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Construction and Practice of Intelligent Classroom of Automatic Production Line Technology based on Deep Learning

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Abstract

With the proposal of Made in China 2025, automatic production line technology is widely used in enterprises. This course is based on the concept of deep learning to construct the intelligent classroom of automatic production line technology, and uses digital twin technology and loose leaf teaching materials to reconstruct the course content. This paper puts forward the 7-step teaching path of deep learning, and conducts specific exploration and practice for this course, which has achieved good teaching results.

Keywords

Production Line Technology; Design and Simulation; Deep Learning; Smart Classroom.

1. Introduction

In the era of digital transformation, new technologies enable the upgrading of the automation industry and accelerate the economic and social development. The constant emergence of new scenarios and new models has brought new opportunities and challenges to vocational education. "Smart classroom" has become the new driving force and new focus of vocational education reform and innovation in the new era. The design of smart classroom in vocational education should focus on students, highlight the industrialization, diversity and openness of vocational education, and promote the effective connection of education chain, industry chain and talent chain. The construction of smart education should integrate industry and education, cooperate with schools and enterprises, promote the transformation of teaching resources, build a scenario smart classroom, innovate the new ecology of vocational education under the support of digital twin technology, deepen online and offline mixed teaching, constantly improve the adaptability of smart classroom, and accelerate the improvement of vocational education talent training quality.

Smart classroom can combine the advantages of traditional learning and digital learning. It should not only give play to the leading role of teachers in guiding, enlightening and monitoring the teaching process, but also reflect the initiative, enthusiasm and creativity of students as the main body of the learning process. In the digital era, the training of automatic production line technical talents needs to be combined with digital technology, from shallow to deep, focusing on scene based and progressive training. Because deep learning requires learners to carry out "hierarchical learning" and "immersion learning", focusing on learners' deep participation, progression and investment in the learning process. Therefore, the greatest significance of deep learning for automatic production line talent training is to promote teachers' teaching reform.

Therefore, the ultimate goal of carrying out in-depth learning smart classroom is to build digital teaching resources based on the online course platform, effectively improve the depth of most students' learning through the in-depth learning path, meet the realization of students' "multi-directional" needs, make the knowledge meet the needs of learners with different experiences during the construction process, and then produce personalized interpretation of automatic production line knowledge, truly realizing the students' learning center position.

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2. Research on Deep Learning and Smart Classroom Development

The idea of deep learning in the field of education can be traced back to Bruner's division of target dimensions in the field of cognition, which implies that "learning has deep and shallow levels". In 1976, American scholars Marton and Saljo explicitly explained the concepts of deep learning and shallow learning for the first time. From the perspective of teaching, American researchers Eric Jensen and LeAnn Nickelsen put forward the Deep Learning Line (DELC), which can also be called a new teaching model and provides effective guidance for the development of deep learning in college classroom teaching.

In China, the new teaching mode is highly praised in the field of education, and the reform of information-based teaching mode oriented to deep learning is imperative. Tan Shuang constructs a mixed teaching mode that points to deep learning based on the theory of Deep Learning Line (DELC). Zeng Mingxing and others transformed the teaching structure and built a SPOC based in-depth learning model from four stages: learning preparation, knowledge construction, transfer and application, and evaluation. Zhang Xiaojuan, with the support of SPOC platform, constructs an in-depth teaching mode under the SPOC platform from five stages of teaching preparation, atmosphere building, situation setting, interaction and evaluation to promote students' in-depth understanding and problem solving ability.

Zhu Zhiting, a Chinese scholar, believes that wisdom education and deep learning are highly consistent in talent cultivation, both of which are aimed at cultivating outstanding talents in line with the development of the times. The core pillar of wisdom education is deep learning. Zhang Lin, a scholar, believes that the core content of smart classroom lies in the cultivation of wisdom and the gradual accumulation of knowledge, which are integrated with the core concept of deep learning. Yu Ying and others believed that the smart classroom teaching model should be guided by the goal of in-depth learning, promote the improvement of students' innovation ability, and achieve the advanced development of the smart classroom teaching model.

The above research shows that higher vocational education has rich research on deep learning and smart classroom, but compared with theoretical research, practical research is still lacking, such as research on better deep learning in smart classroom. For intelligent manufacturing, the intelligent classroom teaching of automatic production line technology should not only focus on students' shallow simple operation, but also on students' knowledge transfer and knowledge application ability. This research aims to explore the intelligent classroom teaching mode of automatic production line in colleges and universities for in-depth learning, optimize teaching practice, apply the intelligent classroom teaching mode to teaching practice, and promote the occurrence of in-depth learning as a new perspective of teaching research.

3. Construction and Practice of Deep Learning Teaching Mode

The key of talent training program is the positioning of talent training objectives, and the way to realize it is scientific curriculum design. With the goal of training highly skilled talents for robot digitalization in the new era, this topic constructs an automatic production line technology wisdom classroom based on the idea of deep learning "designing teaching objectives and contents - pre evaluation - creating a positive learning atmosphere - preparing and activating early knowledge - acquiring new knowledge - in-depth processing knowledge - evaluating learners". Digital empowerment integrates and reshapes traditional teaching, digital teaching, teaching links, digital technology and other elements to explore and practice new models.

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3.1. Digital Empowerment, Collaborative Education and Reconstruction of In-Depth Learning Content

In terms of content design from the digital perspective, with the teaching concept of "deep learning", the school enterprise collaboration carries out project design based on the working process, and reconstructs the structure system of automatic production line courses. Facing the field of intelligent equipment and advanced manufacturing, according to the needs of the current modular teaching reform of vocational education, the curriculum will be reconstructed into five typical projects of "scene based and progressive", including the feeding station, processing station, assembly station, sorting station and conveying station. In terms of content selection, each project pays attention to the connection between teaching content and work posts. The project tasks follow the path of deep learning. At the same time, the digital twins create a ubiquitous teaching ecology to achieve online and offline ubiquitous learning.

3.2. Construction of "Student-Centered" Smart Classroom

We will reform the teaching mode of traditional automatic production line technology classroom based on teacher teaching, and build a student-centered online and offline hybrid in-depth learning smart classroom. Teachers, as the leaders of curriculum learning, In the research, the seven step approach of "designing teaching objectives and contents - pre assessment - creating a positive learning atmosphere - preparing and activating early knowledge - acquiring new knowledge - deeply processing knowledge - evaluating learners" is adopted to build the research path of "smart classroom teaching objectives - smart classroom teaching activities - smart classroom teaching evaluation". Through the combination of pre class, in class and after class, we can strengthen students' dominant position in teaching activities, deepen their understanding and internalization of knowledge, and then improve the teaching effect of the curriculum.

3.3. Twin Technology Integrates Digital Teaching Resources to Create an Unlimited Teaching Platform

The virtual simulation+digital twin technology is used to build a digital training platform that is the same as the real training platform. The online course platform video, animation and other digital teaching resources under the "deep learning" concept path are connected. Students can conduct independent exploration, cooperative communication and online training through online course guidance and two-dimensional code link. In distance teaching, teachers can conduct demonstration operations on both real and digital training platforms, and integrate the concept of in-depth learning into online and offline classes throughout the teaching process.

3.4. Integrate Online Course Resources and Build a New Form of Loose Leaf Teaching Materials with the Concept of In-Depth Learning

Integrate animation, simulation and video resources of online courses to build a loose-leaf teaching material of new forms of media integration oriented by the concept of in-depth learning. Guided by the in-depth learning task unit in the new form of the loose leaf, the links such as project learning theme, determining learning objectives, designing learning activities and carrying out continuous evaluation are combined with classroom teaching links. Through scanning the two-dimensional code, we can obtain the teaching video, animation, simulation, pictures, online tests and other granular teaching resources of online courses, so as to better promote students to "learn independently", "work hard" and "cooperate in learning".

3.5. Follow the Path of In-Depth Learning and Systematically Build a Multiple Collaborative Evaluation System

The teaching evaluation follows the deep learning path to evaluate the whole process of the whole staff, systematically build a multi collaborative evaluation system, and use multi digital

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technology to support the whole teaching process, which is intuitive, evaluable and measurable. Through the smart classroom teaching evaluation link, the production and teaching personnel participate in the evaluation together, the industrial tutor evaluation is practical and standardized, the teacher evaluation is objective and effective, and the student evaluation process is involved. The evaluation is connected with the appeal of "stakeholders", so as to promote students to learn independently and innovate in the process of continuous cooperative exploration and solving practical problems.

4. Smart Twin Environment of Combination of Virtual and Real

As shown in Figure 1, the twin environment of smart classroom uses the current advanced computer 3D display technology to produce virtual equipment of automatic production line with the same functions and attributes as physical equipment in the virtual environment, which can be used as smart classroom teaching and training resources, new project research and development debugging, automatic factory layout planning, scheme demonstration, product pre-sale preview, etc. Digital twin supporting courses, instead of real equipment and hardware, can be independently applied and developed to complete automatic production line course project practice, and support virtual laboratory construction and teaching project development. It mainly includes real controlling virtual, virtual controlling real, and completing virtual imitation related experiments.

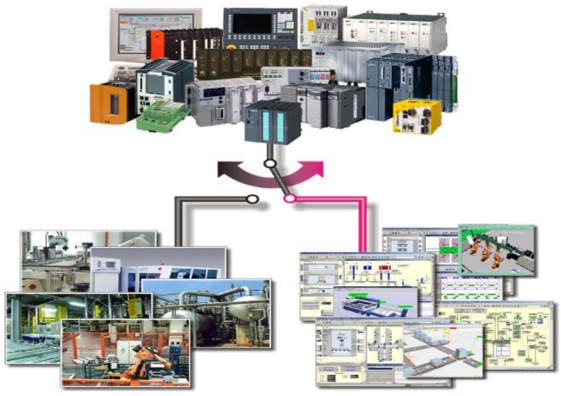

Figure 1. Twin Technologies in Smart Classroom

5. Conclusion

This topic takes the automatic production line and curriculum as the carrier, analyzes the current situation of in-depth learning and smart education at home and abroad, and constructs a student-centered smart classroom. With the cultivation of automation technology application ability of higher vocational students as the main line, and with digitalization as the starting point, actively explore the integration and penetration of unified teaching and digital teaching. Build a teaching ecological environment for the cultivation of highly skilled talents with equal emphasis on professional core competence and professional competence and progressive in-depth learning ability.

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