

# Discussion on Cultivating Students' Practical Innovation Ability Based on CDIO Concept

Wang Guangfei

Yancheng Teachers University Jiangsu Yancheng 224051, China

**Abstract:** The concept of CDIO (Conceive, Design, Implementation, Operation) is an engineering education concept developed by MIT and Royal Swedish Institute of Technology for four years. This teaching model is combined with the present situation of university education in China. It can effectively improve the practical innovation ability of college students. Colleges and universities in our country are the base and cradle of cultivating talents. For most colleges and universities at the present stage, there are still some problems in cultivating students' practical innovation ability. Therefore, colleges and universities in our country should study the concept of CDIO. Through the in-depth analysis of the CDIO concept, this paper put forward the teaching mode based on the CDIO concept, the method of cultivating talents, and put forward some concrete and effective teaching models, which are analyzed from many aspects, such as school and teacher team. For the domestic tourism destination marketing influence and communication power to provide reference and reference.

**Keywords:** CDIO concept; college students; practical innovation ability

## 1. Introduction

For the current universities, the primary purpose is to improve the quality of talent training and build a school brand. In the process of cultivating talents, the most important thing is to improve the innovative practice ability of college students through effective and scientific teaching methods, so that college students can have more space for development in the future. However, the actual situation is that at the present stage, there are some problems, teaching concepts and educational conditions, which make colleges and universities can not ensure smooth sailing in the process of cultivating students' practical innovation ability, and there are many contradictions and problems. For contemporary college students, practical innovation ability has become an important part of their core literacy, and also one of their core competitiveness in the future. Therefore, the localization of CDIO teaching concept has become a new topic of wide attention to change the current teaching mode of cultivating students' practical innovation ability.

## 2. An Overview of 1CDIO Concept and Practical Innovation Ability

The CDIO concept is the most advanced engineering education concept in the world. It mainly includes four parts: conception, design, implementation and operation. It advocates that students should give full play to their subjective initiative, grasp the relationship between courses and practice, so as to learn engineering efficiently.

The development of society has entered a new period, which is bound to put forward new requirements for talent training. In recent years, the ability of practical innovation has become one of the necessary abilities to develop high-quality talents in an all-round way. For college students, we should strive to cultivate and develop their own practical innovation ability. First, practice, we advocate students to do more, experience and observe themselves in the process of learning, followed by innovation, which mainly includes innovation consciousness and spirit, that is, dare to innovate and put forward new ideas.

## 3. Analysis on the Conformity of College Students' Practical Innovation Ability and CIOID Concept

As a new achievement of educational reform, CDIO has a high degree of stability with the

cultivation of college students' practical ability. First of all, the goal of COID concept is to build a system from thinking, design, practice to operation process, and pay attention to the cultivation of students' team learning cooperation and innovation consciousness on the basis of mastering basic knowledge and practical skills. This is the same as the cultivation of college students' practical innovation ability. Secondly, according to the meaning of the two, the practical innovation ability is the fusion of innovation and practical ability, and the COID idea pays more attention to the cultivation and development of students' comprehensive quality. More can meet the practical needs of the society more attention to students' practical ability. The COID model requires that the learning objectives, practice sites, assessment criteria and innovation ability of the twelve standards are highly compatible. Finally, the practical method of discussing the COID model with the two practical methods is mainly to have a strong practicality, which is mainly to let students think, understand and learn in practice, and also fully the students to learn in the project practice, so that students really combine theory with practice. To sum up the localization of the COID concept in the current university education is very positive, which is very effective for the cultivation of college students' practical innovation ability. At the same time, the cultivation of students' practical innovation ability can optimize the CDIO model and The complement them each other.

#### **4. Significance of Cultivating Students' Practical Innovation Ability under CDIO Concept**

##### ***4.1 Enrichment and expansion of existing theoretical research***

CDIO Sinicization is of great significance to cultivate the practical innovation ability of college students in our country, but because the teaching idea was born abroad, at present, the domestic related research is relatively few, most of them still stay in the theoretical stage. Therefore, under the concept of in-depth understanding and exploration of CDIO, the cultivation of students' practical innovation ability in local colleges and universities can make up for the shortcomings of previous research, and further open the teaching of this concept in local colleges and universities. It has very important academic value and practical significance.

##### ***4.2 It opens up a new way to cultivate students' practical innovation ability***

The CDIO teaching mode accords with the characteristics of the present era, its teaching idea is scientific, systematic and creative. It is a very advanced teaching method in the field of engineering education. In its teaching idea, the combination of teaching and practice is advocated, and the key to cultivate college students' practical innovation ability is the combination of theory and practice. Therefore, the combination of CDIO concept and the process of cultivating students' practical innovation ability is a reform of college education. Students who study and graduate in this teaching mode will have higher competitiveness in society. At the same time, it is necessary to learn and popularize CDIO teaching mode.

##### ***4.3 Localization of CDIO education models promoted***

As a very advanced engineering teaching model, CDIO have been studied by many colleges and universities in China, at the same time, these schools also should continue to explore according to their own professional characteristics, and strive to make the teaching model localization. The CDIO itself has detailed regulations, colleges and universities can be based on these relevant standards, the school teaching environment, and students' training goals and other aspects of reform and improvement, to a certain extent, to provide colleges and universities with a large number of experience, which also makes CDIO engineering education and teaching ideas develop and accelerate the localization of CDIO ideas.

#### **5. Ways of Cultivating College Students' Practical Innovation Ability Based on CDIO Concept**

##### ***5.1 Construction of the Training System of College Students' Practical Innovation Ability in CDIO Concept***

###### ***5.1.1 Improving the teaching system***

CDIO requires that the teaching plan should be integrated, that is, in the process of constructing the

curriculum system, we should strengthen the students' ability of combining theory with practice from the point of view of cultivating students' ability. To a certain extent, the proportion of practical teaching in the whole teaching process should be increased to form a complete training program. At the same time, we should pay attention to the comprehensiveness and innovation of practice, set up and innovate and practice credit, control every teaching link, and cultivate students' innovative practical ability in an all-round way.

### ***5.1.2 Innovation appraisal system***

If we want to achieve the desired training goal, we need a set of scientific and complete assessment system as a supplement. The CDIO model is of great help to colleges and universities in formulating assessment standards. In this model, there are many contents that can be used as direct reference for colleges and universities to formulate evaluation assessment system. The traditional assessment method is often through the form of examination papers, which is inevitably too single to fully reflect the actual learning situation of students. In other words, when designing evaluation assessment system, we need to innovate in form, make the form of assessment more diversified, and the tools for evaluation should be more novel, this can not only investigate the students' learning situation, but also help to cultivate the students' practical innovation ability. For example, it can be assessed from three aspects, including course assessment, experimental operation and internship assessment. The score of each part can be weighted. For example, the scores of MIT students' Introduction to Aviation Engineering and Design course will be comprehensively evaluated by classroom performance (weight 10%), exercise set and reading summary (30%), LTA vehicle design topic (45%) and student personal design document set (15%).

### ***5.1.3 Build a platform for practical innovation***

In the teaching process of universities, we should build a platform for practical innovation. In fact, for college students, they often need various types of platforms to show themselves and improve themselves. For example, science competition platform, college student associations, and social practice platform. These teaching platforms built can well exercise students' practical innovation ability and improve students' comprehensive ability from multiple angles and various aspects. At the same time, these platforms are the basic support points for cultivating practical innovation ability. The construction of the practice site also needs to be innovated. Under the premise of conforming with the universality, the actual situation of students should be fully considered in the construction process, and to design a practice site that is convenient for students to learn and exchange.

## ***5.2 Cultivating high - level teachers under the CDIO concept***

In the traditional teaching mode, teachers are often only a single knowledge educator. In the CDIO concept, teachers are more as the designers of the course, and play a guiding role in the students' learning process, making a comprehensive evaluation of students' learning results and positive learning process. To improve the quality of teaching, we must have a professional teacher team, also need to specify the team teaching mode and teaching process, for college teachers, not only need to have a strong professional quality, also need to have a high teaching ability, therefore, universities should give teachers more learning opportunities, regularly organize teachers to participate in teaching and training, constantly improve teachers' own ability. At appropriate times, teachers can enter the enterprise for part-time work, learn the industry cutting-edge work experience, in order to improve their practical ability. Local colleges and universities can also invite experienced managers in enterprises to the school and combine them with the teacher team of the school to comprehensively improve the professionalism of the teacher team. The CDIO requires teachers to transform their roles. Both teaching concepts and methods need to constantly improve their own ability while constantly improving their practical innovation ability.

## ***5.3 The Practical Innovation Ability Training Program of local college students under the CDIO concept***

### ***5.3.1 Reform the current teaching mode.***

At present, the CDIO concept has become a hot topic studied in the field of education. Therefore, local colleges and universities should take the initiative to learn from experience and constantly reform their own teaching mode, including teaching content, teaching methods and the design of teaching courses, constantly enrich and develop the school's own teaching mode. At the same time, the school

should also actively guide the students to participate in the practice more frequently, so that the students can combine the theory with the practice, and constantly improve the teaching quality and efficiency.

### ***5.3.2 Social practice is a very important part***

For colleges and universities in the process of carrying out teaching activities, need to bring social practice into the teaching system, let the students in the process of learning for four years, have full practice opportunities, the school needs to pay great importance to this respect, at the same time, schools should also enrich the form of social practice, let students have higher enthusiasm to participate in the social practice. Some representative social practice activities such as exercise, actively participate in community volunteer service activities, and three to the countryside activities, these different types of activities can be very good, let students in practical innovation, at the same time, the school should combine with the government and enterprises, expand the social practice platform, establish a complete college students social practice system, so as to comprehensively improve the practical innovation ability of college students.

## **6. Conclusions**

The CDIO concept is derived from advanced teaching ideas abroad. Therefore, local colleges and universities in China should make full use of their own characteristics to cultivate students' innovative practical ability. At the same time, colleges and universities should constantly strengthen their teachers, improve their teaching level from many aspects and cultivate students with high practical innovation ability.

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