

# Research on the Importance of University Physics Experiments to Cultivate Students' Scientific Literacy

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**Abstract:** University physics experiments are essential to cultivate students' scientific literacy. Science literacy not only helps to cultivate students' innovative thinking, but also has great significance for the development of national science. University physics experiments can effectively promote the cultivation of students' scientific literacy, but there are also some challenges. For example, the teaching staff is insufficient, and the quality of experiments needs to be improved. To solve this problem, effective measures must be taken, such as strengthening the staffing of teachers and improving the quality of experiments. This paper aims to make some suggestions for improvement by exploring the importance of university physics experiments in cultivating students' scientific literacy, hoping to provide help for the next step of practice.

**Keywords:** University Physics Experiment; Scientific Literacy; Nurture Students

## 1. Introduction

Physics is a subject based on experiment, and physics experiment teaching is an important part of the whole physics teaching, so physics experiment teaching has a very important significance in cultivating students' scientific literacy, innovation ability and improving students' comprehensive ability [1]. In today's society, with the rapid development of science and technology, the process of learning and scientific research is accelerating, university physics experiments have universal ideas, methods and means of scientific experiments, which are an important foundation for follow-up professional course internships, and play an important role in cultivating students' scientific rigorous academic attitude, active sense of innovation, linking theory with practice and comprehensive application ability

to adapt to the development of science and technology [2]. As an important method of science education for students, it can help students understand the operation of physical experiments and promote them to realize the importance of scientific spirit. Therefore, university physics experiments are of great significance to cultivate students' scientific literacy [3]. How to stimulate students' interest in exploring science, and then mobilize students' enthusiasm for exploring science in the curriculum, the cultivation of scientific literacy is very important [4]. As an important part of scientific literacy, "practical spirit" is an important quality that students obtain from experiments, that is, the spirit of inquiry, truth-seeking, and diligent study. The process of experimentation provides students with a practical platform for students to experience scientific thinking in essence, so as to form a thinking mode that applies theoretical knowledge to practical operations. In addition, experiments can help students develop an interest in learning, thereby cultivating students' spirit of Marxist inquiry. Through experiments, students are able to discover the laws of things from practice and enhance their hands-on ability [5].

It is of great significance to cultivate good experimental literacy and innovation literacy of college students [6]. Experiments can not only help students improve the theoretical level of related disciplines, but also cultivate students' scientific judgment ability in experimental practice. Although scientific theories and scientific methods can be learned from books, in order to achieve their own experimental goals, students also need to find problems, analyze problems, find solutions and make correct judgments from experiments, so as to integrate theory and practice, and at the same time master more correct scientific knowledge and methods. College physics experiments can also help students stimulate

interest and increase their motivation to learn. Most students see the experiment as a fun experience through which they can integrate what they learn. Through experiments, students can apply what they have learned and practice their true knowledge, thereby deepening their understanding of the content of the experiment, and cultivating students' observation and thinking skills, which is conducive to improving the ability to internalize knowledge in learning. It can be seen that university physics experiments are of great significance to cultivate students' scientific literacy, which can help students deeply understand the process of physics experiments, stimulate students' interest in learning, promote students to realize the importance of scientific spirit, improve students' scientific judgment ability, cultivate students' practical spirit, and prepare for future learning.

## **2. The Importance of Scientific Literacy**

### **2.1 The Importance of Scientific Literacy for Innovation and Development**

With the rapid development of society, the Chinese government attaches great importance to the innovation and development of new science and technology, and a person's ability to innovate and express himself in complex scientific tasks are the key to measuring a scientist. Science literacy is an important and living concept that keeps pace with the times [7]. The cultivation of scientific thinking skills is a necessary condition for promoting innovation and development, so scientific literacy plays a vital role in the development of society as a whole. In the current reform of science education, the cultivation of scientific literacy has important theoretical value and practical significance [8]. In essence, the scientific literacy of college students is their comprehensive learning and understanding of modern scientific knowledge, methods and abilities, and the use of the scientific spirit of thinking and realistic to conduct in-depth exploration of scientific truth [9]. University physics experiments are an effective way to cultivate students' scientific literacy. Experiments enable students to experience, understand and apply scientific principles, thereby enhancing students' scientific analysis methods and scientific problem-solving skills.

At the same time, participating in experiments also helps to cultivate students' sense of responsibility, stimulate students' teamwork spirit, cultivate students' scientific thinking, and stimulate students' innovation and creativity ability. It is precisely because of the above advantages that university physics experiments play an important role in the cultivation of students' scientific literacy.

Experiments play an important role in students' scientific literacy, and three points stand out. First of all, experiments can enable students to learn scientific truths in order to better understand and master relevant knowledge, and further enhance students' scientific literacy. Secondly, the experiment can improve the comprehensive ability of students, and the experimental process requires students to continuously accumulate experience in analyzing and solving problems, enhance students' ability to analyze and solve problems, and further improve students' comprehensive ability. Finally, experiments can stimulate students' ability to innovate. The University Student Lab is a stage for exploration and innovation, where students can better play themselves, learn and cultivate their innovative ability in the laboratory environment.

In summary, experiments can improve students' thinking ability, thereby enhancing students' innovation ability and developing society, which shows the importance of university physics experiments to cultivate students' scientific literacy. When students master scientific thinking methods, summarize their experience in solving complex problems, have enough innovative thinking and good team spirit, then they can make better use of their abilities and skills, play their role, and play a greater role in the development and innovation of society.

### **2.2 The Importance of University Physics Experiments in Developing Students' Scientific Literacy**

In today's society, the government attaches great importance to innovation and development, so it plays a vital role in the cultivation of students' scientific literacy. Cultivating a higher level of scientific literacy for the country and society is the top priority of the current task of cultivating talents in ordinary colleges and universities [10].

University physics experiments are one of the effective ways to cultivate students' scientific literacy. Participating in experiments can improve students' scientific thinking ability and comprehensive ability, and stimulate students' ability to innovate and create. In summary, university physics experiments play an important role in cultivating students' scientific literacy. University physics experiments can allow students to experience and understand scientific principles, thereby enhancing students' understanding and mastery of science-related knowledge and improving students' scientific literacy. Secondly, in the process of experimentation, students need to continuously accumulate experience in analyzing and solving problems, improve students' ability to analyze and solve problems, and further improve students' comprehensive ability. In addition, the experimental process can also cultivate students' sense of responsibility, stimulate students' teamwork spirit, stimulate students' innovation and creativity ability, and promote the development of students' scientific literacy. University physics experiments are widely used in cultivating students' scientific literacy and are an effective way. University physics experiments can improve students' thinking ability, help students develop good scientific research habits, and thus cultivate students' ability to innovate and invent in the future. Experimental teaching can not only integrate knowledge into students' thinking world, but also improve students' problem-solving skills, promote students' ability to exert their own innovation ability, and lead students to success.

In summary, university physics experiments play an important role in cultivating students' scientific literacy. Experimental teaching can stimulate students' ability to innovate, cultivate students' ability to think independently, judge independently and solve problems, and enable students to have the ability to innovate and invent and contribute to social development. The cultivation of scientific literacy is not only a necessary condition for the promotion of innovation and social development, but also for the development of students' personality. When a person has good scientific thinking ability, can be good at problem solving, proficient in analysis, and able to use his team spirit to seize opportunities, then he can better

play his personal role. In addition, scientific literacy can help students correctly understand science, promote the development of students' thinking, especially stimulate students' innovative spirit, think deeply, guide students to form an inspirational spirit of continuous learning, pursuit of perfection, courage to overcome difficulties, and courage to explore, so as to improve students' comprehensive ability.

Therefore, cultivating students' scientific literacy not only helps to improve students' problem-solving ability, but also enhances students' innovation and creativity ability, cultivates students' teamwork spirit, enhances students' thinking ability, and can correctly understand science and promote students' ideological development. The importance of cultivating physics experiments in college for students' scientific literacy is undoubtedly obvious. Experiments can enable students to grasp scientific truth, enhance students' thinking ability, stimulate students' innovation ability, and effectively improve students' comprehensive ability, so as to play a greater role in the development and innovation of society. Only by cultivating students' scientific literacy can students better play their role, promote the development of society, and achieve social progress.

### **3. The Challenge of Physics Experiments in College**

The importance of university physics experiments in cultivating students' scientific literacy is a topic worthy of in-depth study. Although university physics experiments have made remarkable achievements in recent years, there are still many challenges, such as the continuous upgrading of experimental equipment, the quality of teaching instruments to be improved, and the lack of experimental teachers for students. Therefore, in order to better realize the importance of university physics experiments in cultivating students' scientific literacy, it is necessary to start from the following aspects and strive to solve the existing challenges.

The first is to invest resources. University physics experiments require equipment and instruments to support and service their experiments, and these equipment and instruments have a limited replacement and service life. Therefore, the quality and effect

of university physics experiments are limited by the investment of experimental equipment. Therefore, laboratories, schools and education departments should increase investment to ensure that experimental equipment is updated in a timely manner to ensure the quality and sustainability of experiments. The second is to improve the quality of teaching. University physics experiment is a challenging and high-risk practical activity, teachers should be able to effectively explain the experimental principle and effectively arrange the experimental operation in the process of teaching, so as to ensure that students can complete the experimental task, so as to achieve the purpose of cultivating students' scientific literacy. In addition, teachers should also give students the opportunity to actively participate in experiments and strengthen interaction to give full play to the efficiency of experimental teaching. Finally, it is necessary to increase the number of experimental teachers. University physics experiment teachers are generally teachers with rich professional knowledge and experience, but the teaching staff varies greatly between different schools, and there is a problem of insufficient teacher allocation. Therefore, schools and education departments should increase investment to enrich experimental teachers to provide students with a good experimental teaching environment and services, so as to better explore students' scientific potential. In short, while discussing the importance of university physics experiments to cultivate students' scientific literacy, it is also necessary to consider the challenges faced by university physics experiments, and improve the quality of university physics experiments as much as possible by investing resources, improving teaching quality and increasing experimental teachers, so that university physics experiments can more effectively cultivate students' scientific literacy.

#### 4. Measures

In the face of the great challenges of university physics experiments at this stage, in order to enable students to effectively improve their scientific literacy and experimental quality, it is necessary to improve the staffing of teachers. First of all, strengthening the staffing of teachers is a necessary measure to improve the

quality of university physics experiments and implement experimental teaching. The smooth implementation of experimental teaching, including improving the technical equipment of the laboratory and adjusting the course content, depends on the technical ability of the teachers. Therefore, in order to improve the quality of physics experimental teaching, it is necessary to pay attention to the construction of teachers, strengthen the staffing of teachers, and introduce excellent teachers to guide experimental teaching. Secondly, improving the quality of experiments is also one of the important measures to improve the quality of physics experiment teaching. To cultivate students' scientific literacy, it is fundamentally required that experiments can support students' learning, and only when the quality of experiments is improved can a group of outstanding talents with correct scientific concepts be cultivated. To this end, it is first necessary to strengthen experimental management, improve the experimental environment, and ensure the safety and reliability of experimental materials and equipment. At the same time, it is necessary to improve the experimental course to make the course more colorful and ensure that the experimental content can be interesting under the premise of reflecting scientific thinking, so as to stimulate students' enthusiasm for learning. In addition, it is necessary to explore a variety of teaching modes suitable for university physics experiments, for example, in the process of experiments, teachers should encourage students to think independently, let students discover laws from reality, and actively participate in experiments. Finally, it is necessary to deeply study the latest technology and cutting-edge theory of physics experimental teaching in colleges and universities, closely link experimental technology and teaching theory, organically combine experimental teaching and theoretical teaching, and combine laboratory construction and reform with theoretical teaching, so as to reflect the scientific value of experimental teaching, so as to push experimental teaching to a higher level.

In short, strengthening the staffing of teachers and improving the quality of experiments are the keys to improving the quality of physics experiment teaching in universities. In order to give full play to the role of physical

experiments and improve the quality of experimental teaching, we must attach importance to the improvement of teacher quality and experimental equipment, and push experimental teaching to a new height with high standards and strict requirements.

### 5. Summary

In summary, university physics experiments play an irreplaceable role in cultivating students' scientific literacy. Experiments are an important way to effectively improve students' practical ability and sublimate their theoretical application ability; Experiments can enable students to grasp scientific truth, enhance students' thinking ability, and stimulate students' innovation ability; Experiments can help students correctly understand science, promote the development of students' thinking, especially stimulate students' innovative spirit, so as to improve students' comprehensive ability. Therefore, in today's rapidly changing society, university physics experiments are of great significance for cultivating students' scientific literacy. Only by cultivating students' scientific literacy can students better play their role, promote the development of society, and achieve social progress.

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