Research on Autonomous Learning of Civil Engineering Law Course Group Based on Proficient Teaching

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\textbf{Abstract.} The professional certification of engineering education is an international quality assurance and evaluation system of engineering education. With China becoming a formal member of the Washington Agreement in March 2016, colleges and universities regard this certification as an important training basis. Taking the construction of the curriculum system in the professional certification as the starting point, this paper puts forward the knowledge integration to establish the curriculum group, optimize the civil engineering law course group system, and put forward the civil engineering major of our university. The requirements of the construction of the legal knowledge course cluster of engineering cost and engineering management major, through the proficient teaching method, put forward the research idea of students' self-learning.

1. Introduction

As educators, we are well aware of the disadvantages of the traditional classroom. Dozens of students of the same age sit in the classroom, teachers spend most of their time teaching new knowledge points, students are busy listening and taking notes, and spend very little time thinking. The classroom has become the main place for students to master new knowledge, students' attention, classroom order, homework after class, question feedback of part of the voice become the intuitive feeling of teachers to judge the teaching effect; daily testing, semester examination has become the main tool to evaluate the quality of students. Long live 60 not only reflects the helplessness of college students who cannot control knowledge, but also increases a kind of educational breach of faith that a large area of knowledge loopholes have not been repaired in time. With China becoming a full member of the Washington Agreement in March 2016 and the impact of the digital age, it is obvious that the traditional teaching cannot fully meet the requirements of the era of lifelong learning, and great changes will take place in the learning mode in the future. The classroom needs revolution, and the traditional classroom needs to be flipped, so that students can make use of fragmented time to make up for knowledge loopholes and achieve ubiquitous learning, which is not limited by classroom time, and meets the needs of students to learn all the time. Reshape students' self-confidence and form excellent study habits.\cite{1}

The purpose of education is not to train skilled workers, but to help students become a person with a sound personality. Pay attention to students' feelings, help students build confidence in learning, and let students find a sense of achievement in the process of learning. This topic is combined with Salman. Khan's mastery teaching method and Kandel's nervous system development theory provide a natural hotbed for this education model by making use of the development of digital science and technology. Civil engineering law course is a "liberal arts" course offered by
engineering majors. It is different from the contents of more intuitive and flexible applied courses such as formulas, numbers and pictures that often appear in the knowledge of architecture students in the past. The law course involves a large number of laws and regulations, engineering construction procedures and other relatively boring and abstract teaching content, the knowledge is small, the system is not strong, and the teaching effect is quite weak, but with the rapid development of the construction industry, construction enterprises carry out construction and classroom reform on civil construction legal knowledge which requires more stringent legal quality of employees at home and abroad.

Based on the proficient teaching model and the concept of learning nervous system, this project holds that the construction of curriculum group should be based on the integration of knowledge points, with the help of the development of digital science and technology, and through the benign intervention of teachers, so that students can change the dimension of knowledge from passivity to autonomy, from singleness to integration, from knowledge-based to thinking-based, and from final learning to lifelong learning. The project focuses on the feasibility of the mastery teaching model, taking the three major civil engineering majors of the Civil Engineering College as an example, selecting "Construction laws and regulations", "contract Management and bidding", "Engineering quota principle" and BIM5D knowledge Integration Open Experimental course as the key course construction, carrying out the practice of knowledge integration of digital autonomous teaching platform, and implementing the construction idea of course group into the course teaching and evaluation system. Through rigorous legal research on the needs of the country and industry, after deliberate practice to give play to the results-oriented practical results of sustainable improvement.\[2][3]

2. Research Methods and Steps

The construction of all-digital autonomous teaching platform + legal knowledge integration curriculum group needs to effectively combine the new digital technology and knowledge integration curriculum group, and let students study independently in the digital platform through the benign intervention of teachers. For this reason, the construction idea of the research group is: the sustainable improvement path of "field research-curriculum group theory research-platform autonomous learning-curriculum competition practice teaching".

First, on the basis of the investigation of the legal needs of the construction industry, the key issues are condensed to form plane knowledge points, and "preliminary investigation-collation of common legal questions-demonstration-second investigation of key knowledge points-formation of plane knowledge points".

Second, to integrate the knowledge of the key issues in practice, fragmented information, and combine the graduation requirements of the training program with relevance matrix and consultation interviews with subject leaders, professional course teachers and civil engineering legal experts, to build the civil engineering professional law course group of Xijing University. "the rise of the theoretical transformation of practical problems—the analysis and reconstruction of knowledge content—the curriculum decomposition of civil engineering training plan—the reorganization of knowledge points—the three-dimensional and multi-dimensional of knowledge integration".

Third, digital autonomous learning, under the conditions of curriculum groups that meet the training requirements, students' autonomous learning will be more effective. Through the study of neuron theory, the requirements for students' learning are no longer dozens of minutes in the classroom. Through the effective setting of content, "project-based teaching content setting-decomposing tasks-effective testing of knowledge points-autonomous learning-learning data collection-positioning personalized tracking and evaluation and early warning mechanism-achievement degree-sustainable improvement".\[4]
Fourth, through the introduction of the legal problems of the actual engineering project and the actual solution of the key problems in the competition, let the students get in close contact with the problem-solving, verify the rationality of the classroom reform and student evaluation mechanism, from the point of view of teachers and training system, the key to training talents is to solve practical key problems, and the construction of this curriculum group is also helpful for students to learn new curriculum groups.

3. Methodology

3.1. Construction of Integrated Course Group of Civil Engineering Legal Knowledge

Obviously, the establishment of autonomous learning platform is inseparable from the curriculum group with highly integrated knowledge.

(1) the construction of the integrated course group of legal knowledge in industry research.

Through a variety of ways, this project interviewed more than 100 domestic practitioners, middle and senior levels of enterprises, university teachers and professional legal workers. 84 questionnaires were collected and 80 valid questionnaires were collected for the first time. A second survey was conducted on 7 major categories of questions, 17 branch questions and 25 indicators, collecting 1319 frequently asked questions and 43 key legal knowledge integration systems, which is of great help to the formation of knowledge integration curriculum group.

(2) the construction of the integrated course group of civil engineering legal basic knowledge.

Combined with the requirements of the core concept of output-oriented certification of engineering education, the curriculum group is a curriculum system with highly close knowledge relationship. According to the professional training objectives, through reasonable design and scientific organization, a comprehensive, unified, orderly and efficient curriculum cluster can be formed. There are many civil engineering laws, regulations, local regulations and related norms and rules. in the graduation requirements, there are clear requirements for the understanding and use of professional laws and regulations. Combined with the industry investigation, according to the requirements of the new training plan and syllabus, the correlation matrix of civil engineering legal knowledge and graduation requirements is sorted out, and combined with the interviews of experts and front-line teachers, the integrated course group of civil engineering legal knowledge is formed, as shown in Table 2, detailed knowledge points are compared with formative evaluation test papers.

3.2. Research on All-Digital Autonomous Learning

Through the review of a large number of literature, autonomous learning needs teachers' benign intervention and curriculum design, integrated with the guidance of proficient teaching, and embodies the digitization of teaching resources. At the same time, the core concepts of autonomous learning and the need for knowledge are discussed. Autonomous learning is an important theme of educational research in the world today. as a kind of learning ability, autonomous learning not only helps to improve students' academic performance in school, but also is the basis of their lifelong learning and development. The need for knowledge is the need for individuals to explore, understand and solve difficult problems about themselves and the world around them.

(1) proficient in the concept of teaching method.

The concept of mastery teaching comes from the nervous system development theory put forward by neuroscientist Kandel: when a cell participates in the learning process, the cell will grow. Educated neurons grow new synapses, and when there are more synapses, the transmission of information is more efficient. If information is constantly transmitted to a characteristic area of the brain, it will be stored in that area. These information links are intertwined with their related content.
to form what we call "understanding". How long the newly understood content can be stored in the
brain depends on how active the brain is when receiving information.

Push the flipped classroom to the extreme. Salman Khan, after putting forward the mastery
teaching method, thinks that proficiency teaching simply means that students should fully
understand the concept of previous learning before entering a more difficult stage of learning. The
domestic theoretical research on "flipped classroom" basically focuses on the concept and teaching
methods of flipped classroom, but there is little research on its core proficient teaching method. For
example, Zhang Jinlei's "Research on flipped classroom Teaching Model" puts forward that
information technology and activity learning build a personalized and collaborative learning
environment for learners, which is conducive to the formation of a new type of learning culture,
Zhong Xiaoliu and Song Shuqiang. Jiao Lizhen's "Research on instructional Design based on
flipped classroom concept in the Information Environment" puts forward an effective instructional
design model based on flipped classroom concept in the information environment, and reviews the
development and evolution of instructional design. At present, Bu Yanbin, who consulted the
literature Communication University Of China, put forward in his "Research on the Application of
proficient Teaching method of Micro-course Aid in University computer flipping classroom
Teaching" that the phenomenon of knowledge fragmentation exists on a large scale in traditional
teaching, and there are many contents of teaching materials. the versatility is relatively strong, but it
is lack of professional pertinence, so it is difficult to arouse students' interest in learning. The
examination method is single, and the result deviation is large, so the concept of proficient teaching
is applied to the computer teaching of college students. However, it is not mentioned in the whole
integration of knowledge points in the implementation of the curriculum.

(2) the principle of proficient teaching method.
First of all, the proficient teaching method holds that as long as enough educational resources are
invested, all students can master knowledge and will not be left behind or poor grades.

Secondly, the investment in education is not divided into units according to time (class), but is
determined according to students' understanding and achievement.

Finally, teachers are mainly responsible for guidance, students learn according to their own
rhythm, students should actively interact with each other, improve the examination mode, and
attach importance to feedback.

However, the current education system does not support it. In standardized learning classes, it is
impossible for all students to have the same attention and response speed. Due to the limitations of
classroom time and syllabus, teachers can only take care of the level of most students. Those
so-called "poor students" are mercilessly dragged to the next link without mastering the previous
concept, so that they do not understand and become silent students, not to mention the delusion that
students can study on their own. Therefore, the state of learning to achieve understanding is
definitely not determined by dozens of minutes in the classroom, which requires deliberate practice
after being well-versed in the teaching model, so as to facilitate students to form a memory knot on
the knowledge chain with the passage of time. According to the requirements of the training
objectives of civil engineering majors in our university, the actual investigation and analysis, as well
as the systematic analysis of the relevant laws and regulations involved in this major, we can refine
the course groups that meet the requirements of students' graduation. The establishment of
all-digital autonomous teaching platform the research on the construction of civil engineering legal
knowledge integrated curriculum group is the exploration of the new path of classroom revolution.

(3) to meet the demand for knowledge and arouse students' enthusiasm for autonomous learning.
According to the legal knowledge system reconstructed by comparison, according to the inherent
logical relationship of law and students' learning rules, the "knowledge system" of new laws and
regulations in civil engineering is established by means of content reorganization, knowledge point reorganization and so on. The development of digital science and technology makes it possible to master the teaching model, the online design of the curriculum group of the integration of knowledge points by team teachers, and the integration of teaching contents, teaching methods and teaching resources. Through benign interference after deliberate practice, so that students can reach the level of proficiency in what they have learned. To construct the spatio-temporal development route of "knowledge system" in learning. The digitization of teaching resources is embodied in the informationization of teaching design, the digitization of knowledge points and the intellectualization of formative evaluation.

4. Conclusion

With This topic has achieved remarkable results in the course of curriculum practice and achieved the expected research goal, but because there are still some shortcomings in the preliminary implementation stage of the research, there are mainly the following two points:

First, with the rapid development of the construction industry, construction enterprises have more stringent requirements on the legal quality of their employees at home and abroad, and the reserves of ideological and moral, professional ethics, basic legal knowledge and construction laws and regulations are indispensable. as a professional legal team teacher, although through full practical investigation and expert demonstration, but in the development of curriculum group construction and legal knowledge integration. There is some subjectivity and knowledge preference in the summary of key issues.

Second, this research has achieved full digital autonomy in the open experimental BIM5D knowledge integration. Through the proficient teaching model and with the help of Jiuzhu platform, Guanglianda evaluation system has made a breakthrough in the following two major competitions. However, the strength, time and funds of the team are limited, so this teaching method needs to integrate the construction and support of more curriculum groups under the curriculum system, and the connection between this topic and other curriculum groups needs to be further deepened and strengthened.

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