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Practice and Effect Analysis of Blended Teaching Mode Integrating Knowledge Mapping in the Teaching of the Course "Installation Engineering Measurement and Valuation"

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Abstract

In order to further improve the teaching quality of the course "Installation Engineering Measurement and Valuation", and enhance the quality and level of talent cultivation, the thesis is based on the construction of blended teaching mode by integrating knowledge mapping as an entry point, and then promote the innovative changes in the teaching of the course "Installation Engineering Measurement and Valuation", so as to break the fragmentation of knowledge in the teaching of the traditional "Installation Engineering Measurement and Valuation" and the low efficiency of students' independent learning. Problems. In the study, we first analyze the significance of the blended teaching mode integrating knowledge mapping in the teaching of "Installation Engineering Measurement and Valuation", and then put forward the corresponding teaching practice strategy, and at the same time, we evaluate the effect of teaching practice, so as to help improve the teaching level of "Installation Engineering Measurement and Valuation" and to promote the cultivation of talents to move forward in an orderly manner.

Keywords

knowledge mapping
blended teaching model
the course "Installation Engineering Measurement and Valuation"

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1. Introduction

"Installation Engineering Measurement and Pricing" course is a course with both theory and practice, which is one of the industry-oriented courses for engineering costing students. In the current teaching of "Installation Engineering Measurement and Valuation", there exists the status quo of complicated knowledge system and relatively hidden relevance of various chapters, which can easily lead to fragmented knowledge mastery of students in learning, and the traditional classroom teaching of "Installation Engineering Measurement and Valuation" tends to lack the articulation between the knowledge points, and the classroom teaching is not personalized enough, so it is also difficult to guarantee the quality and

effectiveness of the teaching [1]. Knowledge mapping has structured characteristics, and its integration into the course of "Installation Engineering Measurement and Valuation" can strengthen the correlation between the knowledge of each place, help students establish a knowledge grid, and then promote the improvement of the effect and level of education and teaching. The integration of blended teaching mode can integrate online and offline, forming a three-dimensional education pattern, and promoting the optimization of the teaching level and quality of the "Installation Engineering Measurement and Valuation" course. Therefore, the thesis focuses on the integration of knowledge mapping blended teaching mode into the "Installation Engineering Measurement and Valuation" course teaching practice investigation, so as to help promote the "Installation Engineering Measurement and Valuation" course teaching in an orderly manner [2].

2. The significance of blended teaching mode integrating knowledge mapping practiced in the teaching of the course "Installation Engineering Measurement and Valuation".

The integration of knowledge mapping blended teaching mode into the "Installation Engineering Measurement and Valuation" course teaching practice is of great significance and value. This mode can effectively realize the systematic presentation of the "Installation Engineering Measurement and Valuation" course knowledge, and with the aid of knowledge mapping can help students to strengthen the understanding of the link between the knowledge, so that students are clear about the internal logic of the knowledge, which not only helps to improve the effectiveness and quality of student learning, but also allows students to establish a knowledge memory grid, which helps to enhance the effectiveness of course teaching [3]. Helps to improve the effect and quality of students' learning, and at the same time allows students to establish a knowledge memory grid, which helps to improve the effectiveness of course teaching [3]. Moreover, the blended teaching mode also emphasizes the depth of online and offline synergy, which can also play out the advantages of offline practice and online learning, so that students can carry out personalized knowledge exploration with the help of knowledge mapping, and at the same time can be more in-depth interpretation and analysis of professional theory in the course of "Installation Engineering Measurement and Valuation", breaking the traditional mechanized learning form of students, and then enhance the quality of course teaching and cultivate the comprehensive ability of students to lay a solid foundation. This will lay a solid foundation for improving the teaching quality of the course and cultivating students' comprehensive ability.

3. Idea framework of blended teaching mode integrating knowledge mapping practiced in the course teaching of "Installation Engineering Measurement and Valuation"

3.1. Framework for analyzing the knowledge system of the course and teaching pain points

In the teaching of the "Installation Engineering Measurement and Valuation" course, the primary task of applying the blended teaching mode integrating knowledge graphs is to conduct a thorough analysis of the course's knowledge system and teaching pain points. On this basis, a complete knowledge graph is established, and the blended teaching mode of online and offline is utilized to promote it [4]. In practice, it is necessary to sort out the knowledge system around four dimensions: "basic theory + professional norms + measurement methods + pricing application", such as integrating systematic knowledge in water supply and drainage, HVAC, and electrical aspects into it, and then to clarify the various subsystems in the quota conversion, list preparation, quantity calculation rules and other aspects of the core knowledge hierarchy. At the level of teaching pain point analysis, we need to strengthen classroom observation, student interviews, questionnaires, student work analysis, etc., so as to interpret and analyze the pain points that exist in the current "Installation Engineering Measurement and Valuation" course teaching. For instance, at the knowledge level, the teaching pain points include the relative disconnection of related systems among various systems; at the teaching level, there is a gap between online and offline; and at the learning level, it is difficult to meet the individualized demands

of students. Therefore, in response to the above situation, teaching improvements should be made to promote the innovation of the teaching of the "Installation Engineering Measurement and Valuation" course.

3.2. Path design for the integration of knowledge mapping and blended teaching

"Installation Engineering Measurement and Valuation" course teaching using knowledge mapping to carry out online and offline blended teaching stage, which needs to actively promote the "map construction + scene embedded + process closed-loop" comprehensive education pattern, so as to effectively integrate the key nodes and related contents of each knowledge module in the course teaching. At the same time, we need to do a good job of labeling the attributes of the knowledge, such as the core nodes of the knowledge need to be labeled with the difficulty of the knowledge points and the relevance of the knowledge points and the students' career development, and the related content needs to show the degree of correlation between the various pieces of knowledge, and the labeling of attribute labels needs to cover the typical cases, and the nodes of each place should emphasize systematicness and hierarchy [5]. During the promotion of blended teaching, it is necessary to combine the knowledge map and the students' ability base to carry out the accurate delivery of knowledge, and make the students realize the correlation analysis between the knowledge points through the knowledge map, and link the corresponding micro-teaching video, exercise resources and industry norms and regulations in each knowledge node, etc. The offline teaching can be carried out through the development of group competitions, thematic activities, learning tasks, etc., through the comprehensive teaching activities to make the students focus on the "Installation Engineering Measurement and Valuation", and to make the students focus on the "Installation Engineering" and the "Installation Engineering". Offline teaching can be carried out by organizing group competitions, theme activities, and learning task explorations, etc. Through comprehensive teaching activities, students can conduct knowledge exploration around the "Installation Engineering Measurement and Valuation" course, helping them systematically sort out the knowledge nodes of various subjects in the process of knowledge exploration, so as to ensure that students can fully utilize knowledge graphs and online and offline learning channels to deeply complete the exploration and learning of professional knowledge.

3.3. Planning of the teaching practice implementation and evaluation system

In the teaching of the course "Installation Engineering Measurement and Valuation", the integration of knowledge mapping to carry out blended teaching should formulate a perfect course implementation and assessment system. First of all, in the preparatory stage of the course, the knowledge map should be established to realize the online teaching resource matching. And in the implementation of the course, comprehensive teaching exploration should be carried out in accordance with steps such as knowledge graph navigation, online self-study, offline practical operation transformation, and graph filling of gaps. Moreover, students should be led to update the knowledge graph in combination with their learning progress, and related knowledge content should be integrated into teaching [6]. In the course teaching evaluation link, teachers need to establish a multi-dimensional teaching evaluation system to conduct a comprehensive assessment of students' knowledge mastery dimensions, ability dimensions, etc., reflecting students' professional growth. Secondly, feedback on the teaching dimension should also be provided. Under this evaluation dimension, multiple indicators such as the matching degree between resources and students' learning and the frequency of interaction between teachers and students should be reflected. Furthermore, through multi-dimensional evaluation, the current effect of knowledge graph construction and the achievements of the blended teaching mode are reflected, providing certain data references for the subsequent dynamic innovation of the "Installation Engineering Measurement and Valuation" teaching course.

4. Countermeasures of blended teaching mode integrating knowledge mapping practiced in the teaching of "Installation Engineering Measurement and Valuation" course

4.1. Dynamic optimization of mapping and hierarchical integration of teaching resources

During the period of implementing the blended teaching of the "Installation Engineering Measurement and Valuation" course using knowledge graphs, the primary task is to dynamically optimize the graph and conduct hierarchical integration of teaching resources, so as to ensure the orderly progress of education and teaching. First of all, it is necessary to fully utilize artificial intelligence technology to promptly obtain the high-frequency access nodes of students in their learning through knowledge graphs, and update the weights and association strengths of knowledge nodes in a timely manner. At the same time, during the stage of establishing the knowledge graph, the latest "Code for Measurement and Valuation of Installation Engineering" should be integrated. Furthermore, during the knowledge graph update stage, the norms and provisions within it should be updated in a timely manner [7]. The construction of the teaching resource library should cover conceptual lessons, arithmetic videos, engineering cases and so on. At the same time to combine the knowledge module for students supporting the relevance of exercises, specification interpretation, software operation and other content. Through this measure, the stratified integration of teaching resources is achieved, enabling students to orderly advance each learning module during the stage of learning the knowledge of the "Installation Engineering Measurement and Valuation" course, thereby promoting the optimization and improvement of students' learning outcomes and quality.

4.2. Online and offline synergy, intelligent design of interactive scenes

The use of knowledge mapping in the blended teaching mode of the course "Installation Engineering Measurement and Valuation" requires the realization of online and offline deep synergy, and through online and offline deep synergy, it gradually promotes the intelligent change of the teaching interactive scene [8]. Therefore, it is necessary to deeply integrate online and offline in the teaching stage. For example, an intelligent learning platform needs to be built in online teaching, and the intelligent learning platform provides help for students to find knowledge maps. Students can trigger the corresponding learning tasks for each knowledge map node. For example, when students click on the node "cable laying", the knowledge map can be generated around the similar amount of comparative calculation of the type of exercises, so that students can synchronize the calculation of learning exercises. In offline teaching, it is necessary to do a good job in scenario-based interaction. Therefore, a closed-loop teaching process system of "graph disassembly + practical verification + graph reconstruction" can be constructed. For instance, in the course teaching, students are provided with project engineering drawings and required to mark the related knowledge points in the knowledge graph in combination with the project engineering drawings. Then, they are asked to calculate the engineering quantities of the project based on the knowledge points. Finally, students are required to correct the related logic in the graph by referring to the calculation results. This process can not only promote the deep integration of online and offline, but also help to promote the improvement of students' comprehensive ability, and strengthen the effectiveness of the teaching of the "Installation Engineering Measurement and Valuation" course.

4.3. Multi-dimensional data-driven, accurate feedback on teaching evaluation

To promote the blended teaching of the "Installation Engineering Measurement and Valuation" course by applying knowledge graphs, it is necessary to construct a multi-dimensional data-driven model to achieve precise feedback in teaching evaluation [9]. In practice, multiple data points such as the pass rate of knowledge graph node tests, the quality of cross-module case completion, the duration of students' online resource access, and the application effect of the graph in student group collaboration can be collected. Through the collection and analysis of multiple data points, the specific learning effects of students in the "Installation Engineering Measurement and Valuation" course can be evaluated and fed back. Afterwards, it is necessary to establish a "student

knowledge mapping data image" with the evaluation results of each student, and then through this data image to show the students' knowledge mastery and weaknesses in a more intuitive way, which can not only feedback the quality of teaching in the "Installation Engineering Measurement and Valuation" course, but also generate personalized learning path guidance for students in time for their weaknesses, so that students can have a targeted enhancement and strengthening, to achieve the effect of high-quality completion of the "Installation Engineering Measurement and Valuation" course teaching tasks [10].

5. Analysis of the practical effect of blended teaching mode integrating knowledge mapping in the Teaching of "Installation Engineering Measurement and Valuation" Course

In teaching practice, in order to verify the practical effect of the blended teaching mode integrating knowledge graphs in the teaching of the "Installation Engineering Measurement and Valuation" course, the data shows that the practical application of the blended teaching mode integrating knowledge graphs in the teaching of the "Installation Engineering Measurement and Valuation" course has significantly improved the teaching effectiveness. From the perspective of students' knowledge mastery, the pass rate of core node tests in the experimental class reached 92.3%, which was 15.5 percentage points higher than that of the classes taught in the past. The accuracy rate of cross-module association recognition was 88.5%, which was 23.3 percentage points higher than that of previous teaching classes. This indicates that the application of knowledge graphs in education and teaching can significantly enhance the effectiveness of both online and offline teaching, help students build a systematic knowledge grid, and thereby break through the limitations of fragmented learning in traditional teaching. From the perspective of practical ability, the accuracy rate of engineering quantity calculation for students in the experimental class reached 81.7%, and the proficiency in standardized application was 79.4%, which was significantly better than the data of previous teaching classes. This indicates that the blended teaching mode integrating knowledge graphs has significantly improved the effectiveness and quality of teaching. From the perspective of teaching efficiency, the average time for students in the experimental class to master knowledge points has been reduced by 40%, and the average number of students each teacher tutored has increased by 125%. Therefore, the teaching effect has been strengthened, which is conducive to improving the teaching quality and level of the "Installation Engineering Measurement and Valuation" course.

6. Conclusion

It is found that the blended teaching mode integrating knowledge mapping can significantly break through the problem of fragmentation of knowledge and disconnection between online and offline teaching in the traditional "Installation Engineering Measurement and Valuation" course teaching, improve the students' mastery

Table 1. Statistics of Various Data for the Experimental Class and the Control Class

Evaluation dimension	Specific indicators	Experimental Class (%)	Previously taught classes (%)	Increase rate (%)
Mastery of knowledge	The pass rate of core node tests	92.3	76.8	15.5
	The accuracy rate of cross-module association recognition	88.5	65.2	23.3
Practical ability	The accuracy rate of quantity calculation in engineering cases	81.7	62.5	19.2
	Proficiency in standard application	79.4	58.3	21.1
Teaching efficiency	Average duration of mastery of knowledge points (h)	2.1	3.5	40.0
	The average number of students tutored by each teacher	1:18	1:8	125.0

of knowledge, promote the enhancement of students' practical application ability, and substantially improve the efficiency and effectiveness of teaching, which provides a referable teaching paradigm for the sustainable innovation and change of education and teaching. In the future, with the continuous in-depth application of digital technology in education, this model can gradually transform and upgrade towards the direction of "intelligent knowledge graph + immersive teaching scenarios". Moreover, based on the comprehensive application of BIM technology, a three-dimensional visualization knowledge network is constructed, enhancing the students' perception of complex engineering scenarios, strengthening the quality and effectiveness of their course learning, and thereby continuously providing high-quality talents for the development of the engineering field.

Disclosure statement

The author declares no conflict of interest.

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