Research on College Physics Online Teaching System Based on Course Group Construction

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Abstract. College physics course based on online teaching system can make the boring theoretical derivation process more intuitive and convenient with the help of the unique characteristics of multimedia technology and tools, so that students' learning efficiency can be significantly improved, so it has high research value. Based on this, this paper first analyses the current situation and existing problems of college physics course teaching, then studies the necessity of constructing college physics online teaching platform, and finally gives the construction strategy of college physics online teaching system based on the construction of curriculum group.

Keywords: College Physics Online, Teaching System, Course Group Construction

1. Introduction
University teaching involves a large number of theoretical formula derivation and complex mathematical calculation, and because these theoretical derivation processes is more abstract, students are more difficult to learn, and learning interest is difficult to improve\(^1\). With the continuous iteration and popularization of computer information network system, the current major colleges and universities have gradually carried out online teaching based on online teaching, and achieved certain teaching results and teaching experience. College physics course based on online teaching system can make the boring theoretical derivation process more intuitive and convenient with the help of the unique characteristics of multimedia technology and tools, so that the learning efficiency of students can be significantly improved, and the learning enthusiasm and initiative of students can be improved synchronously.

In addition, college physics, as a basic subject reflecting the law of things, should be combined with more practical experimental courses, so that students can combine theory with practice to better grasp the connotation and essence of physical knowledge. At present, most of the university physics teaching is still based on the traditional teaching methods and methods, and the degree of integration with network information technology still has a large space for improvement. Although some colleges and universities have started the construction of college physics course teaching system and teaching resources online teaching system, and play a more significant role in resource sharing and promoting
the play of students' dominant position, due to the lack of experience accumulation, the operation of the system is not smooth enough, so there is still a large space for optimization.

On the other hand, due to the lack of national and unified system platform, the current college physics teaching resources are difficult to achieve efficient sharing and circulation, and the online teaching systems built by various universities lack the interface of communication links, which makes the curriculum value of the current college physics online teaching system not fully released and played. The construction of university online physics teaching system based on curriculum group can effectively open up the online education resources of each university, give full play to the role and status of modern information technology, ensure the further improvement of college physics teaching quality, and make full use of various technical means as shown in Figure 1 to realize the reform of college physics information teaching. Through the continuous innovation of college physics teaching methods, stimulate students' learning initiative and learning fun, build a comprehensive, multi angle, three-dimensional teaching experience, and realize the significant improvement of students' innovation ability and innovative spirit.

![Diagram](image.png)

**Figure 1.** Various technical means of college physics information teaching.

2. The current situation and problems of college physics teaching

2.1. Current situation of college physics teaching
First, the current college physics course accounts for a low proportion of class hours, but although the class hours account for relatively low, the teaching content of college physics course is relatively heavy, not only covering basic physics disciplines such as mechanics, thermal science, but also covering the more advanced physics disciplines such as electromagnetism and quantum physics. Secondly, the lower proportion of class hours and more curriculum content lead to the pressure on the teaching of college physics course and students' learning, which makes the teaching quality of college physics course difficult to be effectively improved, and the students' interest in learning and the initiative of learning are difficult to fully release and play.

2.2. Problems in current college physics course
First of all, college physics teaching is still based on the traditional teaching methods and methods, and there is still a large space for improvement in the degree of combination with network information technology, and because the process of college physics teaching involves more theoretical formula derivation and complex mathematical calculation, students lack the interest of active learning.[2] Secondly, due to the relatively old teaching methods, teachers are still the main body of teaching activities, which makes it difficult for students to reflect and play the dominant position, resulting in the lack of effective communication and communication between students and teachers, and less exchange of physical knowledge between students, which makes the sharing degree of physical knowledge low, the learning effect of students is poor, and the efficiency is low.
2.3. The construction of college physics curriculum group

The current university physics curriculum is a physical discipline and physical teaching activity system based on its teaching purpose[3]. This curriculum system has its own organizational and purposeful characteristics, and the construction and evaluation of its physics curriculum is mainly based on the definition of teaching category based on the form of teaching settings. The construction of college physics curriculum is not only related to the quality of physics teaching, but also a direct representation of the practice of university teaching reform.

Table 1. The construction mode of college physics course.

| Modes            | Advantages                                              | Disadvantages                           |
|------------------|---------------------------------------------------------|-----------------------------------------|
| Excellent course | Focus on key courses by stages and groups               | Most colleges and universities          |
| Curriculum group | Course group as the unit to carry on the construction    | Optimization before construction         |
| Course + class group | Highlight construction features                          | High conditions of teachers and funds    |
| Quality courses  | Specific and appropriate number of courses               | Optimize the combination of the main courses |

In addition, the current college physics curriculum evaluation and curriculum construction constitute a whole, and its teaching evaluation is mainly based on the actual physics curriculum and teaching plan to achieve its teaching objectives[4]. At present, the construction elements of college physics course are directly related to the achievement of teaching content, and its course construction mode is shown in Table 1 above. This teaching mode has its own advantages, mainly reflected in the typical characteristics of promoting the efficient sharing of physics teaching resources and highlighting the key points of teaching and learning.

2.4. The relationship between excellent courses and course group construction

As a typical and representative course in the course teaching in colleges and universities, excellent university courses can effectively guide the innovation of university curriculum teaching and the in-depth implementation of teaching reform, so as to promote the development of related disciplines, such as the development of college physics[5]. In this context, there is a relationship of mutual dependence and promotion between the current excellent college physics courses and the physics curriculum group, which is mainly due to the high consistency of the construction evaluation indicators and requirements between the two, so as to realize the concentration of resources and the complementary advantages of resources. At present, the relationship between the teaching system and the course group of college physics is shown in Figure 2 below. It can be seen that the construction of excellent college physics courses is realized on the basis of the course group, and can promote the construction of the course group, so as to realize the overall improvement of the construction of other courses.

Figure 2. Relationship between teaching system and course group of college physic.
3. The necessity of constructing college physics online teaching platform

3.1. Characteristics of college physics online teaching platform

Network based college physics online teaching platform is a platform system based on computer network to implement information education, so as to meet the new education and teaching methods, so it has strong characteristics of the times\cite{6}. The current network-based college physics online teaching platform has the typical characteristics of openness, interactivity, collaboration and pertinence, as shown in Table 1 below.

| Characteristics | Contents                        | Advantages                          |
|-----------------|---------------------------------|-------------------------------------|
| Openness        | Reflected in time and space      | Promoting communication and         |
|                 |                                 | communication                       |
| Interactivity   | Acquiring learning content based| Flexible and convenient             |
|                 | on needs                        |                                     |
| Collaboration   | Resource support and teaching    | Cooperative learning, mutual         |
|                 | support                         | exchange and cooperation             |
| Pertinence      | In depth learning, personality   | Autonomy, flexibility and            |
|                 | learning                        | selectivity                          |

In addition, college physics course has the typical characteristics of complete theoretical system, various formula deductions, difficult to understand theory and wide practical application. Therefore, the combination of college physics course and online teaching platform can effectively use the characteristics of multimedia information technology, and realize the significant improvement of teaching effect.

3.2. The necessity of constructing college physics online teaching platform

The construction of college physics online teaching platform can effectively solve the problems encountered in the current college physics teaching process, improve students' initiative in learning, promote the promotion of students' subjective status, and ensure the construction of students' physical thinking, so as to realize the positive development of teaching process reform and innovation level\cite{7}.

Secondly, the university physics teaching system integrated with computer Internet technology can promote the sharing of physics teaching resources, promote the exchange and cooperation among universities, colleges and departments, and individual researchers, etc. so as to realize the maximum utilization of resources.

In addition, the college physics online teaching system can enhance the intuitiveness of teaching process through the application of multimedia technology, and intuitively display and explain the complicated physical theory derivation process, so as to further strengthen students' understanding and imagination of college physics, and expand the breadth and depth of students' physical thinking.

4. Research on college physics online teaching system based on course group construction

4.1. Construction of college physics online teaching system

First of all, the structure of the online teaching system of college physics should be based on students' knowledge reserve and professional needs, The content modules, such as preview module, lecture module and review module, as well as the practical operation course module represented by physical experiment, such as experiment preview module, experiment process teaching module, experiment operation module, experiment report submission module, etc. Secondly, on the level of digital resources production of college physics course, it should organically integrate all the text, pictures, electronic teaching plans, teaching videos and other digital resources based on the teaching framework to create the university physics network teaching resources with the characteristics as shown in Figure 3 below.
4.2. The platform construction of network course group

First of all, in the construction level of the platform framework of the network course group, it mainly includes the basic level of the main courses and the secondary courses based on the public elective courses. Among them, the main courses mainly include the basic courses of natural science represented by university physics, while the secondary courses mainly include the introduction to theoretical physics which belongs to the extension level and the related curriculum types reflecting the improvement of quality education. Secondly, in the network form of the network course group platform, it contains different course group modules, that is, theoretical module, practical course module and related knowledge resource database. Each course module in network form includes teaching content and electronic teaching plan, as well as student self-test module which highlight students' dominant position, including preview, self-study and review.

In addition, as the key and core of constructing the network course group platform, all college physics excellent courses need to be online, and the perfect integration with online teaching interface is realized at the beginning of the course, so as to achieve the sharing of university physics excellent course resources, give full play to the role and advantages of online teaching system and platform, improve students' learning ability, realize the optimization and integration of college physics course group resources, and effectively improve the teaching effect of college physics course.

5. Conclusion

In summary, the construction of university online physics teaching system based on curriculum group can effectively open up the online education resources of each university, give full play to the role and status of modern information technology, and help to ensure the further improvement of college physics teaching quality, so as to realize the reform of college physics information teaching. This paper points out the current situation and problems of college physics course teaching, and points out the current situation and problems of college physics course group and college physics course teaching. Through the analysis of the necessity of constructing the online teaching platform of college physics, this paper studies the role of the online teaching platform of college physics, and analyzes the construction strategy of the online teaching system of college physics based on the construction of the course group.

Acknowledgments

Basic scientific research business fee support project of Heilongjiang Province of China (Key program No. 2018-KYYWF-1265): Research on the construction of three-dimensional teaching system based on TRIZ theory to adapt to the cultivation of Applied Innovative Talents.

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