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Development and Application of Digital Teaching Resources of AI-Empowered Higher Vocational Nursery Specialty from The Perspective of "Great Ideological and Political Education"

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Abstract: Facing the urgent demand of the "three-child" policy, this paper puts forward a framework for the development and application of AI-empowered digital teaching resources for higher vocational nursery education in the perspective of "great ideological and political education (IPE)". The research focuses on morality cultivation, follows the five principles of "IPE guidance, combination of education and training, man-machine cooperation, dynamic optimization, and ecological integration", constructs four types of resource systems covering knowledge transfer, skill training, IPE integration, evaluation and diagnosis, and designs a four stage iterative development process of "demand analysis - design generation - Audit optimization - Application iteration". Through technologies such as KG (Knowledge Graph), virtual simulation, adaptive learning and multi-modal learning portrait, we can realize the pre-positioning of value guidance, the scene of skill training and the personalization of learning support, and form a closed loop of "teaching-evaluation-feedback". This framework has significantly improved students' professional values, ethical decision-making ability and practical norms, and provided a replicable and generalizable paradigm for digital education in higher vocational education.

Keywords: AI; Digital Teaching Resources; Higher Vocational; Nursery Specialty; "Great Ideological and Political Education".

1. Introduction

Vocational education, as the main position of cultivating applied talents, has been given higher expectations for its digital transformation. The state's emphasis on the nursery service system has continued to increase. With the full implementation of the "three-child" policy, the demand for infant care services has surged, but problems such as shortage of talents in the industry and uneven service quality have become increasingly prominent. In this context, as the core channel for cultivating front-line nursery talents, the quality of nursery education in higher vocational colleges is directly related to the sustainable development of the industry and the well-being of the people.

The demand for talents in the nursery industry is characterized by the combination of morality and skills: on the one hand, employees need to master the professional skills of infant physical development, psychological development, health care and so on; On the other hand, it is necessary to have IPE (Ideological and Political Education) literacy, such as professional ethics, sense of responsibility and humanistic care, to cope with the complex ethical decision-making in the nursery scene. The existing teaching materials and courseware focus on skill operation, and cover IPE contents such as nursery ethics and professional values in a scattered way, lacking systematic design [1]. The nursery work is highly situational-dependent, but the traditional training is restricted by factors such as venue, equipment and safety, and it is difficult to restore the real scene. There are significant differences in students' ability levels, but the traditional teaching resources are mainly "standardized", so it is difficult to dynamically adjust the content and difficulty according to individual learning conditions. Teachers' evaluation of students' IPE literacy mostly relies on subjective observation and lacks objective data support, which leads to insufficient pertinence of intervention measures.

The rapid development of AI technology makes it possible to solve the above problems. Through natural language processing (NLP), virtual simulation (VR/AR), KG (Knowledge Graph) and other technologies, the intelligent upgrade of teaching resources can be realized. AI can help to excavate the IPE elements in the curriculum of nursery education, build a "hidden IPE" resource library, and guide students to form correct professional values through situational cases [2]. Virtual simulation technology can simulate high-risk and high-cost nursery scenes, so that students can practice emergency handling skills repeatedly in a safe environment; Adaptive learning system can dynamically push personalized resources according to students' performance and improve learning efficiency. The AI-driven learning situation analysis system can collect students' behavior data in real time and generate a "digital portrait of values development", which provides a basis for teachers' precise intervention and forms a closed loop of "teaching-evaluation-feedback".

Guided by the "great IPE" vision, this study explores the development path of AI empowering digital teaching resources of higher vocational nursery major, aiming at constructing the education mode of "value leading ahead, skill training scene and personalized learning support", cultivating high-quality nursery talents with both professional ability and humanistic quality for the industry, and providing a replicable practice paradigm for the digital transformation of vocational education.

2. AI Empowers the Development Framework of Digital Teaching Resources for Higher Vocational Nursery Specialty

2.1. Principles of Resource Development

In the view of "great IPE", the development of digital teaching resources of higher vocational nursery specialty should follow the following five core principles to ensure that the resources have both educational value, technical content and educational effectiveness:

(1) IPE leading principle

Resource development must carry out the fundamental task of Building Morality and cultivating people throughout, and naturally integrate IPE elements such as socialist core values, professional ethics, family and country feelings into the teaching of professional knowledge and skills. AI technology should act as a "value navigator" rather than a "substitute" in this process. Through the built-in value constraints of the algorithm, all recommended contents, generated cases and scenario simulations are ensured to meet IPE requirements, and the deviation of technology-oriented values is eliminated [3].

(2) Principle of combining education with training

In view of the characteristics of "theory+practice" in nursery education specialty, resource design needs to break through the limitation of traditional "emphasizing knowledge and neglecting practice" and realize the seamless connection between knowledge learning and skill training through AI technology. The development should be based on the integration concept of "post course competition certificate", take the real job demand of the nursing industry as the starting point, and embed the standards such as the setting standard of nursing institutions and the national vocational skills standard of nurseries into the resource content system.

(3) Man-machine cooperation principle

The orientation of "teacher-led, AI-assisted" should be made clear in resource development, and teachers' teaching wisdom and AI's technical advantages should be brought into full play. AI is responsible for handling repetitive tasks, while teachers focus on creative work such as teaching design, emotional guidance and value shaping [4]. For example, in courseware development, teachers can set IPE integration points and core teaching objectives, while AI automatically generates matching teaching cases, interactive activities and evaluation topics based on KG, and forms the final resources after being reviewed and optimized by teachers.

(4) Dynamic optimization principle

Digital resources should have the ability of "data-driven and continuous evolution" and get rid of the disadvantages of "one-time development and solidification" of traditional resources. By collecting students' behavior data in the process of using resources, AI model can analyze the effectiveness and adaptability of resources, and automatically adjust the difficulty, presentation mode or recommendation strategy of content [5]. At the same time, resources should establish a regular audit mechanism, relying on industry experts and IPE teachers to check the values and professionalism of the content to ensure that it keeps pace with the times [6].

(5) Ecological accommodation principle

The resource system needs to be open and interconnected, and can be integrated into a broader digital ecology of vocational education. On the one hand, we should follow the standard interface specification, support seamless connection with the intelligent teaching platform, virtual simulation training center and credit bank system of higher vocational colleges, and realize cross-platform resource sharing and data exchange [7]. On the other hand, it is necessary to strengthen the cooperative development between schools and enterprises, introduce real cases, technological standards and cutting-edge requirements of nursery institutions, and transform them into virtual simulation tasks, digital twin scenes and other resources through AI technology to ensure the same frequency resonance between teaching content and industry development.

2.2. Resource Types and Functional Design

Based on the above principles, the digital teaching resources of higher vocational nursery specialty can be divided into four types, each of which relies on AI technology to achieve specific teaching functions, and pays attention to the organic integration of "great IPE" elements. Table 1 below systematically expounds the design points and typical application scenarios of various resources.

Table 1. Types and functional design of digital teaching resources for higher vocational nursery education with AI empowerment

Resource type	Core function	Typical form	AI empowerment highlights	"great IPE" integration point
Knowledge-imparting resources	Build a systematic knowledge system to support personalized learning	Intelligent courseware, KG micro-course, AI generative handout	KG automatic construction, digital human intelligence teaching, content dynamic adaptation	Embedding industry model deeds, professional ethics and other contents in knowledge nodes
Skills training resources	Provide an immersive and repeatable practical training environment	Virtual simulation training system, MR/VR skill console, intelligent simulation baby	Situation simulation and dynamic adjustment, intelligent evaluation of operational behavior and real-time feedback AI empowerment highlights	Design the ethical choice situation in the simulation scene
IPE integrated resources	Realize value guidance and emotional resonance	VR experience of red nursery history, interactive narration of ethical dilemma, AI digital role model	Emotional computing and interaction, multi-modal narrative generation, personalized recommendation	Transform values such as feelings of home and country into interactive content that can be experienced
Evaluating diagnostic resources	Realize process evaluation and development evaluation	Intelligent operation system, automatic evaluation system for skill operation, portrait generator for learning situation	Multi-modal data acquisition and analysis, cognitive and emotional state recognition	Add indicators such as "professional responsibility" to the evaluation dimension

All kinds of resources do not exist in isolation, but are linked to each other through the AI platform to form a resource ecosystem that supports the whole process of "teaching-learning-practice-examination-evaluation-management". The core support of this system is KG, which, like the "brain" of resources, integrates scattered knowledge points, skill points and IPE elements into an organic network, providing a structured discipline foundation for intelligent

generation, accurate push and dynamic optimization of resources [8]. On this basis, AI technology mainly empowers the following functional designs:

(1) Personalized learning path planning

AI system customizes the best learning sequence for students by analyzing their pre-knowledge level, learning style preference and weak skills [9]. The learning path is not fixed, but dynamically adjusted according to students' real-time performance to ensure the balance between challenge and support.

(2) Intelligent interaction and real-time feedback

Resources are deeply integrated with NLP, speech recognition, computer vision and other technologies to achieve realistic interaction with students. In the knowledge learning session, AI digital assistant can answer questions intelligently, which can not only answer factual questions, but also guide students to deepen their understanding of professional ethics through Socratic questions. This immediate and guiding feedback mechanism has greatly improved the depth and efficiency of learning.

(3) Multi-modal data fusion and insight into learning situation

The resource system has powerful data collection and analysis capabilities, which can aggregate students' learning behavior data, operation process data and emotional performance data. On this basis, the AI model carries out multi-modal fusion analysis to generate a portrait of students' learning situation that fully reflects their knowledge construction, skill development and value identification. The portrait not only provides students with accurate suggestions for learning improvement, but also provides data support for teachers to optimize teaching strategies and carry out personalized intervention.

2.3. Development Process

In order to ensure the quality and efficiency of resource development and fit with the concept of "great IPE", this framework proposes an iterative development process with four stages (as shown in Figure 1). The process emphasizes "demand-oriented, man-machine collaboration, agile development and continuous optimization", and each stage requires close cooperation between educational experts, technical teams and industry instructors.

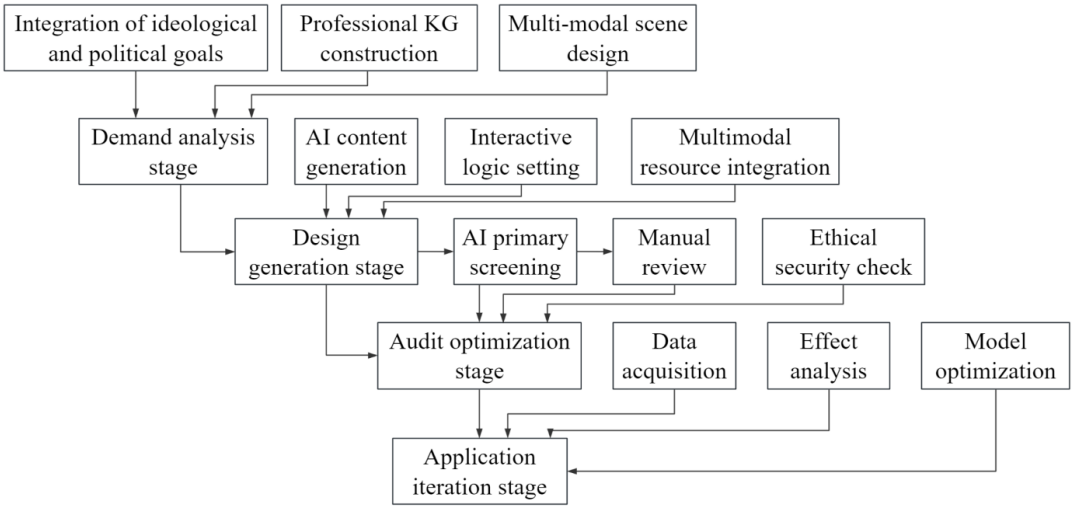

Figure 1. Four-stage iterative development process

Through the cycle of the above four stages, the digital teaching resources of higher vocational nursery specialty empowered by AI have been continuously evolved, and finally a new ecology of intelligent teaching resources with clear IPE orientation, strong technical support and remarkable educational effect has been built, which provides a solid foundation for cultivating high-quality nursery talents in the new era.

2.3.1. Stage 1: Demand Analysis

This stage is the cornerstone of resource development, aiming at accurately locating the targets and parameters of resource development through multi-dimensional data collection and analysis. The resource development team (including IPE teachers) should first make clear the value-oriented goal that resources want to achieve, such as cultivating the professional sentiment of "love, patience and responsibility" or enhancing the awareness of the rule of law of "caring for children's rights and interests". These goals will be transformed into operational and observable behavioral indicators or situational elements as guidelines for subsequent content generation. Using AI technology to semantically analyze the texts of curriculum standards, teaching materials, industry norms, typical cases, etc., and automatically extract the core concepts, skill points and their logical relationships to form a structured domain KG [10]. Based on the goals of KG and IPE, the development team needs to define the specific scenarios and functional types of resource application. At the same time, combined with the analysis of the target students' academic data, the initial difficulty level, interaction depth and media presentation form of resources are clear. The output at this stage is a detailed Specification of Resource Development Requirements, which defines the content scope, technical parameters and acceptance criteria of resources.

2.3.2. Stage 2: Design Generation

After defining the requirement specifications, enter the specific creation and construction stage of resources. At this stage, AI technology is fully used to improve development efficiency and innovation. According to the demand parameters, the corresponding AI tools are called to generate the resource content preliminarily. For knowledge-explaining resources, the text of lecture notes can be input into the "Intelligent Digital Courseware Software" to automatically generate standardized courseware [11] including PPT, explanation draft and digital human teaching. For virtual

simulation resources, 3D modeling and generative AI technology can be used to quickly build the digital twin environment of nursery institutions, and infant behavior models and emergency logic can be set based on rules or machine learning algorithms. In this process, AI can greatly reduce the technical threshold and time cost of art, programming and other links. Inject "intelligent soul" into resources and design how to respond to students' operations and provide teaching feedback. In skill training resources, it is necessary to define the correct sequence of operation steps, common error types and corresponding guiding strategies [12]. The AI model can learn the optimal operation mode by analyzing the video or historical data of experts' operation, and make real-time grading and rectification tips for students' operation accordingly. At the same time, it is necessary to design an interactive opportunity for IPE integration. Systematically integrate all kinds of materials generated by AI to ensure their technical compatibility and consistency in teaching logic. The development team needs to build a unified resource management platform, and carry out version control, metadata tagging and association management of resources, so as to lay the foundation for subsequent accurate push and combined use. The output of this stage is an available resource prototype, which needs to have core functions and contents.

2.3.3. Stage 3: Audit and Optimization

In order to ensure the scientific, educational and safety of resources, all resource prototypes generated by AI must go through a strict review and optimization process. First, resources are automatically audited through the built-in verification rule base. This link focuses on the formal compliance and knowledge accuracy of the content. At the same time, emotional calculation or value recognition model can be used to preliminarily screen the generated content and filter out the content with obvious emotional bias or value deviation [13]. Resources that have passed the initial screening of AI need to be submitted to the manual audit team for in-depth review. The team should be composed of subject experts, senior kindergarten teachers and IPE education experts. Their audit focuses on the teaching adaptability of resources, the effectiveness of methods and the correctness of value orientation. For high-risk content, multiple rounds of cross-examination and field verification are required. In particular, the risks such as data privacy, algorithm fairness and emotional induction that may be brought about by the application of AI technology are specially reviewed. Ensure that the resources meet the requirements of the Personal Information Protection Law and other laws and regulations in the process of data collection and application, and conduct bias detection on the algorithm model to prevent unfair treatment of some student groups due to data deviation. The audit opinions should be clearly recorded and fed back to the development team. According to these feedbacks, the AI system automatically corrects or optimizes the resources, forming a fast closed loop of "generation-review-optimization". The output of this stage is a deployable resource package that meets the quality standards.

2.3.4. Stage 4: Application Iteration

The official use of resources is not the end of development, but a new starting point for continuous optimization. This stage emphasizes the dynamic evolution based on real scene data. In the process of resource operation, students' usage data are continuously collected, including quantitative indicators such as resource visits, length of stay, interaction times, task completion rate, evaluation results, and subjective feedback obtained through questionnaires and interviews. At the same time, monitor the performance index of the system itself. Using big data analysis and machine learning algorithm, the collected data is deeply mined. Evaluate the effectiveness of resources in three dimensions: knowledge transfer, skill improvement and IPE internalization. According to the conclusion of the effect analysis, the parameters of the AI model are optimized or retrained to make it more accurately adapt to the learning needs. For the content of resources that need to be updated, start a rapid incremental development process, supplement micro-courses for weak knowledge points, and develop advanced versions for popular resources. At this stage, a continuous iterative closed loop of "monitoring-analysis-optimization" is formed to ensure the vitality and timeliness of the resource system. Regularly generate resource optimization assessment reports to guide the formulation of the next round of large-scale development plans.

3. AI Empowers the Application Path of Digital Teaching Resources

3.1. Classroom Teaching Application

AI analyzes students' learning situation and interests, accurately pushes suitable knowledge points, industry standards, cases and micro-courses with professional ethics and humanistic care spirit, and guides independent deep learning. Using AI-driven VR/AR technology to develop high-simulation nursery situations, students can internalize professional skills and professional ethics in virtual practice, and enhance classroom participation and IPE infiltration effect. AI teaching assistants answer questions about basic concepts, make initial homework correction and diagnosis of knowledge points, and release teachers' energy for in-depth interaction, value guidance and discussion of complex issues, so as to teach students in accordance with their aptitude.

3.2. Practical Education Application

AI integrates practical video resource library to provide standardized operation demonstration; Through image recognition, motion capture and other technologies, students' operations in nursing and education activities are evaluated and corrected in real time, so as to strengthen normative awareness and safety responsibility. Based on AI, it analyzes the real work scene data of cooperative nursery institutions, dynamically adjusts the training items, simulates the job task chain, and cultivates students' ability to solve practical problems and their dedication. The AI platform aggregates the information of community early education activities and the demand for public service, intelligently matches students' specialties and time, promotes the normalization of social practice, and deepens social responsibility education.

3.3. Teachers' Ability Improvement

AI assists in the analysis of teaching big data, identifies common difficulties and individual differences, intelligently recommends training courses, cutting-edge literature and inter-school collaboration partners, and helps teachers update their nursery knowledge system and information-based teaching ability. AI tools can generate diversified draft teaching plans with one click, intelligently retrieve and reorganize high-quality IPE elements into the resource package of professional teaching, promote teachers to prepare lessons efficiently and cooperatively, and jointly build and

share a structured curriculum material library. Build an AI-enabled online training community, encourage teachers to participate in enterprise practice case discussions and new technology workshops, and continuously improve industry insight, technology application and course IPE design.

4. Conclusion

Through the deep integration of AI technologies such as NLP, virtual simulation (VR/AR) and KG, the problems of IPE content fragmentation, limited training scene and insufficient personalized support in traditional nursery education have been successfully solved. The four types of digital resources developed form an organic ecology relying on KG, which realizes the transformation of learning paradigm from "passive acceptance" to "active construction". AI-driven dynamic learning situation analysis system enables teachers to accurately identify the development track of students' values, virtual simulation technology reduces the training error rate of high-risk scenes, and adaptive learning path improves individual learning efficiency. It not only provides a replicable practice paradigm for the cultivation of higher vocational nursery talents, but also promotes the digital transformation of vocational education to the in-depth development of "moral and technical training".

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