluations from Shanghai Jiao Tong University, Tongji University, and other prestigious universities)

Basic Information of the Organization

■ **Organization Introduction:**

Jiangsu Zhitu Education Technology Co., Ltd., founded in 2015, is a leading education technology enterprise in China, headquartered in Nanjing, Jiangsu. Zhitu Education is not only an education technology service provider but also a partner in the transformation of university education.

With "AI-Native" underlying architecture as its core, the company advocates starting from empowering the "education supply side" to create an "Exclusive AI Teaching Super Assistant" for every teacher. Through AI empowerment of teachers' teaching method iteration, it ultimately transfers to the student end, achieving personalized talent cultivation based on aptitude and goals.

Zhitu Education's parent company, Jiangsu Wisedu Information Technology Co., Ltd. (Wisedu), was founded in 2008. It is a leading higher education informationization service provider in China, focusing on promoting the deep integration of new-generation information technologies such as cloud computing, big data, and artificial intelligence with higher education.

■ **Experience & Qualifications in Digital Education Field:**

[Enterprise Qualifications]

• National High-Tech Enterprise

• Provincial Software Enterprise

• Provincial "Tengyun Jiashu" Excellent Software and Information Service Enterprise

• Executive Director Unit of the Higher Vocational Computer and E-Commerce Professional Committee of the National Research Association on Computer Basic Education in Higher Education Institutions

• Chairman Unit of the National Higher Vocational Big Data School-Enterprise Cooperation Alliance

[Product Honors]

• Jiangsu Province Excellent Artificial Intelligence Product Award 2020 (Jiangsu AI Society)

• Jiangsu Province Excellent Artificial Intelligence Product Award 2021 (Jiangsu AI Society)

• Typical Case of "School-Enterprise Cooperation, Double Hundred Plan" at China Higher Education Expo

[Market Coverage]

• Serving 200+ university customers nationwide

• Covering all levels of institutions: 985/211, ordinary undergraduate, higher vocational colleges

• Built 1,000+ smart courses

• Monthly average of 500 million+ Token consumption

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27. Youlife Group

A Successful Practice Solution for Industry-Education Integration Digital Education

Solution Introduction

Function Overview

This solution adopts a "1+1+N" model as its core framework to establish a collaborative education platform between schools and enterprises, fostering deep integration between vocational institutions and industry players. It creates an integrated "industry-academia-research-innovation" pathway for modern industrial college development. Key features include: 1. Co-building Industrial Colleges: Educational institutions provide infrastructure, Youlan International handles construction and operations, while industry leaders spearhead collaborative initiatives such as "Future Technology Industry Colleges" and "Modern Communication Industry Colleges." 2. Integrated Talent Development: A modular curriculum system is designed around four dimensions— "technology + skills + competencies + certifications" —implementing modern apprenticeship programs and "on-site engineer" training models. 3. Resource Platform Integration: Leveraging industry-level resource databases, corporate project simulations, Youlan International's vocational education ecosystem, and online learning platforms to optimize allocation of course materials, practical training cases, and dual-qualified faculty teams. 4. End-to-End Teaching Management: Establishing a "dual-dean system" and joint management committee to implement project-based approaches, driving classroom innovation and internship management optimization.

Technical Highlights or Innovations

Four distinctive core features:

1. "1+1+N" collaborative education mechanism: Based on academic institutions, with Youlan International as the operational core and N industry enterprises as support, it establishes a four-dimensional collaborative governance framework encompassing decision-making, stakeholders, operations, and safeguards.

2. Digital Management Service Platform: Establish a digital management platform covering teachers 'instruction, students' learning, and practical training processes, enabling the teaching process to be recorded, monitored, and evaluated.

3. Collaborative Model for Industry-Education Integration Training Bases: Enterprises contribute equipment and technology, while schools provide facilities and faculty resources to jointly establish a "Gold-Level Training Base," enabling real-world projects to be integrated into classrooms and production processes to be incorporated into training programs.

4. International Education Resource Integration: Collaborate with institutions such as East Asia University of Thailand to establish international academic advancement pathways including "Secondary Vocational Education 1+3 Direct Bachelor's Program", "Associate-to-Bachelor's Degree Transfer", and "Bachelor-to-Master's Degree Program", thereby promoting the global expansion and internationalization of vocational education practices.

Application Scenarios

■ **Application Environment and Implementation Targets**

This solution is primarily designed for secondary and higher vocational colleges, applied undergraduate institutions, and industrial parks, and is suitable for scenarios such as vocational education industry-education integration reform, modern industrial college development, and training base upgrades. The target users include: Institutions: secondary vocational schools, higher vocational colleges, and undergraduate institutions; Students: candidates for applied and skilled talent cultivation; Teachers: program leaders, core faculty members, and dual-qualified teachers; Enterprises: leading enterprises across various industries and key regional enterprises; Government: education authorities and industry-education integration promotion agencies.

■ **Examples of Typical Application Scenarios:**

Scenario 1: Fuzhou Software Vocational and Technical College-Future Technology Industry College Construction: In 2024, Fuzhou Software Vocational and Technical College, Youlan International, and China Information Technology Group jointly established the "Future Technology Industry-Education Integration Base" and simultaneously founded the "Future Technology Industry College", with the first year enrollment reaching 2,578 students. The college focuses on the new generation of information technology industries, building an integrated "industry-academia-research-innovation" platform, introducing real enterprise projects, and promoting the cultivation of "on-site engineers".

Implementation model: Enterprises provide technical platforms and project resources, schools are responsible for teaching organization and student management, while Youlan International handles resource integration and operational coordination.

Typical activities: Hosting the domestic finals of the "2024 Belt and Road and BRICS Skills Development and Technological Innovation Competition-First Intelligent Control Technology Event", marking the school's first time hosting a national-level competition.

Scenario 2: Construction of Fuzhou Software Vocational and Technical College-Modern Communication Industry College: Leveraging the resources of Youlan International and China Information Technology Group, we jointly established the Modern Communication Industry College, focusing on 5G communication and mobile communication technology directions, to carry out joint program development, shared training base operations, and collaborative faculty cultivation.

Implementation approach: Establishing a school-enterprise collaborative industry-education alliance, and being elected as a vice-chair unit for national mobile communication industry-education integration; jointly building a vocational skills certification and appraisal center to conduct 1+X certificate certification programs for students and the general public.

Typical achievements: Jointly submitted for approval under the Ministry of Education's Supply-Demand Alignement Employment and Education Project, which was successfully approved.

Impact and Case Evidence

■ **Implementation outcomes, evaluation data, or practical experience**

Student enrollment: The Future Technology Industry College enrolled 2,578 students in its first year, while the Modern Communication Industry College maintained steady enrollment, achieving economies of scale.

Event Hosting: Fuzhou Software Vocational and Technical College hosted its first national-level competition—the 2024 Belt and Road and BRICS Skills Development and Technological Innovation Competition— attracting participation from numerous vocational colleges across the country.

Outstanding achievement: The international finals of the Collaborative Robotics event at the 2024 BRICS Vocational Skills Competition, which Youlan International deeply participated in and guided, won first prize.

■ **Replicability, Sustainability, and Scalability**

The model is replicable—the "1+1+N" approach features a standardized implementation pathway, enabling its adoption across vocational and technical colleges nationwide and adaptation to diverse regional and industrial contexts.

Operational Sustainability: Through the "Dual Dean System" and the Joint Management Committee, continuous investment and collaborative operations between the university and enterprises are ensured; diversified revenue sources such as vocational skill certifications, horizontal research projects, and social training programs enhance self-sustaining capabilities.

Continuous promotion value: Successfully implemented in Fuzhou and surrounding areas, with cross-regional replicability; international projects have expanded to countries like Thailand under the Belt and Road initiative, demonstrating global promotion potential.

■ **Typical Case Study**

Core Case: Fuzhou Software Vocational and Technical College's "One University, Two Industrial Colleges" Initiative. Implementation Date: Launched in 2024. Location: Fuzhou City, Fujian Province. Scale: The Future Technology Industrial College enrolls 2,578 students; the Modern Communication Industrial College covers multiple disciplines including communication technology and intelligent control. Key Achievements: Established the "Future Technology Industry-Education Integration Base," achieving deep integration of university and enterprise resources; hosted a national skills competition to enhance the institution's social influence; elected as the Vice Chairman Unit for National Mobile Communication Industry-Education Integration, strengthening its industry influence; jointly applied for the Ministry of Education's Employment Education Project to promote high-quality employment; implemented vocational skill certifications to support regional talent development.

Fig. 1 The Future Technology Industry College

Fig. 2 Award acheivement

Basic Information of the Institution

■ **Institution Introduction**

Youlife Group is a NASDAQ-listed U.S. corporation specializing in blue-collar services and vocational education. It serves as a globally leading lifelong service platform for blue-collar workers, aiming to become the preferred high-quality service provider for blue-collar professionals nationwide and worldwide.

Youlife Group was founded in 2008. Based on eighteen years of industry expertise, it has built a comprehensive service ecosystem covering vocational education, talent recruitment, employee management, and market services. Committed to providing precise and efficient value connections for enterprises and blue-collar talents, it has become a key talent engine driving China's industrial upgrading.

Youlife Group provides end-to-end lifecycle services for blue-collar professionals across four key dimensions: vocational education, talent recruitment, employee management, and market services.

■ **Experience or Qualifications in the Field of Digital Education**

Youlife Group's self-developed digital service product for blue-collar workers— "Compass" under the "Deep Blue Brain" platform—has established itself as a long-term strategic partner of Alipay. The digital service product "Deep Blue Brain" has collaborated with Xiamen Hailu Maritime Service Co., Ltd. on recruitment services for international cultural tourism cruise industry personnel, achieving a one-stop practical cooperation model spanning from mini-programs to backend services. Since 2025 alone, its self-developed digital products have obtained multiple software copyrights, including: 2025SR2119530 Quarterly Performance Analysis System, 2025SR2179332 C-end User Configuration Intelligent Management System, 2025SR2179351 Customer Service Quality Evaluation System, 2025SR2179334 Operational Data Intelligent Analysis System, 2026SR0235820 Intelligent Evaluation List Configuration Management System, 2025SR1962701 Youlan EHR Tenant Payment Management System, 2025SR1962722 Youlan EHR Contract Expiration Reminder Software, 2025SR1917821 Youlan EHR Employee Performance Record System, 2025SR1919737 Youlan EHR Employee Attendance Linkage Software, 2025SR1904757 Youlan EHR Tenant Lease Termination Processing System, 2025SR1904734 Youlan EHR Contract Archiving Management Software, 2025SR1904691 Youlan EHR Employee Salary Calculation Software, as well as the utility model patent application for Information Technology Service Equipment (Patent Application No.2026203344004).

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28. Beijing HQ Intelligent Technology Co., Ltd.

AI-Powered Intelligent Teaching and Evaluation System for Primary and Secondary School Essay Writing

Solution Introduction

Function Overview

This solution is an integrated teaching platform that combines essay task assignment, intelligent grading, multi-modal interaction, and learning paralytics. Its core value lies in building a fully closed-loop digital teaching scenario covering assignment, writing, grading, feedback, revision, and lecture.

Core Functional Modules:

1-Intelligent Task Management

It enables teachers to flexibly assign full-essay or in-class fragment writing tasks via PC/mobile, with customized topics, genres, scoring criteria, writing guidance and deadlines.

2-Multimodal Essay Collection

It supports multiple submission methods: student self-upload, teacher batch/single upload, and convenient submission via an "upload code". The system features powerful image recognition and intelligent matching capabilities, automatically associating essay images with the corresponding students.

3-AI In-Depth Grading and Targeted Feedback

After essays are uploaded, the system completes automated AI grading within 30 minutes, providing comprehensive scores, AI-generated overall comments, sentence-by-sentence reviews, and full-text polishing suggestions. Teachers can perform "2nd revisions" to AI grading results, realizing human-AI collaboration to ensure the accuracy and educational value of feedback.

4-Closed-Loop Design for Evaluation-Driven Writing Improvement

The system supports a "re-grading after revision" function. When teachers adjust task scoring criteria, they can trigger re-grading of submitted essays. Meanwhile, teachers can "require students to resubmit essays" or assign "revision exercises", forming an enhanced loop of writing, evaluation, revision, and improvement.

5-Data-Driven Teaching Decision-Making and Presentation

It provides statistical charts such as class essay grade distribution and task completion status. It supports one-click generation of class performance reports, individual student grading reports, and personal growth portfolios. The exclusive "in-class lecture" function enables instant explanation and interaction.

6-Resource Generation and Accumulation

The system allows excellent student essays to be generated as "model essays" and published, forming a reusable school-based teaching resource library, embodying the concept of co-creation and iterative enhancement through the synergy of human and artificial intelligence.

■ Technical Highlights or Innovations

1-Collaborative Grading Model with Human-AI Interaction

AI undertakes basic and repetitive scoring and grammar checking, freeing teachers to focus on high-level guidance such as ideological content and textual structure, thus achieving a grading efficiency of 1+1>2.

2-Personalized Task Settings Supporting Adaptive Learning

Teachers can flexibly configure differentiated writing requirements, scoring rubrics and writing guidance according to different classes and learning conditions, making teaching tasks more targeted. By collecting full-process data, the system provides a basis for subsequent personalized learning path planning.

3-Construction of a "Strong Feedback" Ecosystem

The system integrates instant feedback (AI rapid grading), multi-dimensional feedback (scores, comments, sentence-level reviews, revision suggestions), interactive feedback (teacher-revised comments, in-class commentary), and motivational feedback (rewriting requirements, revised drafts). It forms a multi-level, three-dimensional feedback network that continuously motivates and guides students.

4-Implementation of the "Evaluation-Driven Writing" Teaching Strategy

Technical design closely centers on using evaluation to promote writing improvement. From "re-grading after revision" to ensure consistent evaluation standards, to "revision draft practice" for targeted revision training, and to "model essays" as learning examples, evaluation is deeply embedded in the writing process, directly targeting the improvement of writing ability.

5-Realization of an Intelligent-Creative Symbiosis Resource Ecosystem

AI-generated comments and revision suggestions, teacher-enhanced critiques, and outstanding student works are accumulated, circulated and reused in the system, realizing mutual inspiration and co-evolution between artificial intelligence and the wisdom of teachers and students.

Application Scenarios

■ Application Environment and Target Users

1-Application Scenarios

This solution is mainly applicable to Chinese composition teaching at the K-12 level, covering various teaching scenarios including in-class writing, after-class assignments, exam simulation, and fragmentary writing practice.

2-Hardware and Software Requirements

It supports the Web version (Chrome browser recommended) and mobile versions (iOS / Android). The teacher-side interface can be used on ordinary PCs, laptops and tablets; the in-class commentary function requires connection to a projector or smart large screen.

3-Target Users

The solution serves teachers, students and teaching administrators of core subjects.

Teachers, as core users, conduct class management, task assignment, grading review and learning analytics.

Students, as core beneficiaries, receive personalized feedback and carry out revisions.

Administrators can access school-wide composition teaching data.

■ **Typical Application Scenarios**

Scenario 1: Intelligent Full-Process Management of Daily Composition Assignments

Teachers assign an unit composition with detailed requirements via the PC. After students complete their writing offline, teachers or class representatives take photos of all papers in an unified way. Teachers then use the "batch upload" function to submit the compressed package to the system, which completes AI grading for the whole class within 10 minutes.

Afterwards, teachers conduct "quick review" on mobile devices and revise comments for selected key essays. Once reviewed, reports are instantly released to students. Teachers use the system-generated "class grade distribution chart" for focused in-class commentary, and project "model essays" and typical problematic examples for explanation. After class, under performing students are required to submit revised drafts in the system.

The whole process frees teachers from heavy grading workload, speeds up feedback, and makes targeted commentary possible.

Scenario 2: Real-Time Interaction and Fragment Practice in Writing Classes

During writing instruction classes, teachers assign a "pre-writing fragment" exercise. Students complete short writing tasks on paper in class; teachers immediately capture and upload students' essay via mobile devices. The system quickly returns AI grading results, which teachers can view immediately and project through the "classroom commentary function". They then combine AI suggestions with on-site evaluation and guidance.

This "write-capture-grade-comment instantly" model greatly improves students interaction and feedback timely, achieving deep and seamless integration of information technology with writing instruction.

Impact and Case Evidence

■ **Implementation Results, Evaluation Data or Practical Experience**

The Heqi Juli AI Composition Teaching Platform (Haozhuanye · AI Intelligent Composition Teaching Platform) has achieved largescale application and obtained authoritative certifications.

As of 2026, the platform has been deployed in more than 4,000 schools nationwide, and the company has served over 10,000 primary and secondary schools in total.

Its core algorithm was filed with the Cyberspace Administration of China in January 2026. In 2024, the platform was selected into the Ministry of Education's Application Cases of Artificial Intelligence Large Models in Educational Scenarios.

Core Achievements: The platform has helped teachers to reduce the time dramatically. It spends less than 10 minutes when grading 90 essays from 8–14 hours , improving efficiency by over 90%.

■ Replicability, Sustainability and Promotion Potential

1-Mature Product and Ecosystem

Heqi Jule has established a mature “4+1+N” AI product system:four core precision teaching products – intelligent scoring, personalized growth portfolios, AI composition teaching, and smart homework; one featured product, Intelligent Learning Companion; plus N sets of customized solutions flexibly adaptable to different regions and school conditions.

2- Diversified Cooperation and Promotion Models

Industrial Cooperation

A strategic partnership has been formed with Guangdong Education Publishing House to jointly launch the Xiyue AI Composition Teaching Platform, exploring an integrated and innovative model of “AI + Publishing”.

Industry-University-Research Collaboration

Together with the School of Chinese Language and Literature at Taiyuan Normal University, we have co-founded the Shanxi Research Center for AI Large Model Empowerment in Chinese Language Education, conducting joint research projects to promote deep integration of AI and teaching research.

Platform Ecosystem

The company has become a product and solution provider for DingTalk Education AI Beidou Initiative, carrying out in-depth cooperation with Alibaba DingTalk Education.

Sustainable Operation

The company possesses full-chain AI capabilities and holds nearly 300 invention patents and software copyrights. The weekly Token consumption of its AI products has exceeded 10 billion.

Global Promotion Potential

Supported by technical pathways including AIGC, visual recognition and machine learning, together with a SaaS-based service model, the platform has the potential for cross-linguistic and cross-cultural adaptation.It provides a proven solution model to address global unequal distribution of educational resources and improve teaching efficiency.

■ Illustration of a Typical Case

Case Name: AI Empowers Regular Composition Teaching— Ding'anli Primary School, Dongcheng District, Beijing

Implementation Time: 2025 (regular application)

Implementation Location: Ding'anli Primary School, Dongcheng District, Beijing, P.R.China

Implementation Scale: The platform has been adopted for regular composition teaching across the school, with in-depth practice of multi-draft polishing especially implemented for Grade 6 students.

Core Achievements: The human-AI collaborative model of “AI grading and feedback → students’ multi-draft revision” has effectively improved students’ writing quality. The students gained the score from 24 to 32 points after multiple rounds of revision guided by the platform. Teachers conduct targeted instruction based on learning analysis data generated by the platform. Using AI-created data charts displayed on the screen, they can easily explain common weaknesses of students. They can take model essays and segment-level grading results as teaching materials to teach precisely and efficiently on the review stage.This practice serves as a vivid model of “AI enabling burden reduction and efficiency improvement in composition teaching” and has been widely promoted as a typical case.

■ **Exhibition Materials**

Fig. 1 Interface Screenshots

Basic Information of the Institution

Founded in 2013, Beijing Heqi Jule Intelligent Technology Co., Ltd. is an AI application technology company dedicated to serving educational institutions. The company is invested and participated by state-owned capital and renowned funds including SDIC Group and Shunwei Capital.

Headquartered in Beijing, it now has 4 major R&D centers and 18 regional business centers across China, covering Hangzhou, Wuhan, Changsha, Shenzhen, Xiamen and other cities.

To date, the company has built a mature "4+1+N" product system:

- 4 core AI precision teaching product lines: intelligent scoring, personalized growth portfolios, AI Essay Teaching, and smart homework;
- 1 featured product line: intelligent learning companion;
- N sets of customized solutions: regional teaching quality inspection, regional teaching quality monitoring and evaluation, AI smart campus, school-based homework, top innovative talent cultivation, regional education large model, and others.

The company is a National High-Tech Enterprise and a Specialized, Sophisticated, Unique and New Enterprise, with nearly 300 invention patents and copyrights, including 25 national invention patents, more than 300 software copyrights, and over 30 other honors and qualifications.

Relying on core technologies such as AIGC, low-code development, visual recognition and machine learning, combined with research capabilities in educational measurement and academic evaluation, the company helps schools to improve teaching method and supports teachers in precision teaching, and provides students with personalized learning tools.

Up to date, Heqi Jule has participated in the construction of six Provincial-level Information Management Platforms in Hainan, Hubei, Gansu, Yunnan, Guizhou and Ningxia Hui Autonomous Region, as well as more than 40 district-level platforms, serving more than 10,000 primary and secondary schools nationwide.

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29. Nanjing PLASO Network Technology Co., Ltd.

AI Empowers Integrated Cloud Service Platform for Education "Research + Lesson Preparation + Teaching"

Solution Introduction

Function Overview

Based on China Mobile's Cloud Intelligent Computing Application Platform, Bosuo Technology has built the "AI Intelligent Teaching and Research Training" application solution and provided SaaS-based software applications. On the basis of the existing hardware equipment of educational institutions or schools, it offers digital lesson preparation and digital teaching and research spaces, and builds the capability of aligning teacher resources with "unified teacher talent pool" and "synchronized teaching and research" for group schools, alliance schools, education communities and ordinary schools. It provides digital teaching spaces and digital resource spaces to establish the capability of sharing teaching resources with "joint classroom teaching" and "resource sharing". It also delivers a management platform to form a management alignment mechanism for coordinated management. Integrating educational AIGC capabilities, it fully realizes school-oriented collaboration, and promotes unified management, coordinated development as well as high-quality and balanced education.The AI Intelligent Research and Training Cloud Platform enables teaching guided by teaching and research in accordance with the requirements of the Ministry of Education. It empowers teaching research, lesson preparation and classroom teaching with AI technology, enhances teachers' AI teaching capabilities, and improves their digital and intelligent literacy. Adopting the cloud-based school model, it promotes the regional balanced allocation of high-quality educational resources, supports the revitalization of county-level high schools and paired assistance programs. In the era of large-scale popularization of artificial intelligence in education, it facilitates the rapid promotion of premium AI teaching and research resources to schools in prefecture-level cities, counties, districts, towns and townships.

Application Scenarios

The AI-powered Smart Training Cloud Platform delivers three core advantages:

- Collaborative Lesson Planning enables teachers to conduct joint instructional design and research;
- Joint Research facilitates peer observation, lesson evaluation, classroom analysis, and evidence-based teaching methodologies;
- Collaborative Instruction supports interactive classroom teaching, teacher-student engagement, multi-teacher collaboration, peer teaching demonstrations, and blended online-offline learning.

The platform enables cross-school and cross-regional joint research initiatives through a unified network. AI-powered intelligent agents enhance teaching preparation, research, and learning processes, while preserving educational resources to build school-specific curricula. It implements a "Cloud School" teaching model integrated with AI literacy courses like Peking University's Basic Education AI Literacy Program, and connects seamlessly to China Mobile's AI Learning Cloud computer terminals for rapid access to national smart education cloud resources. Teaching, research, and learning activities can be conducted through cloud-based software services utilizing the current hardware infrastructure without requiring additional equipment.

Fig. 1

Impact and Case Evidence

Starting from 2025, the Wufeng Education Bureau of Yichang City, Hubei Province, has built the "Wufeng Cloud School" for more than a dozen primary and secondary school education alliances across the entire county. This is the first county and rural version of the "Cloud School" nationwide established as an integrated whole by a county-level education bureau. Relying on the "AI Intelligent Teaching and Research Training" cloud application platform jointly built by Plaso Technology and Hubei Mobile, and under the unified organization and leadership of the county education bureau and the county institute of educational science, the "Wufeng Cloud School" has promoted regular collective lesson preparation, different teaching designs for the same lesson, AI-integrated classrooms, and real-time live classroom observation and evaluation among local education alliances. It realized teaching activities such as "joint research, joint lesson preparation and joint teaching", setting an exemplary practical model for innovative balanced development of high-quality education in the county.

The "Wufeng Cloud School" is fully built on the "AI Intelligent Teaching and Research Training" cloud service platform. It fully leverages the existing hardware facilities in school classrooms without the need for additional hardware equipment. Built directly on the existing classroom hardware with cloud SaaS application software and AI agent educational services, the cloud-based applications can be launched quickly within one hour. The mobile cloud service platform unifies and elevates the teaching and research capabilities across the county. The "AI Intelligent Teaching and Research Training" cloud platform facilitates the delivery of high-quality educational resources to primary and secondary schools in townships and grassroots areas, enabling schools at the county, township and village levels to access excellent teaching resources and content, including integrating artificial intelligence courses into basic education classrooms, thereby advancing equity in basic education.

Basic Information of the Institution

PLASO Network Technology Co., Ltd. (referred to as "PLASO Technology") was founded in 2012, with its headquarters located in Nanjing, an ancient capital of six dynasties. It has branches or offices in multiple cities including Beijing, Shenzhen, Hangzhou and Wuhan to provide customers with efficient and convenient localized services. With years of market business development, the team has accumulated rich practical experience in product development in technologies such as cloud computing, Artificial Intelligence Generated Content (AIGC), rich-media communication, audio and video processing, Canvas Digital Space, AI agents, big data, real-time collaboration, and secure information technology application innovation. For more than a decade, the company has always adhered to the principles of product supremacy and long-termism, upheld the core business philosophy of "customer-centricity, scenario focus, and value creation through excellent products", integrated and innovated the application of the AI Sandbox underlying platform, and successively launched a series of SaaS product solutions including PLASO Cloud Classroom, PLASO Integrated CLASS, and INFI·Thinker. It has successfully served over 120,000 customers in fields such as basic education, higher education, online education, commercial training, and enterprise collaborative office work. The AI intelligent teaching and research training product "AI Smart Research and Training", a three-standardized (standardized, platform-based, application-oriented) artificial intelligence education product developed in cooperation with China Mobile, won the "2025 Best Partner Product Award" in the education industry of China Mobile Group.

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30. Ningbo Shenqi Intelligent Technology Co, Ltd

Huipi Youxue Smart Homework Solution

Solution Introduction

Function Overview

Centered on AI-powered intelligent homework grading, this solution creates a smart teaching closed loop covering the full process of teaching, learning, management and assessment, precisely addressing multi-level pain points in educational scenarios.

It resolves traditional challenges including weak knowledge mastery among students, heavy grading workloads and difficulties in personalized tutoring for teachers, unquantifiable teaching quality for schools, and unclear academic progress and inefficient home-school communication for parents. More importantly, it targets a deep-seated educational dilemma: students' lack of mental motivation leading to "being able to do schoolwork but unwilling to do it".

In response to students'weak emotional regulation, inadequate resilience, and insufficient internal learning drive, as well as the common reality that parents and teachers rely on urging and pressure without scientific tools to activate mental engagement, this solution goes beyond improving teaching efficiency, precise tutoring, home-school collaboration and management empowerment. It further focuses on activating students' learning mental strength, fundamentally reshaping learning initiative and achieving the essential shift from "I am told to learn" to "I want to learn".

Technical Highlights or Innovations

1.Leading technical performance with outstanding multi-dimensional recognition and grading capabilities

Handwritten text and mathematical formula recognition accuracy ≥ 99%, fully covering all subjects for Grades 4–12. End-to-end grading consistency reaches up to 96%, grading time for a single class ≤ 10 minutes, concurrent processing capacity of 5,000 questions per minute, and system availability SLA ≥ 99.9%. Its performance far exceeds similar products, laying a solid technical foundation for efficient homework grading implementation.

2.Multi-engine collaboration for precise dual-dimensional analysis of academic performance and mental engagement

Equipped with four core engines: multimodal input parsing, structured homework recognition, teaching feedback generation, and teaching data modeling. It not only maps knowledge points and models competency dimensions to provide structured data support for precise academic tutoring, but also captures mindset changes through students' learning behavior data, guiding targeted efforts to activate mental engagement.

3.Flexible grading rules for accurate, transparent and mentally supportive scoring
Supports compatibility with multiple solutions, detailed scoring rubrics, customizable rules and refined score allocation. Scoring steps can be broken down and flexible grading rules configured as needed to precisely match scoring requirements for various question types. With low-pressure and highly adaptive scoring, it reduces students' frustration from incorrect answers, achieving both academic evaluation and mental protection.
4.Innovative Educational Memory Operating System
The development of EduMemoOS fills an industry gap. Integrating teachers' grading experience and students' learning trajectories through a memory system, it improves homework grading accuracy and delivers personalized feedback and tutoring at the academic level.
5.Strong implementability and scenario adaptability
Compared with traditional B-end products, it supports 1-hour rapid deployment, requires no special hardware, and features lower usage costs, with a complete teaching closed loop and real-time visual academic feedback. Versus general C-end products, it is deeply embedded in daily teaching workflows, delivering higher user stickiness, more structured academic data, and stronger teaching support capabilities, with significantly better deployment and usage efficiency than similar AI education products.
6.Diversified data-driven value
It enables real-time tracking of teaching data and data-supported decision-making. Additionally, anonymized regional academic data can be monetized, providing professional data and case support for teachers' teaching research and school management.

Application Scenarios

■ **Application Environment and Target Users**

Adaptable Educational Scenarios:

The solution is primarily designed for regular on-campus teaching scenarios in Grades 4–12 of the K12 education stage, focusing on core teaching links such as daily homework grading, intelligent weekly test correction, precise academic performance analysis, and personalized tutoring.
It also supports extended scenarios including home-school-community collaborative education, quantitative management of school teaching quality, coordinated regional education digitalization, and digital campus construction. It can meet the digital education needs of different levels, ranging from daily classroom teaching, whole-school teaching management to balanced development of regional education.

Hardware & Software Environment

Hardware:
No dedicated hardware required. Regular computers and smartphones fully support all functions of the teacher, principal, and parent terminals. For students, the Huixue Tablet is equipped to support dedicated learning operations such as homework submission via photo, error sorting, and AI Q&A. The system features strong device compatibility with no additional upgrades or modifications needed.

Software:
A lightweight multi-terminal product system is deployed, including WeChat Mini Programs (for teachers and parents), PC management systems (for teachers and principals), and a dedicated APP for the Huixue Tablet. The system supports 1-hour rapid deployment without complicated debugging, with a system availability SLA ≥ 99.9%, ensuring stable support for high-frequency, high-volume homework grading and academic analysis.

Target Service Users

End Users:
Students in Grades 4–12, subject teachers, school administrators (principals, academic directors, grade leaders, etc.), and parents.

Institutional Users:
Primary and secondary schools (including junior and senior high schools) nationwide and regional education administrative departments. The solution supports two models: independent implementation in a single school and full-region promotion across multiple schools.

■ **Typical Application Scenarios and Practical Results**

Based on the actual situation of Dongqiao Middle School, two core scenarios are selected to deeply analyze the implementation path and value output of Huipiyouxue.

Scenario 1: AI Intelligent Grading Reshapes Workflows, Freeing Teachers from "Sea of Exercises"

Core Pain Points:
Under the traditional model, teachers spend 1–2 hours per day on mechanical homework grading, leading to delayed academic feedback, rough error cause analysis, and difficulty in providing personalized tutoring.

Implementation Path:

All-Modal Intelligent Recognition:
Teachers only need to take photos or scan assignments. Based on deep semantic understanding and an education large model, the system realizes automatic grading for all subjects and question types. It not only provides instant scoring for objective questions but also step-by-step scoring for subjective questions, accurately identifying multiple-solution problems, complex expressions, and Chinese/English compositions, with a grading accuracy rate exceeding 96%.

Multi-Level Academic Insight:
Reports are generated instantly upon grading. At the macro level, class accuracy rates and completion trends are displayed; at the meso level, weak knowledge point distributions are pinpointed; at the micro level, individual learning trajectories are tracked with risk early warnings.

Automated Resource Accumulation:
The system automatically aggregates common class errors and personalized error notebooks for each student, eliminating the burden of manual copying and providing precise targets for in-class review.

Scenario 2: Data-Driven Teaching Research and Stratified Teaching, Building the "Dongqiao Model"

Core Pain Points:
Traditional "unified instruction" fails to adapt to individual student differences. Teaching research lacks quantitative data support, and teaching improvements are often experience-based rather than evidence-based.

Implementation Path:

- Three-Phase Advancement Strategy

A three-tier mechanism of "teaching application – data research and evaluation – home-school collaboration" is established, implemented in phases: optimization stage, integration stage, and normalization stage, ensuring deep integration of technology and teaching.

- Data-Empowered Teaching Research

Relying on multi-dimensional academic data generated by the system, teaching research leaders organize teachers to conduct in-depth analyses of common error causes and weak knowledge points and discuss targeted teaching strategies, shifting teaching research from "general discussion" to "data-supported practice".

- Precise Stratified Instruction

In class, teachers focus on resolving common errors based on data. After class, differentiated reinforcement exercises are pushed according to individual academic performance, truly realizing "stratified teaching and precise instruction".

- Closed-Loop Feedback Mechanism

Learning reports are synchronized to parents in real time. Parents clearly understand their children's knowledge gaps and progress, and cooperate with teachers to provide targeted at-home tutoring.

Impact and Case Evidence

As an AI-driven education digitalization solution, Huipiyouxue centers on a complete teaching closed loop of grading – analysis – feedback – optimization. Since its implementation at Dongqiao Town Central Junior High School in Haishu District, Ningbo, it has fully leveraged its strengths in full-subject intelligent grading and multi-level academic analysis, effectively resolving pain points in traditional teaching and achieving remarkable implementation results, forming replicable and scalable practical experience. Combined with product capabilities and actual school usage, the effectiveness and cases are elaborated in detail below.

■ **Implementation Effectiveness, Evaluation Data and Practical Experience**

In terms of quantitative evaluation data, the results are significant and measurable:

First, the workload reduction for teachers is outstanding. After implementation, daily homework grading time for teachers at Dongqiao Middle School decreased by an average of more than 2 hours, homework grading efficiency improved by over 80%, and AI grading accuracy remained above 96%, greatly reducing teachers' repetitive workload.

Second, student learning quality improved noticeably. Repetitive practice for students decreased by more than 50%, accuracy in identifying knowledge gaps rose by 75%, targeted in-class learning efficiency increased by 40%, and students' homework quality and learning initiative improved significantly.

Third, school management efficiency increased markedly. Time spent on teaching data statistics decreased by 80%, and the pertinence of teaching research activities rose by 50%. A virtuous cycle of data-driven teaching decision-making has taken shape, driving the transformation of teaching models: from empirical judgment to data-assisted decision-making, from unified instruction to data-driven precise review, and from passive feedback to real-time academic monitoring, thus reconstructing the logic of teaching operation.

The Huipiyouxue solution features strong replicability and sustainability, with broad promotion potential across different regions and educational scenarios.

Replicability

The solution offers universal adaptability:

In terms of hardware, it supports various terminals such as ordinary office computers, tablets and smartphones, enabling multi-terminal synchronization via campus LAN or the Internet without high additional hardware investment.

In terms of software, it adopts a modular design, allowing flexible adjustment of grading standards and academic analysis dimensions in line with regional curricula and teaching models, adapting to junior high, senior high and other school stages without large-scale customized development.

Sustainability

A long-term operation model of product iteration + service support + data accumulation has been built:

At the product level, continuous iteration based on education large models optimizes grading accuracy and in-depth academic analysis to meet the needs of education digitalization.

At the service level, one-on-one on-site guidance and regular technical support are provided to help schools solve various application issues.

At the data level, continuous accumulation of teaching data forms a personalized teaching database, supporting subsequent teaching optimization and product upgrades, achieving a virtuous cycle of application – optimization – improvement.

Promotion Potential

Global demand for education digitalization continues to grow. The solution precisely addresses common pain points such as heavy teacher workload, delayed academic feedback and lack of data support for teaching research. It can help developing countries improve education digitalization and provide technical support for personalized teaching in developed countries. Meanwhile, its lightweight, low-cost and easy-to-implement features enable rapid promotion to various urban and rural schools, especially areas with relatively weak educational resources, helping to achieve balanced educational development and providing a referenceable Chinese model for global education digital transformation.

Basic Information of the Institution

■ **Company Profile**

Ningbo Shenqi Intelligent Technology Co., Ltd., founded in 2025, is an enterprise specializing in AI-powered digital education.

The company has built an education SaaS product matrix covering the whole process of teaching, learning, assessment and evaluation, realizing a complete scenario ecosystem featuring targeted teaching by teachers, personalized learning by students, scientific management by schools, and efficient home-school collaboration.

Based on AI grading technology, it enables automatic marking of assignments across all subjects and question types. Coupled with an academic performance analysis model, it generates reports on knowledge weaknesses at class and individual levels, providing data support for teachers to optimize teaching strategies. Meanwhile, an intelligent dialogue engine creates an AI Q&A channel, combined with personalized practice recommendations and automatic error notebook sorting, helping students improve academic performance efficiently.

At present, its products have served educational channels and institutions in multiple provinces across China. Through standardized product services, customized training support and refined channel management, the company has become an important force driving regional digital transformation in education.

■ **Experience and Qualifications in Digital Education**

Adhering to the core philosophy of “building the enterprise with technology”, the company’s core team brings together senior experts in artificial intelligence, educational technology, enterprise services and other fields with years of industry experience. It boasts profound algorithm research and development capabilities as well as rich practical implementation experience, combining technological innovation with frontline teaching practice to accurately meet actual educational and teaching needs.

The company holds core qualifications including software copyrights. All its educational products have passed authoritative certifications in the education industry, ensuring both compliance and practicality. Its core advantage lies in the deep integration of AI large model technology with primary and secondary school teaching scenarios, creating lightweight, easy-to-implement and highly adaptable digital education solutions. There is no need for schools to extensively restructure their existing teaching systems, significantly lowering implementation barriers and costs.

Successful projects have been deployed nationwide. In addition to the project at Ningbo Dongqiao Middle School, the company’s solutions have been implemented in primary and secondary schools in Henan, Fujian, Hunan, Guangdong and other provinces, serving more than 100,000 teachers and students in total and accumulating rich localized implementation experience.

With high-quality products and professional services, the company has won wide recognition and high praise from partner schools, frontline teachers, students and parents.

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31. Shandong Yiying Intelligent Technology Co., Ltd.

Yiying Intelligence's "AI+Medical Imaging" Immersive Teaching Solution — Innovative Practice of Medical Imaging Talent Cultivation Based on Virtual Simulation and Intelligent Recognition

Solution Introduction

The "AI+Medical Imaging" immersive teaching solution independently developed by Shandong Yiying Intelligent Technology Co., Ltd. is a comprehensive medical imaging education platform that integrates "full-scene virtual simulation, full-process intelligent recognition, and full-dimension skill cultivation." This solution addresses four major pain points commonly encountered in current medical imaging technology teaching: "expensive and inaccessible equipment, dangerous operations that are difficult to practice, hard-to-understand imaging principles, and challenging diagnostic thinking development." By deeply integrating virtual reality (VR), artificial intelligence (AI), and intelligent hardware technologies, it constructs a complete teaching ecosystem that spans from theory to practice, and from anatomy to diagnosis.

Function Overview

1.1 Full-Dimension Knowledge Coverage Teaching System: The solution constructs a closed-loop seven-level competency cultivation system covering: "Equipment Structure Cognition → Imaging Principle Simulation → Performance Testing & Quality Control → Examination Technique Practice → Image Processing & Analysis → Diagnostic Thinking Development → 3D Post-Processing Reconstruction." Through four major virtual simulation systems for MRI/CT/DR equipment structure, performance testing, examination techniques, and imaging principles, it solves the visualization problem of microscopic and abstract knowledge. Furthermore, through the medical image processing, diagnostic thinking development, and 3D reconstruction systems, it bridges the "last mile" from image acquisition to clinical decision-making.

1.2 Immersive Blended Training Environment Combining Virtual and Real Elements: Based on the medical imaging center VR teaching system, the solution creates a 1:1 replica of a real radiology department environment from a tertiary hospital. Combined with Yiying Intelligence XR glasses, MRI/CT/DR teaching devices, Yiying Intelligence simulation mannequins, and other hardware, it builds a hybrid training scenario featuring "virtual roaming + hands-on operation with real equipment."

Students can repeatedly perform equipment operation, positioning exercises, and fault simulation without radiation risk, effectively bridging classroom theory and clinical internship.

1.3 Intelligent Personalized Teaching and Learning Assistance Platform: Relying on the Medical Imaging Smart Teaching Platform and three major professional agents (Equipment Structure, Examination Technique, Diagnostic Thinking), the solution introduces AI companion learning and assisted diagnosis functions. The agents can not only answer students' questions in real time but also analyze students' learning behavior data through the smart teaching platform, providing teachers with precise feedback on learning conditions and enabling personalized instruction.

Fig. 1 Medical Imaging Virtual Simulation Teaching Center

Fig. 2 Yiying Intelligence Simulation Mannequin

Fig. 3 Three Major Professional Agents

■ **Technical Highlights or Innovations**

2.1 High-Fidelity Immersive Training Environment Built with "Digital Twin + XR"

This solution breaks through the limitations of traditional two-dimensional courseware by utilizing high-precision modeling and physics engine technology to create 1:1 digital twins of MRI/CT/DT equipment. The Medical Imaging Center VR Teaching System works in tandem with the Yiying Intelligence XR glasses, not only reproducing the complex internal mechanical structures and electromagnetic field distributions of the equipment, but also supporting multi-user collaborative operation and real-time error correction. Compared to conventional video demonstrations in the industry, this solution allows students to perform disassembly, assembly, and fault diagnosis in a virtual space, visualizing the invisible "black box" processes inside the equipment, thereby significantly lowering the threshold for hands-on practice and reducing trial-and-error costs.

2.2 Multi-Modal AI Agent Cluster Reshaping Personalized Learning Paths

This solution innovatively introduces vertical domain large model technology to build a specialized AI agent cluster comprising "Equipment Structure," "Examination Technique," and "Diagnostic Thinking." Unlike traditional question bank-based exercises, these agents possess contextual understanding and reasoning capabilities. For example, the Medical Imaging Diagnostic Thinking Agent can simulate patient feedback from different cases, guiding students step by step to derive diagnostic conclusions while generating real-time competency profiles.

2.3 "Industry-Academia-Research-Application" Integrated Data Closed-Loop Ecosystem

The Medical Imaging AI Teaching and Research Platform, Medical Image 3D Reconstruction System, and Image Processing Teaching System not only serve fundamental teaching but also support teachers and students in algorithm training and scientific research innovation using real de-identified data. By collecting students' operational data and diagnostic logic from virtual simulations, the platform can optimize AI models in reverse, forming a virtuous cycle of "teaching generates data, data feeds back into teaching." This provides a quantifiable and traceable scientific basis for medical imaging talent cultivation and leads the way in setting industry standards.

AppApplication Scenarios

This solution features high flexibility and adaptability, aiming to build a tripartite digital teaching ecosystem integrating "cloud + terminal + physical" elements. It is widely applicable to multi-level medical education scenarios.

1.1 Adapted Educational Scenarios:

This solution is primarily aimed at higher medical education institutions (undergraduate and graduate programs), secondary and higher vocational colleges (skill-oriented talent cultivation), standardized training bases in affiliated hospitals, and continuing medical education centers. It can serve either as a standalone "Medical Imaging Virtual Simulation Experimental Teaching Center" or be seamlessly integrated into existing smart classrooms or training rooms. It supports various models, including regular classroom teaching, after-school independent training, skills competition intensive training, and scientific research innovation practice.

1.2 Hardware and Software Environment Requirements:

Hardware Layer: Core deployment includes the company's self-developed MRI/CT/DR teaching devices and Yiying Intelligence simulation mannequin as physical interaction terminals; Yiying Intelligence XR glasses are configured for augmented reality experiences; a high-performance graphics workstation cluster needs to be built at the back end to support VR rendering and AI inference, or a private cloud/hybrid cloud deployment can be adopted.

Software Layer: Unified management and control are provided by the Medical Imaging Smart Teaching Platform, which integrates the VR teaching system, the medical imaging virtual simulation teaching system, the AI agent cluster, and the 3D reconstruction engine.

1.3 Service Implementation Subjects:

Student Groups: This includes undergraduate and vocational college students majoring in Medical Imaging Technology, Medical Imaging, Biomedical Engineering, and other related programs, as well as standardized training residents. The solution provides them with a full-cycle growth path from anatomical cognition to complex case diagnosis, particularly addressing the pain points that lower-grade students cannot access large-scale equipment and upper-grade students lack exposure to rare and difficult cases.

Teaching Staff: Serves both clinical instructors and basic course teachers. AI teaching assistants reduce the burden of repetitive guidance, while platform data analytics enable precise understanding of student learning conditions, assisting teachers in carrying out blended teaching reforms and scientific research exploration.

Administrative Institutions: Provides visual teaching quality monitoring dashboards for academic affairs offices, training centers in colleges and universities, as well as science and education departments in hospitals, enabling optimization of training resource allocation and quantifiable assessment of talent cultivation quality.

■ **Typical Application Scenario Examples**

Scenario 1: Shandong University of Medicine (formerly known as Binzhou Medical University) — Innovative Practice of Virtual Simulation Teaching with Deep Integration of Industry-Academia-Research-Application

The Medical Imaging College of Shandong University of Medicine faced the challenge that students had difficulty understanding the complex structures of large-scale imaging equipment. Starting in 2018, the university collaborated with a subsidiary of Yiying Intelligence to establish a virtual simulation teaching center, integrating the MRI/CT equipment structure virtual simulation system and teaching devices into the course "Medical Imaging Equipment Science," achieving a progressive learning model of "virtual disassembly + hands-on operation." The system supports large-scale online experiments, with student satisfaction reaching 96.82% and an experiment pass rate of 96.79%. Leveraging this solution, students won seven first prizes in the virtual simulation category at the 10th "Taishan Cup" National Skills Competition. This collaboration case was recognized as a typical case of the "Double Hundred Plan for School-Enterprise Cooperation" at the 2021 China Higher Education Expo, becoming a benchmark for virtual simulation teaching reform in Shandong Province.

Scenario 2: Yantai Health and Vocational College — Construction of a Full-Scenario Training System Integrating "Post-Course-Competition-Certificate" for a Newly Established Vocational College

As a newly established vocational college in 2024, Yantai Health and Vocational College needed to build a medical imaging training system from scratch. In March 2024, the college purchased over 10 million RMB worth of Yiying Intelligence's full series of solutions, establishing 11 professional training rooms equipped with DR/CT/MRI teaching devices, simulation mannequins, and examination technique virtual simulation systems, achieving full-process coverage from "equipment cognition — examination technique — diagnostic thinking." In January 2026, more than 350 students completed their practical training examination for "X-ray Examination Technology" in a simulated DR training room according to national competition standards, with the assessment integrating operational procedures, humanistic care, and emergency response. In December 2025, the college held its first "Yiying Cup" skills competition, promoting the implementation of the "Post-Course-Competition-Certificate" education model through competition-driven teaching, laying the foundation for cultivating high-quality technical talent for the regional healthcare system.

Outcomes and Case Studies

■ **Implementation Effectiveness, Evaluation Data, or Practical Experience**

- Significant Improvement in Teaching Quality:

Enhanced Theoretical Learning Efficiency: Leveraging virtual simulation technology for the visualization of abstract imaging principles, the pass rate of students in core theoretical courses such as "Principles of Medical Imaging" increased from 82% to 96%, while the excellence rate grew from 15% to 35%.

Standardized Practical Skills: With real-time error correction and evaluation of operational procedures by the "AI agent," the standardization rate of students' practical training operations increased by 40%. In medical imaging skills competitions at the provincial level and above, the award-winning rate of teams trained with this system exceeded 90%, a significant improvement compared to the pre-implementation period.

- Resource Allocation and Cost Optimization:

Breaking the Equipment Investment Bottleneck: The solution successfully addresses the problem of outdated large-scale equipment in institutions. Taking MRI teaching as an example, building a traditional MRI training room requires an investment of approximately 5–10 million RMB, whereas adopting the "MRI teaching device + virtual simulation system" model of this solution costs only 10% of the traditional approach, with near-zero maintenance costs, enabling low-cost, high-frequency practical training.

Enabling "Anytime" Self-Directed Learning: The application of the Medical Imaging Smart Teaching Platform and AI agents breaks the traditional "fixed time and fixed place" limitations of practical training courses. Data shows that the average daily active users of the platform continue to grow, and students' average self-directed study time outside of class has increased by 2.5 hours per week, truly realizing ubiquitous learning.

■ **Replicability, Sustainability, and Promotion Potential**

Replicability: Standardized Product System Supports Rapid Deployment

All software products in this solution adopt a B/S architecture and support public cloud, private cloud, or hybrid cloud deployment, enabling rapid adaptation to the network environments of different institutions. The hardware products feature a modular design that requires no radiation protection renovation, allowing ordinary classrooms to be converted into virtual simulation training environments. The solution covers the entire process from "equipment cognition → examination technique → image processing → diagnostic thinking." It can be either fully procured as a complete system or purchased in modules as needed, meeting the diverse needs of different institutions. The solution has already been adapted to various educational scenarios, including higher medical institutions, vocational colleges, and residency training bases, providing a technical foundation for nationwide and even global promotion.

Sustainability: School-Enterprise Collaboration Builds a Long-Term Operation Mechanism

This solution establishes a sustainable "five-in-one" operation model encompassing teaching, training, competition, research, and teacher development. Through school-enterprise collaboration in curriculum resource development, co-organizing skills competitions, jointly researching teaching reform topics, and co-hosting teacher training sessions, a virtuous cycle is formed. Moreover, relying on the AI teaching and research platform and the four major professional agents, the solution supports continuous updating and iteration of teaching content, ensuring alignment with cutting-edge clinical practices.

Promotion Potential: Serving National Strategies and Global Educational Needs

This solution precisely responds to the strategic deployment of "advancing education digitalization" outlined in the Outline for the Construction of an Education Powerhouse (2024–2035). It effectively addresses the common challenges faced by the medical imaging discipline, namely "high investment, high consumption, high risk" and "difficult implementation, difficult observation, difficult reproduction." With the continuous development of AI+medical imaging technology, the promotion value of this solution in the field of intelligent medical education will further increase.

■ **Typical Case Description**

Case Name: Binzhou Medical University Medical Imaging Virtual Simulation Teaching Platform Construction and Industry-Academia-Research Collaborative Innovation Project

Implementation Period: 2018—Present

Implementation Location: School of Medical Imaging, Binzhou Medical University, Yantai City, Shandong Province

Implementation Scale: Covering approximately 200 students per year from the Medical Imaging and Medical Imaging Technology programs, with a cumulative total of over 1,000 students served. The project includes the construction of MRI/CT/DR teaching devices and a virtual simulation teaching system, covering the entire process modules including equipment structure, performance testing, examination techniques, imaging principles, image processing, and diagnostic thinking.

Core Achievements:

Significant Teaching Outcomes: Student satisfaction with experimental learning reached 96.82%, and the experiment pass rate was 96.79%, demonstrating good online learning outcomes.

Excellent Performance in Academic Competitions: Achieved outstanding results in the First National Medical Imaging Technology Graduate Innovation Skills Competition in 2025; students won 7 first prizes and 6 second prizes in the virtual simulation category at the 10th "Taishan Cup" National Medical Imaging Technology University Student Practical Skills Competition.

Leadership in Teacher Training: A subsidiary of Shandong Yiying Intelligent Technology Co., Ltd., together with Binzhou Medical University, has successively held four sessions of the teacher training conference under the Ministry of Education's Industry-Academia Cooperation Collaborative Education Program, attracting nearly 200 experts and scholars from 70 universities across the country.

Demonstration of Industry-Education Integration: The school-enterprise cooperation model was selected as a typical case of the "Double Hundred Plan for School-Enterprise Cooperation" at the China Higher Education Expo.

Basic Information of the Organization

■ **Organization Profile**

Shandong Yiying Intelligent Technology Co., Ltd., established in 2020, is a high-tech enterprise and a specialized and sophisticated SME. The company focuses on the research and development of "next-generation information technology + medical imaging" and possesses a strong core technical team. It independently develops experimental and practical training products related to medical imaging disciplines, including Medical Imaging Equipment Science, Medical Imaging Examination Technology, Medical Imaging Theory of Imaging, and Medical Imaging Diagnostics. The company aims to continuously support the high-quality development of medical imaging talent through next-generation information technology. In terms of business layout, the company deeply serves the national medical imaging education market, partnering with institutions across Shandong, Inner Mongolia, Liaoning, Xinjiang, Shanxi, and other regions, having served over 80 medical colleges and vocational schools.

■ **Experience or Qualifications in the Field of Digital Education**

Shandong Yiying Intelligent Technology Co., Ltd. holds professional qualifications such as QSE certification and a medical device operating license. It has been recognized as a national "Double-Software Certification" enterprise, a typical case of industry-education integration under the "Higher Education Double Hundred Plan," a "China Good Technology" Class A project, an "Excellent Solution in the Field of Virtual Reality in Shandong Province," a member unit of the "Belt & Road and BRICS Skills Development International Alliance," and a member unit of the China Metrology Association. Among its landmark achievements, the Medical Imaging Education Metaverse Platform won the Shandong Province Virtual Reality Pioneer Typical Case Award.

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32. Chengdu APLUS Technology Co., Ltd.

Intelligent Table Tennis Coaching Solution

Solution Introduction

Function Overview

The core functions include six modules: Intelligent Diagnosis Module, Self-Training Module, Coach Model Training Module, Large Model Interaction Module, Data Recording & Intelligent Analysis Module, and a Standardized Tiered Curriculum System.

It precisely addresses the core pain points of table tennis teaching in primary and secondary schools: scarcity of specialized teachers, difficulty for non-specialist teachers to deliver standardized instruction; the challenge of implementing personalized, tiered teaching in large classes; teaching evaluation relying on subjective experience, lacking scientific, process-oriented data support; and the absence of real-time monitoring and intervention for sports injury risks and training load.

The core value is reflected in: providing highly personalized development for students, balancing skill acquisition with comprehensive quality improvement; empowering and reducing the burden on teachers, promoting upgrades in teaching capabilities and digital literacy; helping schools build distinctive sports brands and fulfill the requirements of educational digital transformation; and offering the industry a replicable smart sports solution to address the common pain point of uneven distribution of sports teaching staff.

Technical Highlights or Innovations

On the technical level, first is the dual-track, unobtrusive motion capture technology, which captures both macro body posture and micro hitting details, solving the traditional problems of movement interference and incomplete data. Second is the exclusive private table tennis model library for youth, which builds refined models based on the physical and mental development characteristics of young people, automatically matching personalized training standards and resolving the core issue of poor adaptability of generic adult models. Third is the full-chain, real-time motion analysis closed-loop technology, enabling millisecond-level identification of motion deviations and real-time correction, breaking through the bottleneck of traditional solutions that can only provide post-session reviews.

In terms of differentiation, unlike the industry's single-point tool products, this solution creates an integrated, full-scenario ecosystem of "Hardware + Algorithms + Curriculum + Coaching + Management." It shifts from the industry's prevalent "fitness testing orientation" to a "teaching-core orientation," deeply focusing on the K12 table tennis teaching track to establish strong scenario adaptability and professional barriers.

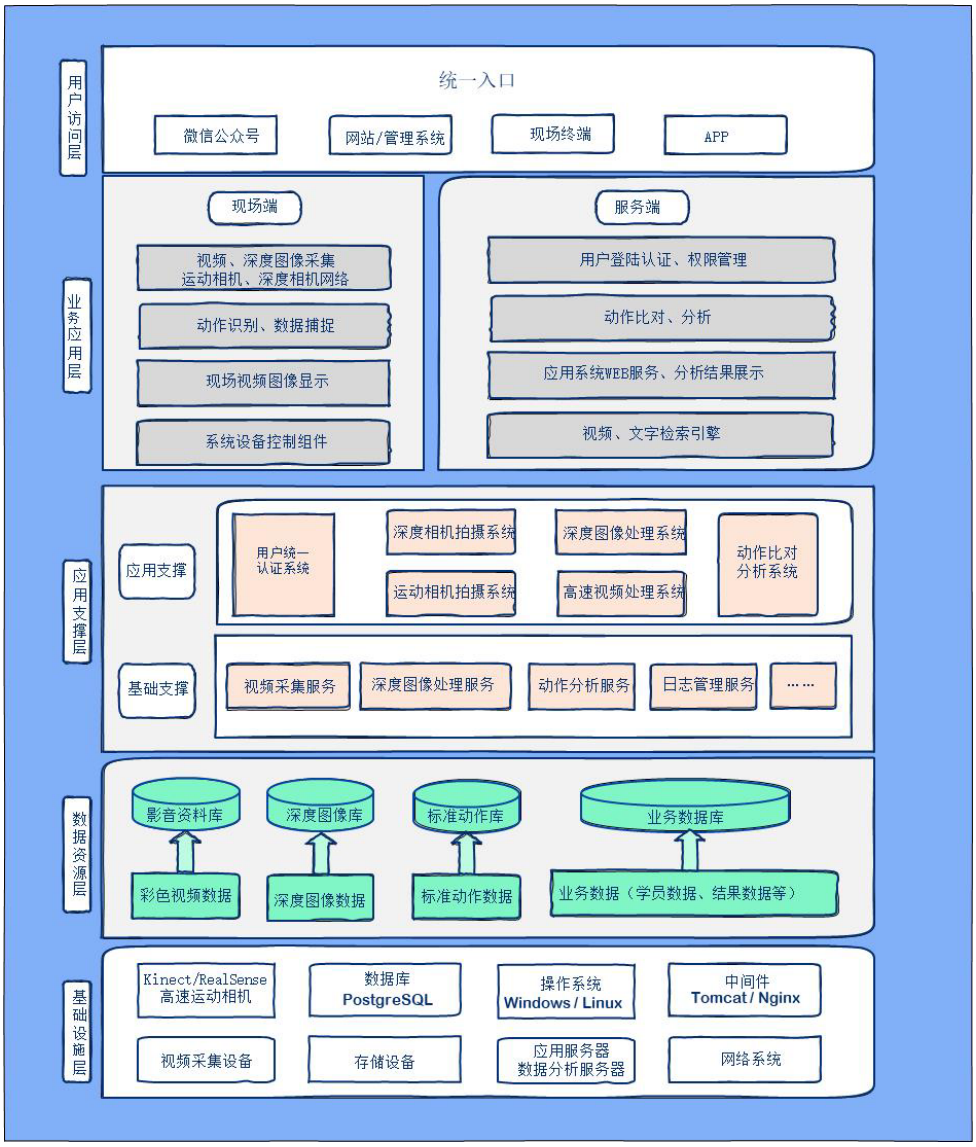

Fig. 1 Product Architecture Diagram

■ **Technical Highlights or Innovations**

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Application Scenarios

■ Application Environment and Target Users

This solution is primarily designed for all types of table tennis teaching scenarios in the K12 education stage, specifically including specialized teaching in national compulsory physical education classes in primary and secondary schools, after-school extended service/enrichment courses, school-based table tennis clubs and professional team training, campus table tennis competitions and grading assessments, standardized teaching at off-campus youth sports training institutions, and smart sports planning by regional education authorities.

On the hardware side, the solution is compatible with existing gymnasiums and table tennis training rooms in primary and secondary schools. It can utilize existing basic facilities like tables, flooring, and barriers, requiring only the deployment of 3D structured light binocular vision capture terminals, data analysis processors, interactive display terminals, intelligent sensor-equipped rackets, and supporting network equipment. No special venue modifications are needed, and a single set of equipment can serve a standard teaching group of 4 people. On the software side, it supports deployment on both Windows and Linux systems, operates on both campus intranets and the public internet, seamlessly integrates with existing school smart campus platforms and unified identity authentication systems, supports multi-terminal access, and fully complies with national educational data security and compliance requirements.

The target users cover K12 students, all physical education teachers in primary and secondary schools (including non-specialists), and specialized table tennis coaches. Partner institutions include public/private primary and secondary schools, off-campus youth sports training organizations, regional education/sports bureaus/information technology departments, and public quality education institutions like youth activity centers.

■ Typical Application Scenarios

Table Tennis Specialty School - UESTC Affiliated Experimental Primary School

UESTC Affiliated Experimental Primary School is a Chengdu municipal table tennis specialty school. Its core philosophy is "Health First," adhering to the mottos "Get Moving, Make Every Life More Brilliant" and "Care for Health, Win with Habits." Its educational goal is "Good Physique, High EQ, Strong Learning Ability," implementing a "one-vote veto" system for health assessments, ensuring three hours of daily physical activity at school, building a "Great Health" curriculum system, and using a "Seven Achievements" evaluation system to make health the primary standard for educational quality.

The school has built two smart table tennis classrooms, one in each of its two campuses. Students quickly improve their skills with the assistance of the AI coach. The school applies this system to both daily teaching and specialty courses.

Event Scenarios - Chengdu Universiade and the 20th National Middle School Students Table Tennis Championships

The 31st FISU World University Games (Chengdu Universiade) was held in Chengdu from July 28 to August 8, 2023. This was the first time a world-class multi-sport event was hosted in Western China, with the slogan "Chengdu Makes Dreams Come True" and the principles of "Green, Smart, Energetic, and Shared."

Our product, as a representative of the Chengdu Science and Technology Bureau's "Technology Empowering the Universiade" initiative, participated throughout the event, providing training assistance to athletes and table tennis enthusiasts.

The 20th China Middle School Students Table Tennis Championships was held at China University of Mining and Technology in Xuzhou, Jiangsu Province, from July 24 to August 2, 2019. Organized by the China School Sports Federation, it is the highest-level table tennis competition for middle school students in China. A total of 92 schools and over 700 athletes participated. Our product served as the technical recording and broadcasting support equipment throughout the competition.

Effectiveness and Case Studies

■ **Implementation Effectiveness**

1) After-School Training Effectiveness at UESTC Affiliated Experimental Primary School

Our company collaborated with UESTC Affiliated Experimental Primary School on a specialized research project titled "Practical Application of Artificial Intelligence in K12 School Physical Education and the Resulting Teaching Methodology Reform." We provided the campus with an AI-powered table tennis "motion capture, analysis, and real-time interaction" intelligent coach. By integrating with the school's actual teaching scenarios, we developed a set of teaching methodologies for physical education courses centered on AI technology. The current pilot has shown significant results.

Research Subjects: Grade 2-3 primary school students.

Research Content: Through planned intelligent teaching applications, we demonstrated the scientific nature of the system-based teaching from aspects such as student psychological acceptance, system recognition, classroom engagement, actual progress, and teacher feedback, and formulated a set of educational methods integrated with the system.

Class Grouping Mechanism: Beginner classes focus on learning fundamental movements, while advanced classes focus on stabilizing and correcting minor movement details to achieve muscle memory and stability.

Training Time: 50 minutes during the extended morning break.

Research Methodology: We comprehensively evaluated students' adaptability to the system and the effectiveness of system-based teaching through student system data (system evaluation data), system training data, video data, teacher feedback, questionnaire responses, comprehension feedback, and surveys on system participation and interest levels.

For the specific knowledge point of left knee bending during the backswing phase, the standard value recorded by the school's Teacher Yuan is 158, with a lower limit of 139 and an upper limit of 168. Student A had a very straight left leg during their first training session, leading to insufficient leg drive and a stiff, weak motion. After two class sessions with four rounds of training, the student gradually brought their motion closer to the standard value, and the system responded with "Very Good."

We tested the forehand drive technique. Compared to traditional methods, children with zero foundation using AI-assisted practice required half the number of hours to achieve the same level of technical proficiency.

2) Effectiveness of Club Classes at Chengdu Shuangliu Tanghu Middle School Experimental School East Campus

Tanghu Middle School Experimental School East Campus introduced the intelligent table tennis trainer, integrating artificial intelligence, depth imaging technology, and professional table tennis techniques to solve the traditional pain points of untimely error correction and lack of data for evaluation. This has established a digital, precise, and personalized table tennis teaching model, laying a solid foundation for the school's "AI + Sports" digital education system and meeting the full spectrum of teaching needs from "zero foundation to advanced teams."

Core Teaching Outcomes

- Standardized Teaching: Unifies movement standards and technical key points, solving issues of inconsistent teacher skill levels and chaotic teaching standards, making foundational teaching more robust.
- Data-Driven Instruction: Real-time collection of data such as ball speed, contact point, and spin, combined with 3D capture and analysis of movement details, transforms teaching from "by feel" to "by data."
- Efficient Classroom: The intelligent ball machine delivers precise and rapid serves, and AI assists throughout the practice for error correction, significantly improving teaching efficiency and learning quality.
- Precise Error Correction: Provides immediate voice corrections during training and uses action replay with slow-motion analysis to pinpoint issues accurately, reducing guidance oversights in the teaching process.
- Scientific Tiering: Students are grouped by skill level to precisely match training content, enabling true tiered teaching that accommodates individual differences.

Fig. 2

The figure above shows a data comparison for one of the club members. The school holds table tennis club classes from Tuesday to Thursday. This particular student had a relatively weak foundation. Through 11 club sessions of intelligent table tennis testing and training, the student's forehand drive skill improved significantly, reducing the number of problematic movements from 8 to just 3 that needed adjustment.

■ **Replicability, Sustainability, and Promotion Potential**

The system supports multi-language versions, offering strong cross-regional replicability. The platform adopts a modular, multi-language adaptable architecture. Without needing to reconstruct core functions, it can be rapidly deployed and promoted in different countries and regions by simply completing language pack configuration and localization adaptation.

As China's national sport, table tennis has a deep-rooted popular base, making the model easy to replicate and promote. Leveraging the culture of the national sport and a mature competition system, along with initiatives like "Ping Pong Diplomacy" and the Belt and Road, the related teaching, training, and operational models can be quickly replicated in various schools, communities, and training institutions with minimal resistance.

The model has knowledge monetization capabilities, and its business model is standardizable and replicable. The model has established a complete system for content production, course conversion, and monetization, with a clear and standardizable profit model that can be rapidly reused in different scenarios to achieve scalable replication and sustainable revenue. The knowledge monetization business model generated by star model dissemination infinitely amplifies the market.

The classroom is also equipped with an intelligent interactive large screen and a voice guidance system. Teachers can use the large screen to view each student's training data in real-time, remotely correct improper movements, or retrieve excellent training cases for centralized explanation. Students can view a comparison of their own movements against standard movements on the screen, independently adjust their training focus, and improve learning efficiency. Meanwhile, the system automatically records each student's training scores and progress trajectory, forming a personal skill growth archive, which facilitates teachers in tracking teaching effectiveness and optimizing teaching plans, and allows students to clearly see their own progress.

Relying on the smart table tennis classroom, the school has integrated table tennis teaching into its regular curriculum, combined with the guarantee of three hours of daily physical activity, ensuring every student can participate. This classroom not only solves the traditional pain points of "imprecise guidance and untimely feedback" in table tennis teaching but also effectively prevents myopia in students through dynamic visual modes, inherits the spirit of the national sport, and strengthens students' physiques. Its mature intelligent configuration and teaching model provide a replicable and promotable template for smart sports construction in primary and secondary schools.

The school has 829 standard table tennis tables and 2 smart table tennis classrooms. The excellent and good rate of student physical health across the school has reached 93.97%, with an excellence rate of 70.93%. The average height of graduating students has increased by 5.52 cm compared to 11 years ago, and their vision is significantly better than the national average for their age group.

■ **Display Materials**

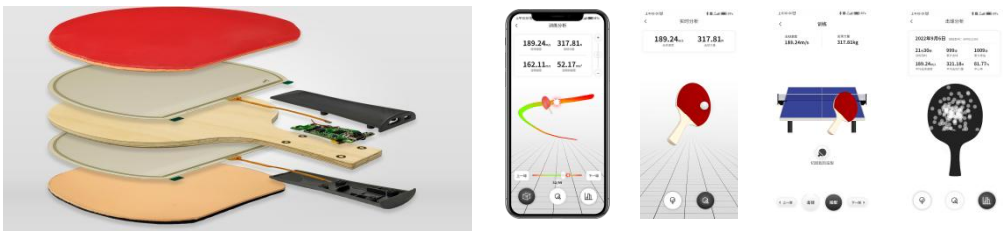

Fig. 29.4 Intelligent Table Tennis Racket

Basic Information of the Institution

Founded in 2011, the company's business focuses on three main areas: Smart Sports, Intelligent Coaching for Sports & Health, and Branded Sports Events. Its primary product direction is intelligent sports and health, using big data and AI technology to pioneer new approaches for traditional sports learning, testing, and training. Particularly in youth sports and health, the company offers comprehensive solutions, including intelligent physical education classrooms, intelligent fitness testing, intelligent physical health management, and personalized youth sports and health enhancement. It has innovatively combined youth physical health with AI sports coaching, contributing to the healthy growth of young people through more efficient, engaging, and personalized technological means. The company's products have been implemented at the Chengdu Universiade, Chengdu Municipal Education Bureau, Ruian City Education Bureau in Wenzhou, Beijing Sport University, Chengdu University of Media and Communications, and UESTC Affiliated Primary School, achieving intelligent coverage of student physical health from kindergarten to university. To date, its products have cumulatively served over 4 million students and have received consistent praise from users at all levels. The company has a well-established R&D team with extensive experience and maintains close collaborations with numerous research institutions, enabling the rapid application of cutting-edge technologies into its products.

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33. Onion Academy

Onion Academy AI-Powered Autonomous Learning Solution

Solution Introduction

Function Overview

In recent years, the rapid evolution of artificial intelligence (AI) has been driving a profound global transformation of educational systems. In China, this trend aligns seamlessly with the national strategy for educational modernization. The AI era demands a new framework for student competencies. Critical thinking, innovation, collaboration, and autonomous learning are replacing rote memorization and exam-oriented skills To become the core objectives of future talent development.

Onion Academy, a flagship enterprise in China's EdTech sector, has been exploring the practical implementation of the "AI-driven autonomous learning" concept since 2013. By deeply embedding AI into both (students') self-directed learning and school-based classroom instruction, Onion Academy has developed a comprehensive "Individual-Classroom" synergistic solution.

To address the common hurdles faced by students in self-directed learning such as difficulty initiating tasks, frequent interruptions, disorganized planning, surface-level thinking, and lack of persistence—Onion Academy innovatively constructed an AI Learning Companion System in 2025, powered by six collaborative intelligent agents:AI Self-Study Master、AI Private Tutor、AI Planning Master、AI Thinking Coach、AI Discipline Partner、AI Emotional Companion.

Building upon individual AI companions, Onion Academy has embedded these tools into daily school routines to cultivate self-directed and inquiry-driven learners while supporting the transformation of teachers' roles.

We aim to transform educational content through technology, provide students with a structured framework for autonomous learning , and develop their ability to learn independently and think critically. Meanwhile, we aim to free teachers from repetitive, low-value knowledge delivery tasks, enabling them to focus on fostering students' character development and creative thinking. This approach enables "large-scale personalized learning" and cultivates future-ready innovators for the AI era.

Technical Highlights or Innovations

Onion Academy innovatively constructed an AI Learning Companion System in 2025, powered by six collaborative intelligent agents:

AI Self-Study Master: Helps students overcome the initial barriers of "what to learn" and "how to learn" by identifying content from uploaded photos of textbooks or notes and recommending adapted resources.

AI Private Tutor: Tracks the learning process in real time, providing heuristic Q&A at cognitive sticking points to ensure smooth progression.
AI Planning Master: Dynamically generates daily schedules based on historical data and individual goals to reduce aimless study and repetitive drilling.
AI Thinking Coach: Focuses on higher-order thinking via Socratic multi-round questioning, guiding students to deconstruct problems and reconstruct thought paths.
AI Discipline Partner: Gamifies repetitive exercises and long-term tasks with achievement incentives to lower the psychological barrier to starting.
AI Emotional Companion: Provides psychological comfort and positive guidance in a warm, equitable manner, ensuring the technology possesses an "educational soul."

Application Scenarios

■ **Application Environment and Implementation Targets**

Onion Academy offers a highly flexible learning platform built on an integrated digital ecosystem(including smartphones, tablets, dedicated learning devices, and smart classrooms). It is designed to support teaching and learning across diverse scenarios, serving K-12 across self-directed learning outside school, everyday classroom learning, and large-scale digital education transformation projects across China.
Target Users:
Learners: Students with diverse academic backgrounds and learning needs who require personalized support and the development of AI literacy.
Educators: Teachers seeking to adopt digital approaches to enable personalized and targeted instruction.
Administrators: Education authorities and school leaders aiming to improve teaching quality and adopt data-driven decision-making.

■ **Examples of Typical Application Scenarios**

In practice, AI helps students identify appropriate learning content through analysis of subject knowledge structures and real-time learning diagnostics. This allows knowledge input to be completed at an individual pace, followed by knowledge output through group discussions and collaborative inquiry.
The AI classroom integrates pedagogical models like Bloom’s Taxonomy and Socratic Questioning, using AI to provide "scaffolding" that guides students from memory and understanding toward analysis, evaluation, and creation.
Relying on real-time feedback from the AI, teachers can dynamically adjust instructional pacing and focus on high-frequency errors. Liberated from repetitive grading, teachers transition from "lecturers" to "learning designers" and "growth coaches."

Impact and Case Evidence

■ **Implementation Results, Evaluation Data or Practical Experience**

With over 130 million student users, 4 million teachers, and more than 500 billion recorded learning interactions, the scale of adoption demonstrates the model's widespread acceptance and effectiveness. These large-scale learning data provide a strong foundation for the continuous improvement and evolution of AI-driven educational models, forming a virtuous cycle of deployment, feedback, and refinement.

■ **Replicability, Sustainability and Promotion Potential:**

The model has been implemented in over 2,000 schools across diverse regions, ranging from leading urban schools to rural and under-resourced areas. Public welfare initiatives have reached more than 4.7 million rural teachers and students, significantly expanding access to high-quality digital learning resources and teacher development opportunities.

Onion Academy leverages AI to address traditional limitations in teacher capacity, enabling personalized learning at scale. Through real-time learning diagnostics and adaptive learning pathways, each student progresses at an individual pace while teachers are freed from repetitive instructional tasks and able to focus on higher-value activities such as learning design and personalized guidance.

■ **Illustration of a Typical Case**

Yueyang No. 20 Middle School is a representative example of how an underperforming school can achieve a transformative turnaround through digital innovation.

Founded in 2022, the school faced three major challenges: a lack of high-achieving student intake, limited teaching expertise, and no prior experience to build on. Among its first cohort, only 18% of students achieved high performance in mathematics, far below the 46% average of leading urban schools. Traditional teaching approaches were insufficient to close such a significant gap in a short time, prompting the school to pursue accelerated transformation through digital innovation.

By the end of 2023, the school partnered with Onion Academy to implement its AI classroom solution across all subjects, the entire learning process, and multiple learning scenarios. By integrating AI into pre-class preparation, in-class instruction, and after-school self-study, the school developed an AI-supported "learning-before-teaching" classroom model.

Using the Onion Academy platform, students engage in autonomous learning, group collaboration, interactive communication, and classroom presentations. Teachers, meanwhile, step away from the front of the classroom and move among students, monitoring each student's learning progress and providing timely and targeted guidance at key moments. Process-based assessment data has become a reliable "guide" for teachers, enabling them to quickly identify which students struggle with logical reasoning and which excel in planning and organization.

After school, students can engage in advanced enrichment or receive remedial support, ensuring that learners of all levels receive appropriately tailored practice and reinforcement. Before exams, teachers develop tiered revision plans based on student learning data, creating a comprehensive, school-based learning plan covering new learning, review, and exam preparation.

Through the extensive implementation of Onion Academy's AI-powered autonomous learning solution, the school achieved a significant breakthrough in the 2025 Zhongkao (Senior High School Entrance Examination): the school produced the city's top overall scorer, and the proportion of high-achieving students in mathematics rose from 18% to 60%, surpassing several traditionally strong schools.

Basic Information of the Institution

■ **Institution Introduction**

Founded in 2013, Onion Academy is a leading Chinese EdTech company specializing in AI-powered learning. The company is committed to translating next-generation information technologies into educational applications, with a focus on developing advanced learning models, algorithms, and digital content. It has launched a range of industry-leading hardware and software products, including AI study companions, smart learning devices, and AI classroom solutions. These solutions are designed to meet the diverse needs of learners, educators, and administrators, using technology to support high-quality and equitable education development.

Onion Academy has served over 130 million students and more than 4 million teachers, with a presence in over 130 countries, including China, the United States, Canada, Japan, South Korea, Singapore, France, the United Kingdom, and Australia.It has supported more than 2,000 schools in jointly developing AI-enabled classrooms, and has supported over 4.7 million teachers and students in rural areas through public service initiatives.

■ **Experience or Qualifications in the Field of Digital Education**

Onion Academy has been recognized as an Outstanding Smart Education Case by the Ministry of Education for four consecutive years. It has also been recognized by the China Development Research Foundation as an Outstanding Case in Digital Education and Educational Equity, and as an Outstanding Case in motivation and capacity building for poverty alleviation by the State Council Leading Group Office of Poverty Alleviation and Development and People's Daily. Additionally, it was among the first to receive certification under the Ministry of Education's 2024 Digital Campus Comprehensive Solutions initiative, and has been included as a representative case of digital innovation by Peking University's Guanghua School of Management.

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34. YBC (Beijing) Technology Co., Ltd.

"Yuanchuang Future" Artificial Intelligence Education Platform

Solution Introduction

Function Overview

The YuanChuang Future AI Education Platform is a comprehensive AI teaching solution for K-12 education (grades 1-9), featuring dual interfaces for teachers and students. The teacher platform provides digital support for the full teaching workflow: lesson planning → instruction → hands-on practice → assessment → administration. The student interface focuses on classroom learning and hands-on activities, centered around three key scenarios: classroom teaching → practice exercises → creative projects. The platform's login page allows seamless role switching between "Teacher" and "Student" labels. Users can select their preferred role and enter corresponding account credentials to access different perspectives.

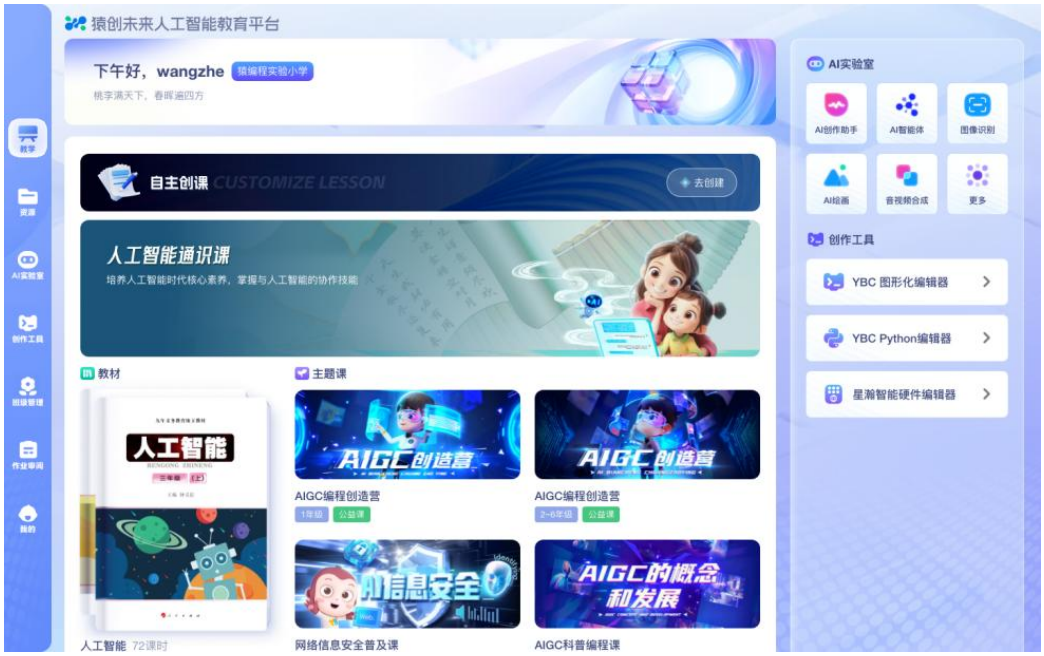

Fig. 1 Teaching homepage module

Self-created course area: Teachers can create courses independently with a quick "Create" entry.
Course Catalog Section: The platform offers the following courses:

Course title	Type	Grade range	Class hour
Artificial Intelligence General Course	Textbook Course	Grades 1–9	36 class hours
AIGC Programming Creation Camp	Themed Lesson	Grade 1 / Grades 2–6	4 class hours
AIGC Science Programming Course	Public Welfare Class	Grades 3 to 6	—
Online Information Security Introduction Course	Public Welfare Class	Grades 1–6	—

Table 1

Shortcut panel area (right):
AI Lab Entrance: AI Creative Assistant, AI Agent, Image Recognition, AI Painting, Audio-Video Synthesis
Creation tool entry: YBC Graphical Editor, YBC Python Editor, Xinghan Smart Hardware Editor
The platform offers a structured digital teaching resource library, featuring a tree-like directory on the left (organized by textbook grade/semester, general education courses, open classes, etc.) and a resource list on the right. It supports multi-dimensional filtering by purpose (teachers/students), teaching phases (introduction/demonstration/explanation/discussion/practice), and file types (images/videos/interactive lessons/presentations/graphical building blocks/Mix hardware code/Mind map). Each resource provides three actions: preview, add to lesson plans, and download.

Application scenario description

The YuanChuang Future AI Education Platform specializes in promoting AI and programming education for K-12 students. Leveraging its comprehensive features and adaptability to diverse educational scenarios, it provides teachers and students with systematic, end-to-end instructional support to facilitate the effective implementation of K-12 AI literacy education. The following sections elaborate on two key aspects: application environments and target audiences, along with illustrative case studies of typical implementations.

Application Environment and Implementation Targets

In terms of application environments, the platform is designed to accommodate diverse educational scenarios across K12 stages, including daily classroom instruction in public/private K-12 schools , after-school services programs, science and technology club activities, AI science popularization practices, and regional balanced education development programs. It enables integrated online-offline teaching that balances centralized classroom instruction with student-led practical learning. Regarding software and hardware configurations, the platform supports mainstream operating systems and meets standard teaching equipment requirements, with recommended browsers for optimal user experience. It is compatible with hardware such as Xinghan Intelligent Hardware Editor and various practical devices, while supporting campus LANs and broadband networks to ensure seamless teaching operations. Mobile devices can be utilized as supplementary tools.

The program targets diverse groups: Student participants range from first-grade elementary school students to ninth-grade junior high students, catering to varying cognitive levels and learning needs across age groups. Teacher participants include information technology educators, general technology instructors, and science innovation club mentors in K-12 schools, empowering them to deliver effective AI education. Educational institutions involved encompass public schools, private educational organizations, regional education authorities, and AI education practice bases, addressing multifaceted demands such as large-scale instruction, personalized tutoring, and regional educational equity development.

■ **Typical Application Scenario Examples**

Scenario 1: Regional AI Education Equity Initiative Implementation. Addressing disparities in AI educational resources between urban and rural areas and insufficient AI teaching competencies among front-line grassroots educators, the platform adopts a regional strategy of "science literacy empowerment and pedagogical support" to achieve comprehensive coverage. For front-line teachers, the platform leverages its rich resource ecosystem to provide grade-specific standardized course materials, instructional designs, and instructional videos, complemented by tiered programming tool training programs to help educators rapidly master AI and programming pedagogical techniques.

In the teaching process, leveraging the platform's integrated hardware-software advantages, front-line grassroots schools are equipped with Xinghan Smart Hardware Kits that enable students to create various smart devices, extending programming learning from digital interfaces to tangible experiences. Through a complete teaching cycle, educators can efficiently prepare lessons and deliver instruction, while students complete practical projects in AI laboratories. Teachers conduct online assignment reviews and classroom management, ensuring systematic educational progression. The platform's dual-device separation design safeguards students' safe use of AIGC tools, with diversified question formats catering to practice needs across different grade levels. This initiative supports regional development of a county-level AI education ecosystem integrating "curriculum + faculty + practice," fostering balanced urban-rural educational development.

Scenario 2: AI and Subject Integration Teaching Practices in K-12 Education. Addressing urban K-12 schools' innovative AI education needs, this initiative focuses on deep integration of AI with academic disciplines. Implementation strategies include: integrating the platform into daily lessons and STEM clubs for younger students through AI-powered tools like digital painting and song generation to cultivate AI literacy interest; introducing data-driven thinking and algorithm instruction for middle grades with interactive exercises and flowcharts to solidify foundational knowledge; and empowering senior students with model training and Python programming capabilities for technical practice and solution design.

Teachers can effortlessly link lesson preparation resources through the platform, delivering instruction via full-screen teaching features. By leveraging students' inclination for hands-on learning, they distribute AI-generated classroom exercises to guide creative projects under teacher supervision. Capitalizing on integrated hardware-software advantages, the platform facilitates interdisciplinary STEAM activities where students design smart devices combining subject knowledge, achieving deep AI integration across disciplines. Its systematic curriculum and diverse practical approaches significantly enhance students' AI literacy and innovation capabilities, providing replicable and scalable models for AI education innovation in K-12 schools.

Outcomes and Case Studies

■ Implementation Outcomes, Evaluation Data, and Practical Experience

During the pilot phase, the platform provided services to multiple primary and secondary schools, covering thousands of teachers and students, and developed practical teaching experiences that are implementable and verifiable.

In terms of practical outcomes, the platform's systematic curriculum framework effectively addresses the pain points of K-12 AI education characterized by "lack of structure and clear pathways." Its tiered programming tools are tailored to students of different age groups, significantly lowering the entry barrier for AI and programming education. The integrated software-hardware teaching model enables students to transition from theoretical learning to hands-on practice, markedly enhancing their practical skills and innovative thinking. Field experience demonstrates that the platform's end-to-end closed-loop instructional design seamlessly connects five key stages: lesson preparation, teaching delivery, practical application, evaluation, and management, thereby reducing teachers 'instructional workload. Meanwhile, the dual-device separation design and controlled AIGC experience strategies ensure students' safe and standardized use of tools, providing a secure and efficient solution for implementing AI education.

■ Replicability, Sustainability, and Promotion Potential

In terms of replicability, the platform adapts to K-12 education scenarios across global countries and regions without requiring extensive software/hardware modifications. It supports multilingual compatibility and educational system integration, allowing flexible adjustments to curriculum content, exercise formats, and resource allocation based on regional educational objectives and syllabi. Whether for urban premium schools, rural institutions, or organizations adopting diverse educational models, the platform enables rapid deployment without requiring full technical support teams, featuring low replication costs and high implementation efficiency.

In terms of sustainability, the platform adopts a long-term operational model integrating "resource renewal + faculty training + technological iteration." It regularly updates course materials and AI tools while aligning with the latest educational policies and technological advancements. The platform establishes an online teacher training system to continuously enhance educators' instructional capabilities and maintains a technical operations team to promptly address various teaching needs, ensuring stable platform performance. Additionally, leveraging teaching data feedback, the platform continuously optimizes functional design, creating a virtuous cycle of "teaching practice → data feedback → iterative upgrades."

In terms of promotion potential, the global demand for K12 AI education is growing steadily. The platform's AI tools, curriculum systems, and teaching models cater to diverse educational needs across countries and regions. It not only promotes balanced regional education development and supports school AI innovation but also serves after-school programs and STEM clubs, demonstrating significant outreach value. This model can be progressively expanded to multiple global regions and educational scenarios of various types.

Basic Company Information

Founded in 2012 with its headquarters in Beijing, Yuanli Technology Co., Ltd. is an education technology company driven by artificial intelligence. Upholding the mission of "Technology empowering everyone to access better education," the company operates multiple service brands including YBC (Beijing) Technology, Zebra, XiaoYuan Learning Machine, and Checkmath. In recent years, Yuanli Technology Group has been honored with prestigious titles such as "Beijing Municipal Advanced Party Organization for Dual Strengths and Six Excellences," "Beijing Municipal Advanced Collective for Poverty Alleviation Collaboration," "Beijing Municipal Advanced Collective for Entrepreneurship and Employment," and "Beijing Municipal Model Labor Collective."

YBC (Beijing) Technology, established in 2017 as a core business unit of Yuanli Technology, is an online education brand dedicated to artificial intelligence education. Focusing on future technologies and AI education, it aims to nurture tech-savvy youth for the AI era.

YBC (Beijing) Technology established the "Children's Programming Research Institute" and has successively carried out comprehensive cooperation with research institutions such as Tsinghua University, Beijing Normal University, Chinese Academy of Educational Sciences (CAES), and China Association for Educational Technology (CAET). It continuously conducts relevant research topics and theoretical studies in the fields of artificial intelligence education and children's programming, exploring and improving industry standards and curriculum standards.

YBC (Beijing) Technology has built an educational curriculum resource system covering seven major fields—including smart hardware, game algorithms, applications, data analysis, internet applications, advanced algorithms, and artificial intelligence—by leveraging over 500 million cumulative deep learning data points. The company launched China's first "Computational Thinking" and "Future Technology Literacy" courses, serving more than 8 million students to date.

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35. Qilin Software Co., Ltd.

An Information Technology Teaching Application Solution Based on the Galaxy Kylin Operating System

Solution Introduction

Function Overview

The information technology teaching application solution based on the Galaxy Kylin Operating System leverages a full-stack, secure, and reliable underlying environment built upon the Galaxy Kylin desktop operating system and full-architecture chips. Grounded in practical information technology teaching, it demonstrates its feasibility and stability through applications in scenarios such as implementing new curriculum standards, supporting computer-based assessments for academic proficiency across all stages of general education, fostering innovation in educational competitions, and ensuring robust security management. This solution represents a exemplary and innovative practice in the field of educational information technology applications.

Technical Highlights

- Adopting a full-stack Kirin system approach covering desktop OS, terminals, and CPUs ensures a secure and reliable supply chain with no risk of supply disruption;
- Comprehensive compatibility with teaching applications across all technological environments enables stable operation of essential software for teaching and office work, programming development tools, data analysis environments, and artificial intelligence tools;
- Through machine-generated master disk images for lab sessions via the teacher management interface and one-click simultaneous translation installation technology, lab teaching efficiency is enhanced by over 50%;
- Overcoming the technical barrier of lost system activation status after simultaneous translation in IT lab environments, significantly improving lab management standards;
- Integrating independently controllable technologies into AI introductory cases and application component adaptation examples to foster innovative talent development;
- Providing a replicable model for other similar educational institutions.

Application Scenarios

I. Core Teaching Scenarios:

Data and Computing Scenarios: Python Programming Teaching and Data Analysis Activity: Students write Python code using pre-installed IDEs such as IDLE, VSCode, or Thony, learning from basic syntax (variables, loops) to complex data structures (lists, dictionaries).

Application: Using the built-in Python 3.8 interpreter in the Kylin system and libraries like pandas and matplotlib, students clean, analyze, and visualize data exported from WPS Sheets. This replaces the traditional Excel+Python approach on Windows.

Information Systems and Society Scenarios: Understanding Operating Systems and Network Management Activity: Students no longer merely learn graphical operations in Windows but use the Galaxy Kylin terminal to master basic Linux shell commands (e.g., ls, cd, grep), understanding file permissions, user management, and process control.

Introduction to Artificial Intelligence Scenarios: AI Algorithm Experience and Simple Project Practice Activity: Configure the scikit-learn machine learning library in Python on Galaxy Kylin to conduct simple classification and regression experiments.

Application: Experience leading domestic AI frameworks such as Baidu's PaddlePaddle or Huawei's MindSpore through introductory cases, gaining insight into the development of AI technology.

II. Standardized Assessment Scenarios Daily In-Class Quizzes and Homework Submission Activity: Teachers distribute exercise files (Python fill-in-the-blank questions and data processing tasks) to all students via the Polar Coordinate Electronic Classroom software. Application: After completing tasks locally, students submit homework files (.py,.wps, etc.) to the teacher's computer through the Polar Coordinate Electronic Classroom. The entire process is completed in a closed-loop hardware-software environment.

Activity: This is a mandatory requirement scenario. A dedicated examination system compatible with the Galaxy Kylin platform is deployed in the backend.

Application: Candidates log into the examination client on their terminals; the system automatically verifies their environment, runs test questions (programming and operational tasks) in a sandbox environment, and encrypts answer data before uploading it to the server, ensuring exam security, fairness, and operational control.

III. Comprehensive Practice and Innovation Scenarios Project-Based Learning Activity: Students collaborate in groups on projects such as "Campus Public Opinion Analysis Using Python Web Scrapers."

Application: Students use Python libraries like requests and beautifulsoup4 on the Galaxy Kylin platform to scrape data, employ jieba and wordcloud tools for Chinese word segmentation and term cloud generation, and ultimately produce project reports using WPS. The entire process utilizes the foundational platform.

Club Activities and Competition Preparation Activity: Informatics Olympiads and programming club activities.

Application: Students utilize the stable and efficient VS Code on the Galaxy Kylin platform for algorithm training and code debugging, demonstrating that domestic platforms can effectively support high-intensity academic competitions.

Impact and Case Evidence

Implementation Feedback:

- Functional Features: Comprehensive Teaching Coverage: The solution comes pre-installed with a complete suite of teaching software covering IT curriculum standards (e.g., Python programming, data structures, networking fundamentals, databases, and introductory artificial intelligence).
- Performance Features: Low System Resource Consumption: The Galaxy Kylin kernel is deeply optimized for domestic hardware, resulting in minimal system overhead.
- Usability Features User-friendly interface: Features a Windows-like UI design that reduces learning difficulty for both teachers and students.
- Completeness Features Out-of-the-box teaching environment: Provides a complete system image containing the operating system, drivers, teaching software, and management tools without complex configuration.
- Portability Features Hardware platform compatibility: Supports multiple CPU architectures (e.g., ARM, Loongarch, C86).
- Reliability Features System Stability: Built on a stable Linux kernel, ensuring long-term fault-free operation.
- Scalability Features: Flexible software installation: New educational software can be easily installed via a graphical package manager or command-line tools (apt/dpkg).

Basic Information of the Institution

Qilin Software Co., Ltd. is a technology enterprise under China Electronics Information Industry Group Corporation (CEC). With secure and trustworthy operating system technology at its core, Qilin Software develops innovative and secure operating system products for both general and specialized applications. The company has established a product portfolio featuring desktop and server operating systems, achieving the highest security standards in China. The Qilin operating system fully supports mainstream domestic CPUs such as Phytium, Kunpeng, and Loongson. Its products are widely deployed across key industries including education, government affairs, finance, transportation, telecommunications, and energy, serving users across all central ministries, government agencies, and municipal party committees. Qilin Software boasts leading advantages in system security, stability, user-friendliness, and overall performance. According to CCID Consulting, Qilin Software has held the top market share in China's Linux operating system market for 14 consecutive years (2011–2024).

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36. References-AI Technology (Beijing) Co., Ltd.

Ref-AI Empowered Integrated Solution for "Three Futures" Education

Solution Introduction

Function Overview

This solution is centered on the integration of artificial intelligence and data interoperability, guided by the principles of layered implementation, organic integration, and coordinated empowerment. It establishes a “1+4+3+1” integrated framework—comprising one core technological foundation, four unified application systems, three layers of differentiated scenario implementation, and one comprehensive data governance and assurance system.

The framework is designed to address three persistent challenges in traditional education systems: fragmented application scenarios, data silos, and isolated “application stacks.” By doing so, it enables a closed-loop integration across the entire educational process—spanning teaching, learning, management, and evaluation.

Ultimately, the solution facilitates seamless alignment between classroom instruction, self-directed learning, and school management, driving the deep integration and coordinated development of the “Future School,” “Future Class,” and “Future Learning Center.”

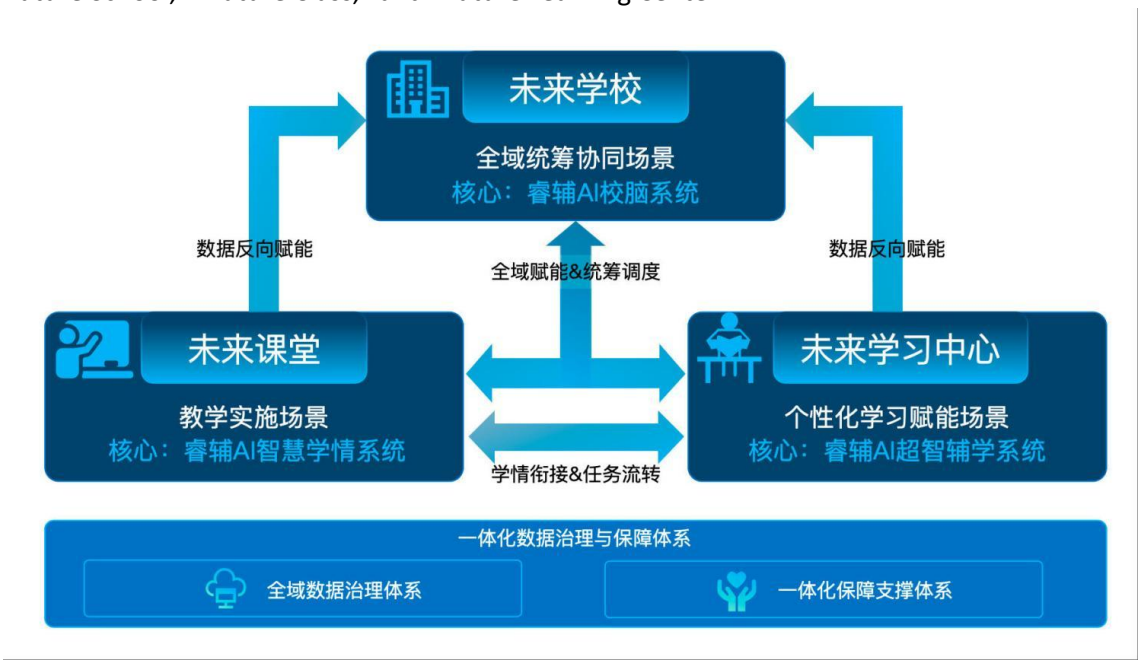

Fig. 1 “Three-Future” Ecosystem Structure Diagram

“三未来”教育载体的共性与差异性提炼 “未来学校”、“未来课堂”、“未来学习中心”			
核心共性			
统一的技术内核	均以人工智能为核心驱动，依托计算机视觉、自然语言处理、知识图谱、自适应算法、大数据分析等AI技术，搭配云边端算力、5G/WiFi6物联网、智能终端硬件形成技术支撑体系，贯穿教育教学全流程。		
一致的核心理念	坚守以学生为中心的教育本质，聚焦个性化、精准化、智能化教育升级，打破传统教育同质化局限，实现因材施教；同时遵循教育数据安全、未成年人隐私保护、AI育人伦理的统一规范。		
数据闭环相通	3.均构建“数据采集-处理分析-建模应用-安全管控”的全链条数据体系，以学情、教情、管理数据为核心，实现数据驱动教学优化、管理提质、服务升级，数据标准与安全要求高度统一。		
目标导向相同	4.依托AI技术解放教师重复性劳作，提升学生学习自主性与学习效能，推动教育模式从“被动灌输”向“主动探究”、从“经验判断”向“数据决策”转型，助力教育高质量发展。		
核心差异化			
对比维度	**未来学校**	**未来课堂**	**未来学习中心**
载体定位	全域教育生态总载体，学校整体智能化综合体	核心教学实施单元，教与学的主阵地	泛在学习专属空间，个性化学习赋能载体
覆盖范围	全校全域，涵盖教学、管理、德育、后勤、家校社协同	仅限课堂教学场景，聚焦课内40/45分钟教与学互动	突破课堂边界，覆盖课内外、校内外自主/协作/探究学习
核心职能	统筹学校整体运营、管理决策、资源调度、生态构建	聚焦学科教学、师生互动、当堂测评、课堂评价	专注个性化学习支持、探究实践、素养提升、自主学习服务
服务对象	全校师生、管理者、家长及校外协同主体	授课教师、本班学生	全体学生、研学小组、自主学习者
核心侧重	宏观管理、全域协同、整体办学效能提升	中观教学实施、当堂精准教学、课堂效率优化	微观个性化学习、自主探究、素养培育、学习闭环落地

Fig. 2 Commonalities and Differentiation of the “Three-Future” Framework

■ Technical Highlights and Innovations

The “1+4+3+1” integrated framework proposed in this solution innovatively establishes a new paradigm for smart education characterized by system-wide coordination, layered empowerment, and data-intelligence-driven transformation.

By holistically coordinating technology, infrastructure, teaching capacity, and content resources, the framework significantly improves resource allocation efficiency and reduces redundant construction costs. Leveraging data-driven learning analytics and personalized recommendation mechanisms, it enables differentiated empowerment across multiple layers—including system-level instructional planning, classroom implementation, and self-directed learning—thereby supporting both holistic and individualized student development and effectively advancing the principle of personalized education.

At the same time, through end-to-end data integration and intelligent processing, the framework drives a shift in educational management from experience-based judgment to evidence-based decision-making. This transformation continuously enhances the systematic coherence, precision, and modernization of education governance.

Unique Value Across Four Dimensions:

① Pioneering a “Three-Layer Integrated” Elastic Technology Foundation, Enabling a Paradigm Shift from System Integration to Native Fusion

Unlike traditional education informatization projects that rely on loosely connecting isolated systems from different vendors, this solution fundamentally reconstructs the underlying architecture. Its unified AI core foundation deeply integrates general-purpose capabilities—such as computer vision, natural language processing, and generative AI—with domain-specific educational models, including knowledge graphs and learning analytics, forming a dedicated “education intelligence engine.”

More importantly, through a "fusion middle platform layer," core capabilities are modularized, standardized, and shared as reusable services. This allows key functions in teaching, learning, and management to be flexibly orchestrated and invoked on demand across the "Future School," "Future Class," and "Future Learning Center." This "Lego-like" modular architecture ensures rapid development and agile deployment of new features and scenarios, fundamentally eliminating data fragmentation and functional silos, and providing a sustainable, evolution-ready technical foundation for education.

② Building a Fully Integrated Application Ecosystem Across Teaching, Learning, Management, Evaluation, and Research to Close the Data Value Loop

A persistent industry challenge lies in the fragmentation of data across teaching, learning, administration, assessment, and research systems, preventing meaningful synergy. Rather than a simple aggregation of functions, the four unified application systems in this solution are built upon standardized data models and coherent workflow design, enabling seamless data capture and natural data flow across all scenarios.

This creates a comprehensive loop—where learning is central, teaching provides guidance, management offers support, and evaluation serves as evidence—transforming AI from a supportive tool into the "neural network" of the education ecosystem. As a result, the solution enables truly data-driven personalized learning at scale and supports evidence-based educational decision-making.

③ Introducing a Layered, Scenario-Driven Implementation Path to Ensure Precise Alignment Between Technology and Core Educational Needs

Rejecting a one-size-fits-all deployment approach, the solution introduces a differentiated implementation strategy based on the distinct functional roles and technological requirements of the "Future School," "Future Class," and "Future Learning Center."

The Future School focuses on system-level coordination, leveraging the School Brain AI System to enable intelligent resource allocation and strategic decision-making. The Future Class emphasizes instructional efficiency, utilizing the Intelligent Learning Analytics System to deliver precise, interactive, and adaptive teaching. The Future Learning Center prioritizes personalization, with the Super-Intelligent Learning Support System providing immersive and adaptive learning experiences.

This layered design ensures both top-level coherence and grassroots flexibility, allowing technology to be deeply embedded in authentic teaching practices while respecting institutional diversity and pedagogical autonomy.

④ Establishing an Integrated Governance Framework Centered on Security, Compliance, and Ecosystem Openness to Ensure Sustainable Development

In response to stringent requirements for data security and privacy protection in education, this solution embeds governance and security mechanisms directly into its core architecture, rather than treating them as afterthoughts. Its integrated data governance system ensures end-to-end protection and compliance across the entire data lifecycle—from collection and standardization to application and security—particularly through encryption and anonymization of minors' data.

In parallel, the integrated support system emphasizes capacity building and ecosystem co-development. Through open APIs and developer platforms, the solution fosters collaboration with content providers, hardware partners, and service ecosystems, enriching its application landscape.

This “technology + governance + talent + ecosystem” model ensures not only effective deployment but also long-term sustainability and scalability, forming a replicable and extensible operational paradigm.

Application Scenarios

■ **Application Environment and Implementation Scope**

This solution is specifically designed for schools and educational institutions committed to advancing digital transformation in education. It is deeply aligned with three core smart education scenarios: the “Future School,” the “Future Class,” and the “Future Learning Center.” The hardware and software environment configuration is as follows:

Future School: This scenario is dedicated to building a “system-wide coordinated operational environment.” Its core software component is the Ref-AI School Brain System, which is responsible for unified management and decision support across campus-wide data domains, including school-level data governance, campus safety, resource allocation, and academic administration.

Future Class: This scenario focuses on classroom-based teaching and learning implementation. Students are equipped by default with smart pens and smart notebooks, without the need for additional learning devices. Teachers conduct instruction directly through existing interactive displays or smart whiteboards, running the Intelligent Learning Analytics System. Data generated from students’ classroom activities—such as handwritten notes captured via smart pens—is seamlessly collected through AP routers and a cloud–edge collaborative computing platform, enabling unobtrusive data acquisition and real-time AI-driven analysis. This supports interactive teaching and precise learning feedback in a natural classroom environment.

Future Learning Center: This scenario is designed to create an immersive, personalized learning space. The learning device serves as the core hardware, supplemented by smart pens and smart notebooks. On the software side, the Super-Intelligent Learning Support System provides comprehensive, scenario-based personalized learning support and intelligent tutoring services across the entire learning process.

The solution serves a diverse range of stakeholders within the education ecosystem:

- Core users: students and teachers. Students benefit from personalized, adaptive learning pathways and support systems, while teachers are empowered by intelligent teaching tools that reduce workload and enable precision instruction.
- Key decision-makers: school administrators (such as principals and academic directors). The solution provides data-driven decision support through intelligent management systems, enabling refined and system-wide school governance.
- Collaborative participants: parents and external partner organizations. Through home–school–community collaboration capabilities, the solution promotes co-education and shared responsibility in student development.
- 4. Primary implementers: K-12 schools committed to building smart education ecosystems, as well as external educational service and tutoring organizations. The solution supports these institutions in achieving pedagogical transformation, enhancing governance capabilities, and optimizing the allocation of educational resources.

■ **Typical Application Scenarios**

Scenario 1: Practice of the "Future Learning Center" at Beijing Academy

This scenario has been implemented at Beijing Academy, where the Ref-AI Super-Intelligent Learning Support System has been introduced to establish a "Future Learning Center" within two key Grade 10 classes. The initiative integrates artificial intelligence into teaching management, classroom instruction, and after-school learning services, enabling real-time monitoring and data-driven evaluation of the teaching and learning process. It supports the transformation of school management from experience-based judgment to data-driven decision-making, ensuring that technology serves the fundamental goal of student development.

The Ref-AI Super-Intelligent Learning Support System builds an intelligent closed-loop learning framework encompassing "assessment, instruction, learning, practice, reflection, inquiry, and evaluation." Within this framework, the system enables dynamic learning analytics and generates personalized learning pathways for each student. In after-school services, it supports intelligent task delivery and centralized learning management, significantly improving both service efficiency and standardization.

At the instructional level, the system enhances student engagement and learning outcomes through precise diagnosis and adaptive pathway planning, while also empowering teachers to conduct highly targeted and effective instruction.

Scenario 2: "Three-Future" Integrated Smart Education Ecosystem at Changle No.1 Middle School Education Group (Shandong Province)

This scenario has been implemented at the Changle No.1 Middle School Education Group in Shandong Province, where Ref-AI has deeply restructured the campus education ecosystem through its integrated smart education framework.

The "Future School" is powered by the School Brain AI System, serving as a central coordination hub that provides comprehensive school-level empowerment. It enables the dual evolution of both the "teaching intelligence system" and the "research intelligence system," achieving deep integration of AI-driven teaching, research, management, and evaluation. This supports data-driven school governance, scientific decision-making, and real-time learning assessment.

The "Future Class" is centered on the Intelligent Learning Analytics System, leveraging real-time learning analytics and AI-powered interactive instruction within classroom environments to support precision-based differentiated teaching. This allows teachers to dynamically adjust instructional strategies according to student learning states.

The "Future Learning Center" is enabled by the Super-Intelligent Learning Support System, providing students with an open and structured space for self-directed inquiry and personalized learning exploration.

In terms of service delivery, Ref-AI uses Xiao Rui, the Super AI Tutor, as the core interactive interface. Through a combination of digital human representation and intelligent terminal deployment, it delivers continuous, end-to-end support across teaching, learning, management, evaluation, and research processes. Xiao Rui not only provides real-time intelligent Q&A, error correction loops, and adaptive learning guidance, but also functions as a data bridge that seamlessly connects classroom instruction with after-school self-directed learning.

This model effectively addresses the challenge of large-scale personalized education. Through a comprehensive data governance system, it provides teachers with precise instructional and research insights, while offering students holistic learning profiles and personalized learning pathways. Ultimately, it establishes a fully integrated smart education model—known as the "Changle No.1 Middle School Model"—characterized by the deep integration of intelligent teaching and learning systems.

Impact and Case Evidence

■ **Implementation Outcomes, Evaluation Data, and Practical Experience**

In pilot deployments, this solution has demonstrated **significant measurable impact:**

1.Teaching Dimension:The AI system helps teachers save approximately 30% of lesson preparation time on average, while classroom interaction efficiency has improved by about 25%.

2.Learning Dimension:The personalized learning system improves the efficiency of identifying and consolidating students' knowledge gaps by 40%, leading to notable academic performance improvements in the corresponding classes.

3.Management Dimension:School space and resource utilization efficiency has increased by over 20%, while decision-making response time supported by the data dashboard has been reduced from a day-level cycle to a minute-level cycle.

Core Practical Insights

1.Stepwise Integration Approach： Rather than replacing all systems at once, the implementation prioritizes the "Future Class" as the initial entry point to quickly demonstrate the value of AI in instructional interaction and learning analytics, thereby building trust among teachers and students. This is followed by connecting the "Future Learning Center" to establish a localized closed loop for personalized learning data. Finally, the system is extended to the "Future School" management platform to achieve full-domain empowerment.

2.Data Governance First Principle: Before deployment, a unified data standard, interface specification, and security policy framework are established in advance. This effectively prevents the re-emergence of data silos during later integration stages and ensures the accuracy, consistency, and authority of learning analytics and student profiling systems.

3.Synchronous Enhancement of Digital Literacy for Teachers and Students: Systematic teacher workshops and student guidance programs are implemented to ensure effective adoption of the technology. This ensures that digital tools are not merely introduced as technical infrastructure, but are meaningfully applied to solve real teaching and learning challenges, rather than becoming an additional burden.

■ **Replicability, Sustainability, and Scalability Potential**

This solution demonstrates strong global replicability and contextual adaptability. Its modular, "Lego-like" "1+4+3+1" architecture supports flexible configuration, enabling different countries and regions to tailor deployment based on their educational foundations, resource availability, and regulatory environments. The three core scenarios—"Future School," "Future Clas," and "Future Learning Center"—can be flexibly combined or deployed independently.

Regions with mature infrastructure can implement the full solution to explore next-generation smart education ecosystems, while resource-constrained areas can begin with a minimal deployment model such as a single AI-powered classroom solution, progressively scaling over time. This elasticity allows the system to adapt to diverse contexts—from urban school systems to rural education environments, and from individual schools to large-scale regional platforms—effectively addressing core challenges such as precision teaching and resource scarcity. At the regional level, aggregated learning analytics and data insights can further support education authorities in evidence-based macro-level decision-making, forming a closed value loop of "application → data generation → decision optimization."
Sustainability is ensured through a value-driven operational model, supported by a subscription-based mechanism that enables continuous iteration and system upgrades. In addition, strong localization capabilities—including multilingual support, curriculum alignment, and regulatory compliance—allow the solution to embed itself within different educational ecosystems.

Basic Information of the Institution

■ **Organization Profile:**

References-AI Technology (Beijing) Co., Ltd. (brand name: Ref-AI) was founded in 2025 as a technology leader dedicated to the deep integration of artificial intelligence and education. Guided by its core mission of enabling "AI-powered, full-scenario intelligent teaching and learning," the company develops comprehensive solutions that enhance both pedagogical efficiency and student learning outcomes. Its flagship framework consists of four integrated modules: the School Brain AI System, Intelligent Learning Analytics System, Super-Intelligent Learning Support System, and Xiao Rui (the Super AI Tutor). Together, these components form a holistic "AI + Education" ecosystem designed to support personalized learning, intelligent instruction, and data-driven school governance.

■ **Experience and Qualifications in Digital Education**

Ref-AI has demonstrated exceptional scalability, serving over one hundred schools across major Chinese regions, including Beijing, Tianjin, Guangdong, and Fujian. On the international stage, the company actively engages with the global education community. Its technological achievements debuted at the 2025 Global Smart Education Conference, earning widespread recognition from international education leaders for their innovation and forward-looking perspective.
In the digital education sector, Ref-AI offers robust technical capabilities and proven practical experience:
Technological Leadership: Powered by a team of nearly one hundred advanced AI scientists and engineers, Ref-AI has developed a proprietary "three-layer large model" architecture. This has led to breakthroughs in cross-disciplinary handwritten text recognition, process-oriented assessment, and whole-paper automated grading. Its digital mentor, Xiao Rui, stands at the forefront of multimodal cognition and interactive teaching, providing highly adaptive and responsive learning support.
Ecosystem Engagement: Ref-AI is a proactive contributor to the broader digital education landscape. Beyond its successful global debut in 2025, the company collaborates with technology leaders like Huawei to advance AI innovation in K-12 education within secure and resilient computing environments.

Demonstrated Impact: The company's large-scale implementations have yielded significant results. Its collaboration with Beijing Academy on AI feedback systems for self-directed learning was honored as an exemplary case at the 2025 Global Smart Education Conference. Furthermore, its partnership with Changle No.1 Middle School Educational Group on the "School Brain AI-Enabled Flipped Classroom 2.0" has normalized AI-driven teaching and management, validating a scalable pathway for personalized education at scale.

Through continuous innovation, Ref-AI remains committed to advancing the digital transformation of education and fostering a more intelligent, equitable, and effective global learning ecosystem.

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To promote the deep integration of digital technologies with education, facilitate international exchanges, mutual learning, and collaborative application of high-quality digital education solutions, and empower education technology enterprises to expand globally and connect with international partners, the World Digital Education Alliance (WDEA) launched the "Call for Outstanding Digital Education Technology Solutions".

Selected cases cover key categories as follows:

- General large models or education-specialized large models
- AI agents and intelligent learning assistants
- Digital education platforms and application systems
- Digital education resource production systems or pipelines
- Intelligent education equipment
- Digital education infrastructure
- Integrated digital education technology solutions

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