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Construction and Exploration of Intelligent "Web Design" Course Based on Knowledge Graphs

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Abstract: *This paper focuses on responding to the national education digital transformation strategy, in order to meet the requirements of the era of artificial intelligence, taking the "web design" course in Higher Vocational Colleges as the research object, exploring new teaching modes and future learning methods, and building a smart curriculum system based on knowledge mapping. Through the construction of this project, it is expected to significantly improve the core skills of students' web design, optimize the teaching efficiency of teachers, promote the cutting-edge and practicability of teaching resources, and provide a replicable and popularized example for the intelligent transformation of vocational education.*

Keywords: *knowledge map; Personalized learning; Wisdom teaching; Teaching practice*

1. Project significance and requirements

In order to further explore the new teaching mode and future learning methods, and implement the national education digitalization strategic action, the construction and upgrading of "web design" course into a smart course has the following significance:

1.1 Help to improve the quality of education and teaching

By introducing advanced information technology and intelligent means, teachers can design teaching programs more flexibly, realize personalized teaching, and stimulate students' interest and potential in learning. At the same time, students can conduct autonomous learning and exploration through the smart education platform to improve learning efficiency and learning effect.

1.2 It helps to cultivate students' innovative ability and practical ability

In the smart education environment, students can access rich resources such as virtual experiments and online courses, and improve their problem-solving ability and innovative thinking through interactive learning.

1.3 Help to promote the development of teachers' professional ability

Smart classroom provides rich teaching resources and intelligent teaching tools, which can help teachers quickly obtain high-quality teaching resources and improve the efficiency of lesson preparation. Through intelligent analysis and feedback in smart classroom, teachers can timely understand students' learning situation, adjust teaching strategies and improve teaching quality.

2. The course has a foundation

2.1 From 2010 to 2012, the exploration phase

The course team should strengthen the construction of teaching staff, and arrange teachers to participate in the further study of the course during the holidays; Participate in various teaching seminars to learn from others' experience. Through the implementation of a series of teacher training programs, gradually cultivate a team of teachers with relatively new professional knowledge. It has carried out a series of exploration and Reform on the teaching methods and means of the course, and was selected as a college level excellent course in 2012.

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2.2 2012-2015, construction phase

After years of teaching practice and experience accumulation, the knowledge and technology level of the teaching team is more skilled. At the same time, the teaching level has also been significantly improved through practical training. A group of teachers with double qualification have embarked on the front line of teaching and practice of this course; Through learning, the teaching concept has been fundamentally changed, and the work of teaching reform in higher vocational colleges has also been carried out in an all-round way. In the teaching process, new teaching modes such as task driven teaching and case teaching have been boldly adopted, and provincial excellent course projects have been actively applied.

2.3 From 2015 to 2018, the reform phase

After failing to apply for provincial quality courses for two consecutive years, the course team settled down to re sort out the course content, jointly develop learning field courses based on working process with enterprises, pay attention to students' learning effect, pay attention to course evaluation feedback, develop electronic homework management system, and effectively improve the quality of talent training. In 2018, it was approved as a quality resource sharing course in Shandong Province.

2.4 2018-2021, construction phase

Online course resources on superstar Fanya online teaching platform to explore hybrid teaching methods; Through the integration of course content, compile electronic teaching materials suitable for the content; Create case base, assignment base and test question base, and provide corresponding operation demonstration videos for cases.

2.5 From 2021 to now, optimization stage

After three years of mixed teaching practice, according to the problems encountered in the teaching process, the course was optimized, the original seven projects were reduced to six, and a new version of electronic homework management system was re developed, adding new functions such as homework statistics, homework evaluation, online testing and so on.

In order to effectively guide students to carry out online and hybrid teaching, the course information, teacher information, guidance information, etc. are synchronized to the network teaching platform, course resources and activity design, benchmarking web front-end development skill certificates, and realizing the integration of post, competition, course and certificate; The course page layout is reasonable, the chapter menu is clear and clear, which can effectively guide students to carry out online teaching. The chapter content is rich and diverse, and it supports the display of rich media resources such as video, documents, text, animation, audio, etc; The chapter directory is arranged in a tree to clearly show the teaching progress.

Actively adapt to the new situation of digital education, and according to the teaching needs of students, design and develop online resources such as basic theoretical knowledge, case operation videos, videos and animations according to the content of knowledge points. At present, there are 68 teaching videos, 302 minutes; There are 60 case libraries, including course Ideological and political case library, enterprise practical case library, etc; Online resources can meet students' autonomous learning, SPOC learning and other learning modes, accounting for about 70% of the total courses, and can meet the actual teaching needs. [1]

The course team is a diversified team of teachers composed of school teachers, part-time teachers from enterprises and information teaching assistants. It has rich teaching experience and has 2 associate professors, 3 lecturers and 3 part-time teachers from enterprises; All teachers in the school are double qualified teachers. Through school enterprise cooperation, we can deepen the theoretical teaching ideas and methods and improve the teaching effect; Enterprise teachers make full use of the actual cases of enterprises, effectively carry out the teaching of combining theory with practice, consolidate the teaching effect of students, and improve professional skills [2]; Information assisted teaching assistants make full use of information technology to help teachers carry out teaching reform, improve teachers' and students' information literacy, use information technology to integrate new technologies and research in the industry into the curriculum, and improve the breadth and depth of the curriculum.

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3. Course construction objectives

3.1 Using AI intelligent teaching construction resources

Using artificial intelligence technology, we will reform and innovate the course content, course scene, course resources, teaching methods, teaching evaluation and other aspects. Through the integration of AI teaching assistants, AI workbench and other AI tools and platforms, knowledge base, question and answer base and application base are created to realize the intelligent management of teaching content, personalized learning path recommendation, interactive teaching experience, accurate teaching evaluation and intelligent teaching management, and comprehensively improve the teaching quality and learning effect. [3]

Aigc technology is used to automatically generate or assist in the generation of high-quality teaching materials, such as course PPT, code examples, experimental guide, test question bank, etc., so as to improve the teaching efficiency and personalization of resources. Through AI analysis of students' learning behavior and performance data, personalized teaching content with different difficulty and depth is generated for each student to achieve individualized teaching.

3.2 Personalized and interactive learning experience

The course online teaching system provides multimedia, interactive and personalized teaching resources, including teaching videos, courseware, exercises and other conventional teaching resources, as well as interactive teaching resources supporting online teaching activities, such as communication and interaction, tutoring and question answering, testing and examination. [4] By changing the traditional teacher led and unitary teaching method, smart courses adopt new modes such as flipped classroom, project-based learning, problem-based learning, game based learning and man-machine collaborative teaching to achieve more flexible, personalized and efficient teaching and learning, and improve the effectiveness of talent training.

AI teaching assistant system is introduced to interact with students in real time through deepseek, Kimi, beanbags and other tools, answer questions, provide instant feedback, and enhance students' learning participation and interest.

Using intelligent coding aids such as Tongyi lingcode and Baidu express code, this paper analyzes common errors in students' programming process, and intelligently recommends correction suggestions and advanced learning resources.

3.3 Building and applying knowledge maps

Taking six real projects as the framework and knowledge points as the basic unit, the course content is re integrated to establish a visual, systematic and structured knowledge map. [5] There are not only hierarchical structures between knowledge points, but also interconnected network structures. Students can easily jump from one knowledge point to other related knowledge points, expand their learning from point to area, and recommend the most suitable learning path according to the knowledge map, so that learning is no longer rote memorization, but like exploring a map to improve the learning effect.

3.4 The goal of improving teachers' ability

Organize teachers to participate in special AI technology training courses, including but not limited to the use of AI teaching assistant, aigc (AI generated content), AI big data analysis and other tools. Ensure that teachers master the ability of using AI technology to assist teaching design, content generation, learning situation analysis and teaching evaluation.

The course team strengthens the exchanges and cooperation between teachers and enterprises, regularly send teachers to cooperative enterprises for practical training, invite enterprise technical experts to give lectures and training in schools, share the methods and experience of enterprises using AI to generate real industry cases, and help teachers integrate enterprise practical elements into daily teaching.

3.5 Reform objectives of teaching mode and evaluation mechanism

This course integrates artificial intelligence technology into all aspects of education and teaching,

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promoting the transformation of teaching from "teacher-student interaction" to "teacher/student/machine" in-depth interaction, providing students with a more flexible and personalized learning experience, and comprehensively improving the quality of teaching.

Adhering to the concept of "people-centered" and "student development centered", we continue to optimize teaching design through online learning platforms, smart classrooms and other tools, so as to make better use of teaching resources, better students' learning experience and comprehensively improve teaching quality.

3.6 Expected objectives of AI technology empowerment course

AI teaching assistant: the course online teaching system provide students with personalized learning paths, recommend html/css learning resources, and answer code questions in real time.

AI content correction: the course online teaching system automatically detect syntax errors and layout compatibility problems in student code, and generate optimization suggestions.

AI problem setting and evaluation: the course online teaching system intelligently generate exercise questions according to students' weak links (such as responsive layout debugging and CSS animation Implementation), analyze the learning effect through AI big data course report, and accurately locate the short board of ability.

AI intelligent writing: the course online teaching system assist students to quickly generate basic code framework (such as navigation bar and carousel map), and improve development efficiency.

AI intelligent evaluation: the course online teaching system build AI anti cheating invigilation module based, and generate digital portraits of practical ability in combination with 50+dimensions such as server response speed and script operation efficiency.

4. Construction of teaching resources

4.1 Construction of knowledge map of smart Curriculum

The purpose is to systematize and structure the course content for students to understand and master. With web design as the core, we divided our knowledge points into six projects, including development environment construction, college website management, tourism website production and e-commerce website production. Specific knowledge points are subdivided under each project, such as HTML5 syntax, CSS3 selector, bootstrap framework use, etc. By combing the logical relationship between knowledge points, a clear knowledge system is formed. It is expected that there will be 40-50 secondary knowledge points and 150-200 tertiary knowledge points.

4.2 Construction of problem map of smart Curriculum

The problem map will be constructed around the difficulties and problems that students may encounter in the learning process. By collecting and analyzing the data of students' homework, tests, speeches in the discussion area and so on, the common problems are summarized and related to the knowledge points. The map will contain the description of the problem, causes, solutions and links to relevant learning resources.

4.3 Construction of Ideological and political map of wisdom course

The map of Ideological and political education will combine the course content and integrate the ideological and political elements to form a distinctive ideological and political education system. The atlas will include ideological and political themes, relevant knowledge points, cases, practical activities, etc. By excavating the ideological and political resources in the field of web design, we can guide students to establish correct values, cultivate the feelings of home and country and the spirit of craftsman.

4.4 Teaching video and courseware update

The course online teaching system update the content of teaching videos and courseware to ensure the foresight and practicability of teaching resources in combination with the latest technology trends

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and industry needs. AI technology is introduced to automatically generate or assist in generating high-quality teaching videos and PPT courseware to improve teaching efficiency.

4.5 Item bank construction

The course online teaching system leverages AI technology to generate exercises and tests intelligently according to students' learning situation and industry needs. The question bank will cover basic theoretical knowledge, practical skills, innovation ability and other aspects to meet the learning needs of students at different levels. [6]

4.6 Training projects and enterprise cases

The course team strengthen cooperation with enterprises, introduce real projects of enterprises as training cases, and let students master front-end development skills in practice. At the same time, combining with the method that enterprises use AI to generate real industry cases, AI technology is integrated into training projects to improve students' AI application ability.

5. Update of teaching methods

5.1 Flipped classroom and project based learning

The flipped classroom mode is adopted to allow students to learn basic knowledge independently through videos, courseware and other resources before class, and deepen their understanding through group discussion, project practice and other methods in class. At the same time, the project-based learning method is introduced to let students explore around practical problems and cultivate the ability to solve problems. [7]

5.2 AI assisted instruction

The AI teaching assistant system is used to provide students with personalized learning paths and resource recommendations, and answer students' questions in real time. Through AI analysis of students' learning data and scores, dynamically adjust the teaching content and difficulty, and achieve individualized teaching. [8]

5.3 Online and offline integrated teaching

The course team combine online learning platform and offline classroom to carry out online and offline integrated teaching. Online provides rich learning resources and interactive functions, while offline focuses on practical operation and teacher-student interaction, forming a complementary teaching mode.

6. Course features and innovations

6.1 The four in one education system of "post course competition certificate" has been constructed

Based on the integration idea of "post course competition certificate", the course takes the ability of front-end development post as the starting point, deeply integrates ideological and political education, integrates the post standard of Web front-end development engineer, the competition item standard of "web technology" in the BRICs vocational skills competition, the "1+x" web front-end development vocational skills certificate standard, introduces enterprise programming specifications, and adds new technologies.

6.2 Reconstruct the structure of teaching content and carefully select teaching items

The course team reconstructed the teaching content, selected the websites that students are interested in and common as the project carrier, and divided it into 6 projects and 34 tasks.

The learning time of theoretical knowledge of each task should be controlled within 10 minutes, and the theoretical learning should be completed before the students' attention is distracted. The cases

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selected in the course are pages with visual effects that are shocking and easy to arouse students' interest, so as to improve students' learning enthusiasm.

Each task provides pre class preview cases, project work tasks, classroom practice cases, after class practice cases, case materials, case renderings and case demonstration videos for each case. If they encounter some knowledge points that they cannot, they can watch the pre class preview micro video and case demonstration video, which is easier to break through the difficulties. [9]

6.3 Establish a diversified ideological and political education system

At the same time, based on various web projects, the course designed ideological and political themes such as "national self-confidence, serving the country with technology", "political identity, feelings of home and country", "artistic literacy, ecological civilization". The course is based on moral education and focuses on the cultivation of professional ability. Through "diversification of education subjects", "enrichment of Ideological and political elements", "diversification of teaching methods" and "multidimensional evaluation content", the training of front-end it craftsmen with "positive thinking, high literacy, excellent technology and excellent service" is realized.

6.4 "Whole process penetration+multiple and multi-dimensional" collaboration to build a "precise and three-dimensional" value-added evaluation system

The course mainly carries out SPOC based blended teaching in the school. In order to promote teaching through evaluation, the course combines result evaluation and process evaluation, actively explores value-added evaluation, pays attention to the diversification and multidimensional of evaluation subject and evaluation content, and constructs a "precise and three-dimensional" evaluation system. [10] The process evaluation is mainly reflected through the usual course learning, including three links: before class, during class and after class. Results the knowledge in the evaluation was tested by the final test, and the skills and literacy were tested by the submitted group work. The value-added evaluation is mainly tested by the stage tests and learning behaviors recorded in the students' electronic Growth Portfolio. The content of the evaluation mainly includes six dimensions: learning attitude, theoretical knowledge, vocational skills, professional quality, ideological and political quality, and innovative scientific research.

6.5 The electronic homework management system based on AI intelligent marking has been developed to implement the online and offline mixed teaching mode

According to the idea that resources should serve teaching, the course team independently developed an electronic homework management system based on AI intelligent marking. The system can realize the functions of homework release and resource sharing, teachers' evaluation of students' homework, mutual evaluation between students, and statistics of the number and quality of students' homework, which solves the problem of quantifying the evaluation of students' homework.

7. Expected effect

Through the construction of smart courses, it is expected that the learning effect of students will be significantly improved, especially in the core skills such as web design and front-end development. Teachers will use AI technology to assist teaching and improve teaching efficiency and quality. Course resources will be automatically generated and optimized through AI technology to ensure the cutting-edge and practicability of teaching content.

After the construction of this course is completed, the course content will be continuously optimized through AI technology and big data analysis to ensure the cutting edge and practicability of the course. Course resources will be shared through the online platform to promote the co construction and sharing of high-quality teaching resources and help the transformation of professional intelligence.

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