

# Research on Physics Teaching Reform in Applied Local Undergraduate Universities

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**Abstract:** Since the National Conference on Undergraduate Education in Colleges and Universities, the overall level of college education has improved, but under the overall development situation, there are still some problems in the teaching of local applied undergraduate colleges. The article takes university physics teaching in local applied undergraduate colleges as the breakthrough point, explores its specific problems and corresponding solutions, and discusses the specific role of reform measures in physics teaching. Provide a certain reference basis for related workers.

## 1. Introduction

Under the situation of sustained and stable social and economic development, the demand for talents in social development is increasing day by day. As one of the main bases for talent output, applied undergraduate colleges bear a heavier teaching responsibility. Under this situation, in order to meet the needs of social development and improve the quality of their own talent output, curriculum teaching reform is an unavoidable issue for colleges and universities, and it is also an effective means to continuously improve their educational level under the influence of the times. Therefore, for the content of college physics courses, how to optimize relevant teaching through effective reforms is one of the key issues that relevant workers need to study and solve.

## 2. Current Situation of Physics Teaching in Colleges

Based on the overall teaching situation, physics teaching in my country's local applied undergraduate colleges is too dependent on knowledge theory in teaching materials, and its related formula content and mathematical derivation process are mainly used to assist in solving problems [1]. Affected by the structure of the textbook content and the teacher's own teaching concepts, physics teaching as a whole presents a certain degree of vagueness, that is, it only emphasizes the introduction and explanation of the theory of knowledge, ignoring its application and extension in reality, leading to its relationship with the reality of life. The connection of the situation is very shallow, which makes the content of physics teaching gradually unable to meet the needs of social development, resulting in a situation where physics teaching is out of touch with reality, and causing certain obstacles to the training of college talents [2]. In addition, in the process of college physics teaching, some problems show certain stubbornness, such as uncoordinated development of students' knowledge learning ability and application ability, insufficient self-learning spirit and ability, weak sense of exploration and practice, and excessive utilitarianism in curriculum learning. Wait. From the perspective of the overall physics teaching environment in China, the physics curriculum emphasizes theory and neglects practice, which leads to limited physical practice activities for students in the entire physics learning process, which prevents them from passing the rich physics experiment content and further forming the spirit of physics exploration. And related abilities, not only can't have a comprehensive and objective cognition of the content of physics knowledge, but also have insufficient grasp of the operation steps and principles of basic physics experiments [3]. This is based on my country's national conditions and the overall situation of education development. Therefore, in the process of physics teaching reform, some work has achieved little effect.

Under the influence of the teaching model that emphasizes knowledge and skill explanations and

neglects practical application, although students can deal with the examination of test paper knowledge by entering the classroom, they are seriously inadequate in the specific experimental operations and physical exploration thinking. They only know what they are, and they do not know why they become students. The main learning problems presented in physics learning. And in the current physics teaching model, teachers also focus on cultivating students' basic knowledge and theoretical understanding and problem-solving application skills, ignoring the coordinated development of students' physics quality, leading to weaker self-learning ability and awareness of knowledge exploration. In the case of insufficient ability, it is impossible to effectively make up for it through course learning, so that the actual learning needs cannot be met, which highlights the shortcomings of autonomy and insufficient inquiry in physics teaching [4].

In addition, in the process of continuous development of university physics teaching, some teachers are affected by their own professional quality or cognitive level and cannot update their teaching concepts and methods in time. As a result, their physics classroom teaching has shown a certain weakness as a whole. , Unable to effectively mobilize students to participate in classroom learning activities, and lost the initiative to improve the quality of physics education and teaching. At the same time, in the limited physics experiment link, some teachers completely copied the content of the textbook for relevant demonstrations, and required students to perform the experiment completely according to the previously formulated experimental plan. The educational significance of such physics experiments is very limited. It not only fails to promote students' awareness of physics inquiry, but also makes students' learning and cognition of physics knowledge stay at a superficial level, which is not conducive to their personal growth and development. It also caused certain adverse effects. The specific reasons for the above characteristics of teachers are different. Some teachers have a weak professional foundation and cannot improve their teaching quality in time, and some teachers emphasize their own research work and ignore the importance of teaching. On a subjective level Weakened the actual effect of physics teaching.

### **3. Approaches to Physics Teaching Reform**

In order to ensure the development level of physics teaching and education and the quality of talent training, colleges and universities should combine the needs of social development and their own actual conditions, and take corresponding measures to optimize the physics teaching, so that it can meet the needs of the development of the times and the growth of students. You can start from the following aspects.

#### **3.1 Strengthen the Cultivation of Independent Learning Ability**

Under the new requirements of education and teaching, teachers should pay more attention to and cultivate students' autonomous learning ability, urge them to gradually master the learning methods and skills of corresponding knowledge through physics learning, and effectively improve them by applying them in the actual learning process. Self-learning ability reduces their dependence on teachers. To this end, teachers can make full use of information technology to introduce the flipped classroom model into actual teaching. Flipped classroom itself takes students as the main body of the classroom, and provides students with corresponding course materials, such as courseware, videos, etc. before or after class, to encourage them to actively complete the knowledge learning process outside of classroom time, while teachers are mainly responsible for the questions that students have in self-study are solved and explained in a deeper level [5]. Compared with the previous physics classroom teaching model, the flipped classroom model provides students with new knowledge learning methods and self-improvement methods, which not only reduces their dependence on classroom teaching, but also creates a broader space for independent learning. . With the rapid development of information technology and its related resources, by flipping the classroom, teachers can get rid of the limitations of teaching materials, effectively combine knowledge points with the latest research results, broaden students' thinking horizons, and promote them in the actual learning process. Mastering the cutting-edge information about the knowledge points of the course effectively avoids the disconnection between physics teaching and the reality of

life. At the same time, when teachers use information technology to organize teaching content, they have a deep understanding of their own teaching content through exposure to a large number of resources, and on this basis they absorb the essence of online teaching content, thereby improving their own teaching quality, and its effect. It will also reflect the learning situation of students in the flipped classroom mode, and provide teachers with a basis for teaching adjustment, so that both teachers and students can achieve common development under the same teaching mode [6]. In addition to physics knowledge learning, the flipped classroom model also has a certain positive impact on the overall quality of students. Flipped classroom gives students more opportunities for independent learning, which not only provides space for independent growth, but also effectively exercises their learning self-control and planning ability. Students need to concentrate and analyze the published course information resources without supervision. This process requires students to use autonomous learning methods, such as taking notes, collecting learning materials, finding corresponding cases, etc., to complete learning tasks, which has a certain exercise and improvement effect on students' self-control, and long-term use of flipped classroom mode for teaching can promote Students form good study habits and fundamentally improve their learning ability. For example, for the course content of simple harmonic motion, teachers can collect and prepare class-time materials about simple harmonic motion in advance, including the motion characteristics of simple harmonic motion, differential equations, equations of motion, and the introduction and basic demonstration of the three characteristic quantities of simple harmonic motion , So that students can establish a corresponding cognitive framework through the understanding of the concepts of physics knowledge before the course learning, and by recording the problems encountered in autonomous learning, clarify the focus of classroom learning, and greatly improve the learning efficiency in formal classrooms . At the same time, unlike the traditional physics classroom teaching model, the flipped classroom has a certain degree of flexibility, that is, students can relatively freely choose the place and time of study. This feature enables students to have a more comprehensive understanding of their own time management ability and knowledge learning ability in the process of planning learning according to their own situation, and then by making up for related deficiencies, improving learning quality, and enhancing the comprehensiveness of physics education and teaching [7 ].

But teachers should also note that whether the advantages of flipped classrooms can be used in actual teaching depends to a certain extent on the teachers' ability to set teaching goals. For this reason, when teachers introduce the flipped classroom model to classroom teaching, they should combine the teaching needs of the curriculum with the actual level of students, clarify the overall teaching direction, and set teaching goals on this basis. Teachers should try their best to consider the feasibility and rationality of their own teaching design from the perspective of students to ensure that the teaching work can achieve the expected results. Teachers can regularly use online platforms such as Yu Class, Wisdom Tree, Tennent Class, etc., in different teaching stages Collect students' ideas and suggestions on physics teaching, and continuously adjust the teaching design through feedback content to avoid personal subjective factors that weaken the actual teaching effect.

### **3.2 Intensive Self-Learning Ability Test**

In the process of physics teaching reform, teachers should realize that the effectiveness of teaching work cannot be judged solely by teachers' personal observations and students' independent feedback. Instead, teachers need to set up corresponding test links to help teachers and students discover the actual effects of flipped classrooms. Insufficiency in teaching, after further understanding the application of flipped classroom, adjust the relevant teaching design to promote the application of flipped classroom to receive better results in physics teaching. To this end, in view of the effect of flipped classrooms on students' autonomous learning ability, teachers can start with the Q&A session in the classroom. Classroom Q&A is an important part of flipped classroom teaching, and it is also the main means for teachers to check students' learning achievements through teacher-student discussion and exchange. For the Q&A link, the teacher first asks the students before the students ask questions. The content of the questions is mainly the connection between the content of the materials prepared by the teacher for the students and the knowledge

points in the classroom. According to the question and answer, the teacher can understand that the students pass before or after class Flipped the classroom learning mode, the mastery of classroom knowledge points. After initial understanding of the situation, the teacher can give priority to the students who are more relevant to the course learning. Through the order of answering from the shallower to the deeper, the teacher shows the students the correct level of knowledge and learning, so that they can form the correct learning in the subconscious. For example, in the classroom teaching of magnetic media, for the knowledge of magnetizing current, the teacher should combine the teaching objectives of the class with the learning questions raised by the students, and arrange the order of answers, that is, according to the “generating conditions of the magnetizing current-the special case of the magnetizing current-the flow process of the magnetizing surface current-Questions are answered in the order of “the specific physical relationship between magnetization and magnetization current” to realize gradual physics teaching. At the same time, through the priority answers, the enthusiasm of the students is promoted, so that they can establish a sense of learning achievement and gain. Teachers should not ignore issues with weak relevance. Instead, they can judge whether they contain innovative thinking through their own professional knowledge and experience. If they have a certain value of thinking, teachers should also explain and encourage them. In fact, the importance of innovative thinking in the physics classroom is not weaker than any learning quality. Finally, teachers can deepen their understanding of classroom knowledge by changing the role of the classroom and the mode that students help teachers answer questions. At the same time, students sort out the relevant knowledge points by answering the teacher’s “doubts”, and discover their own problems in time. Through the speeches of other students and the explanations after the teacher’s activities, students fill in the knowledge learning loopholes and improve their learning level [8].

In addition to testing students' autonomous learning ability under the flipped classroom teaching mode through classroom Q&A, teachers can also assign learning tasks to further investigate students' autonomous learning and help them consolidate the corresponding knowledge learning foundation. Teachers can feedback the results through the Q&A test in the classroom, design targeted learning tasks for students in time, and help them to continuously make up for their learning shortcomings through learning tasks. At the same time, teachers can also set up group learning tasks to enable students to enhance their awareness and ability of physics inquiry through cooperative inquiry, and strengthen their sense of team honor and cooperation awareness in the process of teamwork learning, so as to ensure the comprehensiveness of college teaching and training.

### **3.3 Strengthen Practice Assessment**

In view of the traditional teaching that emphasizes explanation and neglects practice, teachers can increase the proportion of practical ability assessment in the curriculum by appropriately changing the assessment method, which in turn causes students to attach importance to practical ability. To this end, teachers can specifically set the assessment method to “normal results + written test results + experimental results” mode, in which the content of the written test is basically unchanged, and the usual results focus on students' usual classroom performance, and the specific experimental results can refer to the practical ability and experimental process Corresponding examination content and scoring standards are set in these two aspects of the completion of the experiment report. Through diversified assessment methods, teachers have changed the traditional teaching model that places too much emphasis on knowledge inspection and ignores practical ability assessment.

### **3.4 Strengthening the Professional Quality of Teachers**

All colleges and universities should pay attention to the professional quality construction of teachers when carrying out physics teaching reform. As the main body of teaching, the professional quality of teachers determines the upper limit of students' growth. Therefore, colleges and universities should organize physics teachers to carry out teaching and research activities on a regular basis. Teachers can share and learn from other teachers' teaching experience and methods in

the activities, improve their own teaching cognition and design concepts, and effectively improve their own teaching level. At the same time, colleges and universities can also regularly organize teachers to observe and study in other colleges and universities to grasp advanced teaching ideas and methods in a timely manner, and then combine their own teaching conditions to optimize specific teaching links, improve the overall physics teaching level of the college, and make it more effective. The talent training plan of colleges and universities plays a positive role to ensure that students can obtain effective subject training through physics courses and improve their own subject quality.

#### **4. Conclusion**

In summary, in the physics teaching reform process of applied undergraduate colleges and universities, in order to make up for the current deficiencies in teaching and improve the actual teaching effect, teachers should introduce the new teaching model represented by flipped classrooms into actual teaching. And through multiple forms of assessment, change the focus of teaching and investigation, take into account knowledge learning and practical application ability, ensure that students can achieve comprehensive development of subject quality in physics learning, achieve the teaching goals of physics courses, and ensure that colleges and universities can cultivate those that meet the needs of social development High-quality applied talents.

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