

# Research on Teaching Reform of Engineering Mechanics under "Internet +" Mode

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**Abstract.** Teaching reform in college education has always been the research direction of the school. In order to cultivate more outstanding innovative talents, every school is exploring a new way of teaching reform and new direction. How to make use of "Internet +" platform, Reform in education has become a new research topic for University teachers. Perhaps, the emergence of "Internet +" is a development opportunity of the traditional education mode, Construction of engineering dynamics education reform based on "Internet +" mode, It is a trend of the times and the inevitable choice of talents training in Colleges and universities.

## The Introduction

The word "Internet +" has been mentioned by premier Li Keqiang in the government work report of the two sessions in 2015, It has quickly become a popular new term . And be a new way of thinking in all walks of life. "Internet +" is a new form of internet development and new business mode under innovation 2.0. It is the new form of internet morphological evolution driven by the innovation 2.0 of knowledge society. "Internet +" is a further practical result of Internet thinking. It represents an advanced productive force, and promotes the continuous evolution of social mores. Therefore, we will promote the development of the society and provide a huge network platform for the reform, innovation and development of all industries. Generally, "Internet +" is "Internet + traditional industries ." Internet + education" is also a change and innovation of education form, with the help of internet platform to expand and even reconstruct the current education mode. Teaching reform in university education has always been the research direction of the school. In order to cultivate better innovative talents, every school is exploring new ideas and directions of teaching reform. How to make use of the "Internet +" platform to make education reform is a new topic for university teachers. In the "Internet + educational reform" use "Internet" provide knowledge network platform or the advanced network technology, and even to provide large data, cloud computing and artificial intelligence as a representative of a new generation of information technology, the traditional teaching method and the "Internet +" combined, so as to promote the change of the concept of education reform, achieve the goal of education teaching mode innovation. Engineering mechanics is a compulsory course for engineering students. It consists of two parts of statics and material mechanics. More content, more formulas, difficult to teach and difficult to learn. In the traditional classroom, teachers, as the center of the class, still follow "you teach, I learn; You give, I accept", Students learn without enthusiasm, and teaching does not achieve results. How to cultivate students' interesting in learning is an important part of teaching reform. And the emergence of "Internet +", which shows the advantages, may be a development opportunity of the traditional education mode. Micro-lectures, MOOCs, flipped classroom, mobile classroom, The construction of education reform based on "Internet plus" mode, this is the inevitable trend and inevitable choice for the talent cultivation in undergraduate colleges and universities. Reform of engineering mechanics under "Internet +" mode

The teaching framework of engineering mechanics in "Internet +" is shown below, The engineering mechanics teaching website is to be developed by three-layer architecture. The content includes three modules based on theoretical teaching, The modules are independent and

interdependent, They become an organic whole. Theoretical teaching module is the main knowledge system, which is the focus of study. The teaching and guidance module is the window to consolidate the theoretical knowledge and to feed back the knowledge. The practical teaching module is the ability to improve students' practical ability and discover new problems under the guidance of theoretical knowledge, so that the teaching can achieve the result with half the effort. To achieve teaching is for the purpose of not teaching. The three modules realize the perfect integration of the course. The three modules realize the perfect integration of the course.

### **Reform of Engineering Mechanics under "Internet +" Mode**

The teaching framework of "Internet +" engineering mechanics is shown in the following figure. The teaching website of engineering mechanics is to be developed by three-layer architecture. It includes three modules: theory teaching, teaching guidance and practical teaching. Theoretical teaching module is the main knowledge system, which is the focus of study. Teaching guidance module is the necessary teaching method to consolidate theoretical knowledge and feedback knowledge. Practice teaching module is under the guidance of theoretical knowledge to improve students' practical ability and the ability to discover new problems, is consolidating theory knowledge, cultivate students' innovative thinking ability and the ability to observe and necessary teaching method. The three modules are independent and interdependent, becoming an organic whole. It forms the perfect integration of course teaching.

#### **Theoretical Teaching Module**

In theory teaching module, based on course syllabus, making multimedia courseware and electronic courseware for classes and class, set up the Internet open learning platform, for students to choose study way, students can online learning anytime and anywhere, the flexibility to invoke various learning resources.

In the theoretical teaching module, the application of "Internet +" is an innovative teaching concept. Teaching should pay more attention to the people-oriented, based on the application of knowledge, let the engineering mechanics teaching intelligence, human nature, comfortable, not only the teacher taught with ease, let students learn happily. Break the traditional teaching thinking. With new teaching ideas, new teaching methods and new teaching tools to do well in teaching, To provide students with excellent education resources, Take learning as a hobby, To create a convenient learning environment for students. Add some innovative teaching ideas in teaching:

When making multimedia courseware, we can collect some application examples in engineering, Take these engineering examples into slides, Using real historical data to tell students the importance of learning engineering mechanics, so as to stimulate students' interest in learning.

With the help of the website platform of the school, we offer Micro-lectures and MOOCs, for engineering mechanics teaching. Micro-course can help students deepen their understanding and mastery of a certain knowledge point; MOOCs are different from traditional video courses, and the courses are made up of "micro-lessons", which are about 10 minutes or so. And the whole course is run through one line, Each module has a level of imitation game. Only through this level can the next module learn. This learning mode makes students feel like they are learning in play. While learning, I also enjoy the fun of "game clearance" and greatly improve their interest in learning. This model enables students to fully extend their learning space. In order to encourage students to study online, the online learning can be converted into ordinary grades as part of the overall grade.

The teaching model of "flipped classroom" is used for engineering mechanics teaching. "Flipped classroom" teaching mode refers to the students' learning of knowledge after class, and the classroom becomes the place where teachers and students interact with students. Including the answer, the use of knowledge, and so on. Students are transformed from the object of learning to the subject. To realize the "student-centered" teaching philosophy, The teacher has become the organizer and guide of the whole teaching activity, thus mobilizing the students' enthusiasm to achieve better teaching effect. This innovative teaching mode allows students with strong subjective willingness to learn, with questions in learning, students study more actively and can develop

students' independent thinking ability and the ability to deal with the problem, not rigid hard set, learning will achieve mastery through a comprehensive study.

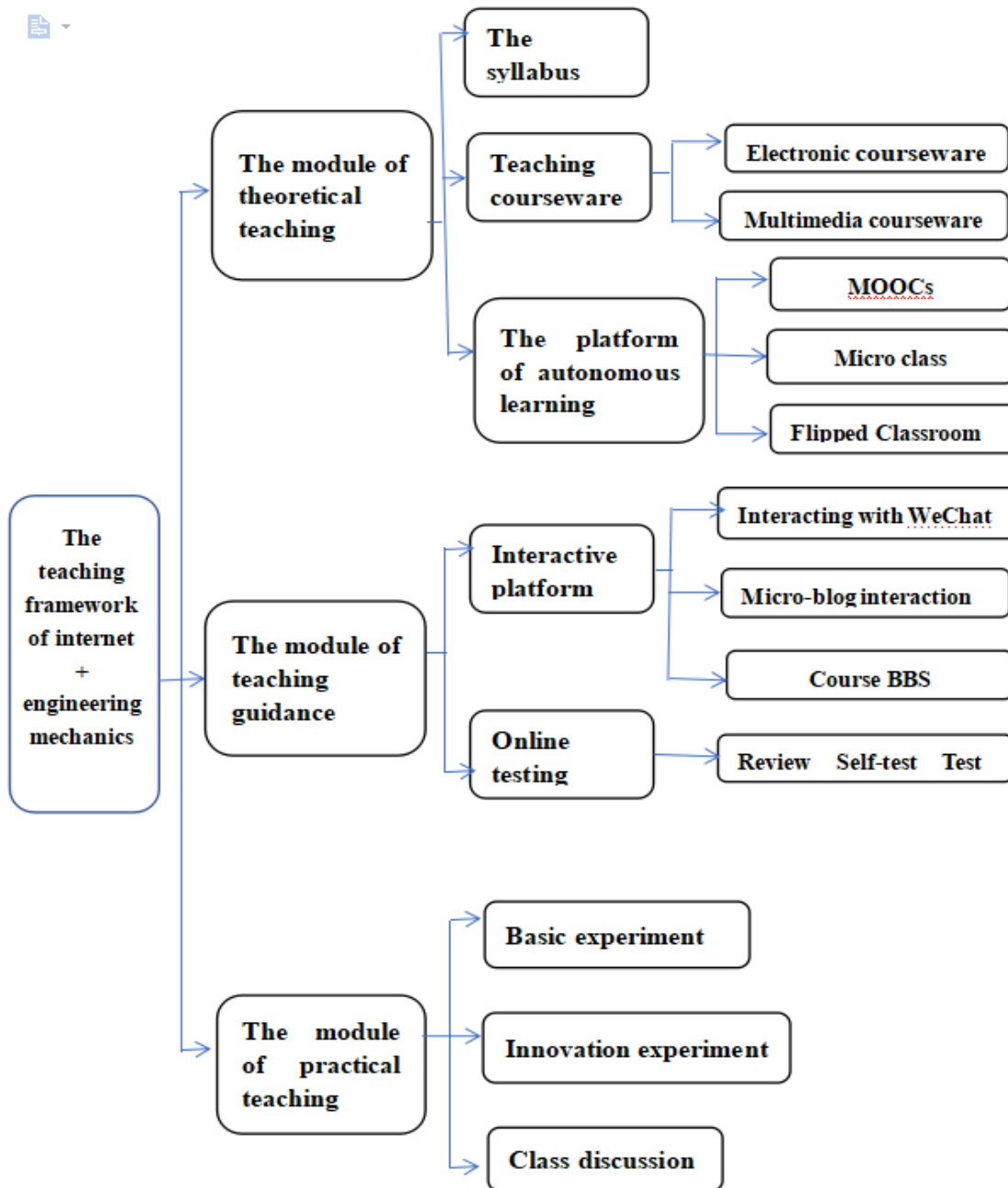


Figure 1 The teaching framework of "Internet +" engineering mechanics

### The Module of Teaching Guidance

The teaching tutorial module is divided into two parts: interactive platform and online test. On the interactive platform, students can ask questions in online messages, and teachers answer questions online. This kind of learning is not limited to the classroom, It's everywhere; In addition, through BBS, teachers and students can interact with each other to improve communication and communication between teachers and students, so as to make learning more enjoyable. The second tutorial module is online testing. In the course of autonomous learning, students can conduct periodical review, examination, self-study and self-test. Online testing comes with a standard answer, Students can find their own weak links by self-test, and have targeted learning, so the learning efficiency is higher.

## **The Module of Practice Teaching**

The practice teaching module consists of three parts: basic experiment, innovation experiment and classroom discussion. The mechanical basic experiments include the measurement of the modulus of elasticity of mild steel, the tensile and compression experiments of metal materials, and the torsion test of metal materials, etc. A group of 5-6 people, everyone can do it. Through experiments to consolidate theory, through theoretical guidance experiment. Innovative experiments and classroom discussions can provide students with a number of topics, Through the observation and analysis of a large number of scientific and technological achievements, the operation can deepen the understanding of the basic concepts of engineering mechanics, consolidate the theoretical knowledge, and cultivate students' innovative thinking ability and observation ability. The study of "Internet + "engineering mechanics.

Relying on the Internet, mobile learning and ubiquitous learning can be realized. There are several main features in the teaching reform of "Internet + "engineering mechanics: The first is that the information technology based on the Internet is supported by the learning support. Second, learning resources allow the time and space of learning activities to be fully extended. Students are free to choose the way they like to learn, Both the teacher and student face-to-face instruction and guidance in the classroom, There are also learning on Independent platform and interactive platform. The traditional teaching and Micro-lectures, MOOCs, flipped classroom and mobile classroom are fully integrated into the teaching, which complement each other. The teaching optimization of the course is realized, and the teaching time and space are greatly expanded.

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