

# Research on the Teaching Reform of Heating, Ventilation, and Air Conditioning Courses in Colleges and Universities Under the Internet Background

Shupeng Zhao\*

Shandong Huayu University of Technology, Dezhou 253000, Shandong Province, China

\*Corresponding author: Shupeng Zhao, zhaozipi@foxmail.com

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**Abstract:** This study discusses the importance and practical strategies of Heating, Ventilation, and Air Conditioning (HVAC) course teaching reform in colleges and universities under the background of the Internet. With the rapid development of information technology, the Internet has brought unprecedented changes to the field of education. This paper first analyzes the problems existing in the traditional HVAC course teaching, such as being out of the industry demand, weak teachers, insufficient practical teaching, single teaching methods, and so on. Then, combined with the advantages of Internet technology, it puts forward a targeted teaching reform plan, taking effective reform measures to achieve the expected teaching results, aimed at improving the teaching quality of HVAC courses and training more high-quality talents to meet the needs of the times.

**Keywords:** Internet; Universities; Heating, Ventilation, and Air Conditioning (HVAC) courses; Teaching reform

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## 1. Introduction

With the rapid development of information technology today, the Internet has gradually penetrated various fields, and the field of education is no exception. Heating, Ventilation, and Air Conditioning (HVAC) courses in colleges and universities are important to train professionals, and their teaching quality is directly related to students' professional quality and future career development. However, the traditional HVAC course teaching mode often has problems such as delayed content updates and single teaching methods, which makes it difficult to meet the needs of today's society. Therefore, HVAC course teaching reform under the background of the Internet is not only the inevitable requirement of education modernization but also the key to improving the quality of talent training. In view of this, this paper combined the existing theory and experience to carry out an in-depth discussion, first briefly elaborating on the teaching status of the HVAC course, then analyzing the current problems in the teaching of the course, and finally putting forward effective reform measures based on

the background of the Internet, in order to provide references to teachers<sup>[1]</sup>.

## **2. Teaching status of the HVAC course**

Firstly, the HVAC course is an important link to training professional talents. HVAC courses play a crucial role in majors such as energy and power engineering, built environment, and energy application engineering. Through the study of this course, students can not only master the basic principles, design, operation, and management of heating system knowledge but also form solid professional quality and practical skills. This will play a fundamental role in students' future work and research in related fields. At the same time, the study of HVAC courses can also cultivate students' innovative thinking and problem-solving skills, laying a solid foundation for them to become leaders in the industry<sup>[2]</sup>.

Secondly, HVAC courses are an important driving force to promote technological progress. With the transformation of the global energy structure and the popularity of the concept of environmental protection, the heating industry is facing unprecedented challenges and opportunities. The technology and theory involved in HVAC courses are the key to driving technological progress and innovation in the industry. Through the study of this course, students can timely understand and master the latest heating technology and equipment and contribute their wisdom and strength to the innovative development of the industry<sup>[3]</sup>.

## **3. Analysis of HVAC teaching problems in colleges and universities**

As an important branch of the energy field, HVAC is of pivotal significance for cultivating talents with professional and practical skills. However, in the actual college HVAC course teaching, there are a series of problems, which not only affect the quality of teaching but also limit the future development of students.

### **3.1. Detachment from industry needs**

With the rapid development of science and technology and the continuous changes in the field of HVAC, new technologies and standards are emerging in an endless stream. However, the teaching content of some colleges and universities fails to reflect the latest developments and changes in the industry in a timely manner. This has led students to find a clear gap between what they have learned and the employment requirements after graduation. This disconnect not only increases the difficulty of students' employment but also wastes educational resources.

### **3.2. Single teaching methods**

At present, many colleges and universities still adopt the traditional "cramming" teaching method in the teaching of HVAC courses. This method is teacher-centered and lacks interaction and practice with students, which makes it difficult to stimulate students' learning interests and initiative. Under such a teaching model, students often just passively accept knowledge and lack the ability to think independently and innovate. This not only affects students' learning effect but also limits their future career development<sup>[4-7]</sup>.

### **3.3. Insufficient practice links**

HVAC is a highly practical course, and students need to consolidate and apply the theoretical knowledge they have learned through practice. However, some colleges and universities are unable to provide sufficient practical opportunities for students due to funding, venues, and other reasons. Lacking the support of practice bases and experimental equipment, it is difficult for students to have an in-depth understanding and experience

of the actual operation and management of heating systems. This lack of practice links not only limits the cultivation of students' practical skills but also affects their future employment competitiveness.

### **3.4. Weak teaching staff**

The professional quality and teaching experience of teachers has a crucial impact on the quality of teaching. However, some colleges and universities have problems with the staffing of HVAC courses, lacking teachers with rich practical experience and industry background. These teachers may not be able to introduce the latest industry techniques and experience into their teaching or provide effective career guidance and advice to students. This issue not only affects the quality of teaching but also limits the future career development of students.

## **4. HVAC teaching reform strategies in colleges and universities under the background of Internet**

### **4.1. Improving the curriculum system through the network platform**

Under the background of the Internet, the primary task of HVAC teaching reform in colleges and universities is to reform the curriculum system and adjust the teaching syllabus. This reform strategy aims to build a new curriculum system that adapts to the requirements of the information age and integrates knowledge imparting, skills cultivation, and quality improvement. To this end, course teachers need to re-examine the traditional teaching syllabus, break the inherent knowledge framework, integrate into the Internet thinking, and realize the real-time update and dynamic adjustment of course content. Among them, teachers can further improve the curriculum system by introducing online teaching resources, case analysis, engineering practice, etc. In addition, teachers should reform theoretical knowledge and practical teaching content by strengthening school-enterprise cooperation, combining work with study, and re-examining and adjusting the teaching content and syllabus<sup>[8]</sup>. Firstly, the introduction of online education resources, the use of network platforms, and the integration of domestic and foreign high-quality education resources can provide students with a wealth of learning materials. Through online courses, teaching videos, and other forms, students can study anytime and anywhere, improving learning efficiency. Secondly, to strengthen practical teaching, colleges and universities can rely on the Internet platform to build a virtual laboratory or remote experiment platform to allow students to operate and maintain HVAC systems in the virtual environment, enhancing students' practical skills. At the same time, colleges and universities can also provide field internship opportunities for students through school-enterprise cooperation to further consolidate and expand practical skills. Thirdly, an online communication platform can be built. Teachers can ask students to establish online learning communities through the Internet to encourage students to communicate and cooperate. In addition, teachers can post assignments and discuss topics through the community, guide students to actively participate in discussions, and improve students' learning interests and initiative.

### **4.2. Introducing information technology to optimize teaching effect**

In the information age, information technology has become an important force to promote the modernization of education. For HVAC courses in colleges and universities, the introduction of information technology can not only enrich the teaching methods but also improve the teaching effect and promote students' deep learning. In theory, information technology provides a variety of teaching resources for HVAC courses. Through the online teaching platform, teachers can integrate high-quality teaching resources at home and abroad, including video tutorials, expert lectures, engineering cases, etc., to present a more comprehensive and in-depth HVAC

knowledge system for students. In addition, information technology also supports real-time interactive teaching, and teachers can communicate with students in real time through online questions and answers, discussion areas, and other ways to answer students' doubts and improve teaching effects<sup>[9-12]</sup>. For example, during the lesson "Heater and Heater Hot Water Heating System," first of all, the teacher can create a virtual model of the heater and its hot water heating system with the help of three-dimensional modeling software, so that the students can observe its structure and working principle relying on the computer. Secondly, teachers can also introduce simulation software to simulate the operation process of the system, so that students can directly observe the changes in temperature, pressure, and other parameters, so as to deepen their cognition and understanding of the operating principle and guide them to practice operation. Lastly, through the data analysis software, students can analyze the energy efficiency ratio, economy, and other indicators of the system operation, so as to cultivate students' analytical and problem-solving skills.

### **4.3. Promoting school-enterprise cooperation and building practical training bases**

In the Internet era, the teaching reform of HVAC courses in colleges and universities should pay more attention to practicality and application. Therefore, the promotion of school-enterprise cooperation and the construction of practical training bases have become an important part of the reform. Taking the course "Refrigerant Air Conditioning System" as an example, through school-enterprise cooperation, students can be provided with a real and vivid learning environment. This lesson is an important part of the HVAC course, which can make the living environment more comfortable and play an increasingly prominent role in the life of modern residents. In classroom teaching, we should introduce the classification and characteristics of refrigerant air conditioning systems, room air conditioners, unit air conditioners, multi-link and water ring heat pump control air conditioning systems, and the mathematics of the unit system, so that students can deeply understand the important role of central heating system in modern city construction. In addition, school-enterprise cooperation provides students with a valuable opportunity to deeply understand the central heating system. By cooperating with heating enterprises and establishing practical training bases, students can directly participate in the actual operation of the central heating system, observe, analyze, and solve problems. For example, students can learn about the knowledge and skills of equipment configuration, operation management, and troubleshooting of the central heating system in the training base. This kind of hands-on learning can not only enhance students' practical skills but also cultivate their ability to solve practical problems<sup>[13]</sup>.

### **4.4. Improving the structure of teaching staff and enhancing their strengths**

HVAC courses are highly professional and practical, and teachers' cognitive level, teaching skills, and professional ability have a direct impact on the teaching quality of the whole course. Therefore, it is necessary to strengthen the construction of teachers and improve teachers' professional quality. On the one hand, the professional quality of teachers needs to be improved. In order to further cultivate students' professional quality and improve their teaching skills, colleges and universities should regularly organize training or learning activities for teachers to participate in, including lectures, academic seminars, course group discussions, etc., so that teachers can timely understand the development trends and research results in the field of worker engineering and grasp new technologies and ideas. In addition, colleges and universities need to encourage teachers to actively participate in various scientific research projects, which can not only expand their cognitive vision but also improve their practical skills, so that they can be applied to classroom teaching. On the other hand, various incentive mechanisms should be set up. In addition to cultivating students' professional quality, colleges and universities should also set up a reward mechanism to commend and encourage teachers who have

made remarkable achievements in teaching or scientific research. In this way, teachers' work enthusiasm and motivation can be aroused, and a harmonious teaching atmosphere can be created<sup>[14]</sup>.

#### **4.5. Enhancing the evaluation system and adjusting the teaching program**

HVAC course teachers should be fully aware of the important role of course teaching evaluation, that is, it can not only provide a clear direction for students to check the gaps but also provide a reference for teachers to adjust the teaching plan, and finally make the course teaching more targeted and effective. Among them, teachers should combine the teaching objectives and actual learning situation to determine the evaluation standards and content, not only focusing on students' test scores and common quality but also their practice level and personality quality, so as to reflect the actual development of students as comprehensively and objectively as possible<sup>[15]</sup>. The richness and diversity of the evaluation content does not mean that each evaluation standard has the same evaluation ability, otherwise, it will not be conducive to the development of students, resulting in their inability to maximize their advantages. For HVAC courses, teachers should abandon the traditional evaluation method of emphasizing results over process, pay more attention to students' learning process and quality development, and integrate students' learning ability, operation skills, innovation ability, collaboration skills, professional quality, and moral quality into the evaluation system. The evaluation indicators should be scientific and effective. In addition, it can also reflect the requirements of enterprises and the market for students, so as to objectively reflect the actual learning situation of students and promote their all-round development.

### **5. Conclusion**

All in all, in order to adapt to the current development trend of quality education reform, HVAC course teachers in colleges and universities should actively carry out the research and practice of HVAC course teaching reform from the perspective of the Internet, and constantly explore the teaching mode and path suitable for their own development. They can rely on the network platform to improve the curriculum system; introduce information technology to optimize the teaching effect; promote school-enterprise cooperation and build training bases; improve the structure of teachers and strengthen their strength; enhance the evaluation system, adjust the teaching program, and other measures to optimize the teaching effect, so as to promote the HVAC course teaching reform as well as the technical progress and industry development in the field of workers engineering.

### **Disclosure statement**

The author declares no conflict of interest.

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