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The improvement of the training and education quality in Vietnamese universities by accessing the CDIO

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Abstract: The nature of CDIO is a systematic approach to development of outcome-based training programs for input design. This process is built to ensure the science and practicality closely. So, it can be said CDIO is actually a solution to improve the quality of training, meet the social requirements, on the basis of defining the output standards, from which design programs and training plans in a way too. So far, the CDIO program has expanded to more than 50 universities across 25 countries, including the United States, Canada, France, New Zealand, the United Kingdom, Sweden, Finland, South and Portugal. In Vietnam, the application of CDIO is in the early stages of testing. In the 2009-2010 academic year, Hanoi National University and Vietnam National University Ho Chi Minh City started to apply CDIO to train some branches at member universities.

Keywords: CDIO, improvement, training and education, university

1. Introduction

CDIO is a systematic methodology for developing an engineer training program, but in essence, this is a standard-based, outcome-based training process for input design. This process is built to ensure the science and practicality closely. In general, the CDIO can be used to develop standardized procedures for a variety of training areas outside the engineering training sector, as it ensures knowledge and skills frameworks, such as those applied to business disciplines, business management, etc. So, it can be said that CDIO is a solution to improve the quality of training, meeting the social requirements, on the basis of defining the output standards, from which Design effective training programs and plans.

Training in the CDIO model, students need to achieve the four blocks of skills, knowledge and graduation, students will be developed skills, knowledge (see this article 4). The goal of CDIO training is to help students gain the hard and soft skills they need when they graduate, meet the needs and requirements of society as well as catch up with the fast changes of real life. Good students can master, lead the necessary change in a positive direction.

According to assessors, the benefits that CDIO training provides are: Linking the training facility to the employer's requirements, thereby narrowing the gap between the school's training and love. Bridge of the human resource use; Help learners develop holistic "hard skills" and "soft skills" to quickly adapt to the ever-changing working environment and even lead the change; Help the training programs are designed and designed in accordance with a standard procedure; The process of training is linked and closely linked science; Link development of training programs with transfer and evaluation of higher education (HE) performance, contributing to improving the quality of HE.

The "CDIO" approach (referred to as "CDIO" approach) is a way to approach a theoretical model of output-oriented training in technical universities. This theoretical model provides a scientific basis and a set of quality standards that assure that tertiary technical institutions address two key issues: What kind of skills, skills, and attitudes are there when leaving college, and at what level of competency? And how can we do better in ensuring that students gain these skills?

The CDIO model is based on the philosopher's ability to develop the pillar's capability to meet the principle of implementing the life cycle of the product, process and system. - Conceive - Design (Design - Implement and Operate in the context of business and society.

From the practical experience in developing the curricula in Vietnam and in its unit, Dr. Do The Hung (Quality Assurance and Testing Department - Hung Yen University of Technical Education) has proposed the program CDIO training needs to be done in five steps, including: • Matching current curriculum with new learning outcomes; Design training curriculum framework; Design instructional syllabus for standardized topics on skills, attitudes; Distribute the sequence of teaching subjects into subjects; Design outlines of subjects.

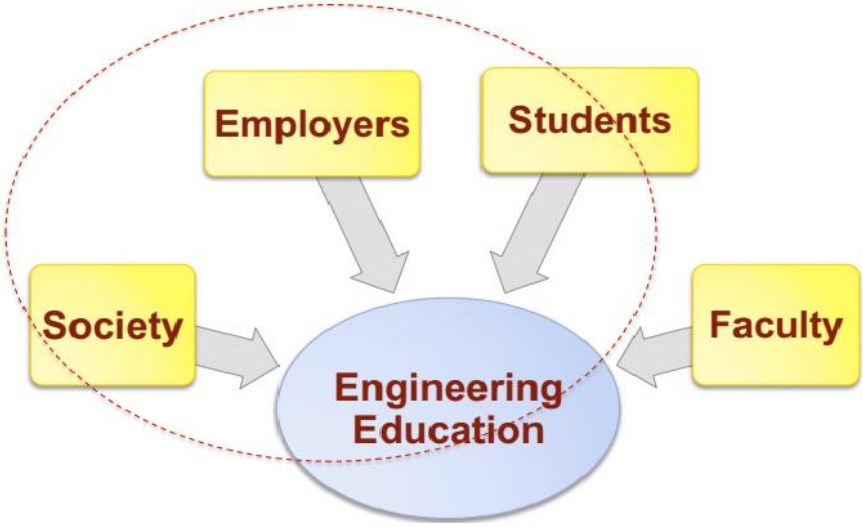

Figure 1. Involvement of stakeholders in CDIO development

Integrated learning and active experience

Under the CDIO approach, students will learn personal skills, communication, product design, process and system skills, and industry knowledge in the context of professional practice. That is integrated learning. Integrated learning has the advantage of allowing students to use double time to learn while learning skills.
But to be able to use the dual use of study time, it is important to have new teaching and learning methods, to make the most of the time but not to degrade the program. The new theory is already dense in content. Teaching and learning based on active learning methods and experiences is a solution to the above problem.

According to Dr. Do The Hung, integrated learning experiences in the CDIO model lead to the acquisition of specialized knowledge, as well as personal and communication skills and skills in product design, system. These are pedagogical methods that promote specialized learning while simultaneously learning personal and communicative skills, and product, process and system building skills.

They incorporate practical professional technical issues into contexts in which they exist with specialized problems. For example, students may consider the analysis of a product, the design of the product, the social responsibility of the designer of the product, all in one exercise. Business partners, former students, and other key stakeholders are often very helpful in providing examples of these exercises.

Teaching and learning based on active learning approaches based on the CDIO model include methods that engage students directly in thinking and problem-solving activities.

There is less passive communication but more emphasis on engaging students in exploring, applying, analyzing, and evaluating ideas. Active learning in lectures-based disciplines may include methods such as discussions with peers or small groups, demos, arguments, conceptual questions, and feedback from students. About what they are learning.

Teaching under the CDIO approach

The philosophy of teacher education is to inspire students to be inspired by what the teacher will do in the role of "spiritual engineer" in the high school; The philosophy in the CDIO approach will be towards the development of core competencies for graduates: Conceptual Design - Design - Deployment - Complete the teaching and learning process in the context of education innovation. The school is oriented towards standardization, modernization, socialization, democratization and international integration.

According to Dr. Do The Hung, the principle of teaching here is to promote active and active students in the process of building each individual's knowledge; Calculate the problem of teaching and learning situations and ensure consistency between the learning outcomes and the teaching and assessment activities. Methods, strategies and techniques of teaching should emphasize active and experiential teaching and have specific orientations.

It is: Teaching by organizing learners to practice hands-on professional activities in educational practice, integrative teaching, career orientation, personal and social development, and communication. The system of teaching methods and techniques in this model to guide effective use in practice include: Experiential learning, Problem based learning, Project based learning, Case study.

2. CDIO standard

CDIO consists of 12 standards, a summary of the CDIO standards as follows:
Standard 1: Focus on the philosophy of the program,
Standards 2, 3 and 4: The development of training programs,
Standards 5 and 6: Designing and implementing experiences and workspaces,
Standards 7 and 8: New teaching and learning methods,
Standards 9 and 10: Developing trainers,
Standards 11 and 12: Evaluation and accreditation.

Specific 12 standards as follows

Standard 1: Background
This standard is derived from the principle that the development and implementation of product life cycle, process and concept formulation, design, implementation and operation are the technical education context;

Standard 2: Output standard
Specific output specifications, specific to personal and communication skills, product design skills, processes, systems, and expertise should be consistent with program goals and approved. By stakeholders of the program;

Standard 3: Integrated training
The curriculum is designed to have specialized learning courses that support one another, with a clear plan for integrating personal and interpersonal skills, product design, process and systems skills. Theung;

Standard 4: Introduction to engineering
A referral provides a framework for technical practice in the design of products, processes, systems and the introduction of essential personal and communication skills;

Standard 5: Designing - implementing experiences
A training program of at least two design-implementation experiences, including one at basic level and one at advanced level;

Standard 6: Technical Workspace
Technical workspace and support laboratories, encouraging hands-on learning in product design, processes and systems; specialized knowledge; Study social;

Standard 7: Integrated learning experiences
Integrated learning experiences lead to the acquisition of specialized knowledge as well as personal and communicative skills, product design, process and system skills;

Standard 8: Active Learning
Teaching and learning based on active learning experience;

Standard 9: Capacity building for trainers
Capacity building activities for trainers in personal and interpersonal skills, product tectonics, processes and systems;

Standard 10: Enhancing the teaching capacity of faculty members
Actions for enhancing the faculty's capacity to provide integrated learning experiences, in the use of active learning methods and in student learning assessments;

Standard 11: Academic Evaluation
Assess students' learning of skills and communication, product tectonics, processes and systems as well as specialized knowledge;

Standard 12: Accreditation
A program accreditation system complies with these 12 standards and provides feedback to students, faculty and other stakeholders for continuous improvement.

Standard CDIO program output consists of 4 items:

- Knowledge and technical reasoning
- Personal and professional skills
- Communication and teamwork skills
- Form ideas, design, implement and operate in the business and social context.

Develop a CDIO training program that meets the needs of student learning to help the team become engineers with professional knowledge, social consciousness and creativity to create products, systems, and processes, process complex, value-added.

According to the CDIO approach, when building and developing a training program, strict procedures must be followed: setting the learning outcomes, designing the curriculum framework and the way it is delivered in practice. Evaluate learning outcomes as well as the entire training program. The key of CDIO is the CDIO outline. This is a statement on the objectives of the training program that the 12 CDIO standards are designed to achieve.

CDIO aims to develop higher education with 12 standards such as design of basic to advanced curriculum, study space, assessment of curriculum, integrated curriculum or active teaching and learning methods ... With the current training methods, the schools offer training programs and then define the standard of output, which makes the recruiting units have difficulties, especially high quality human resources. Therefore, the reality in Vietnam in recent years is to force the recruitment units to retrain or supplement knowledge and skills after recruitment. Meanwhile, CDIO provides high quality training and human resources, because the training program is designed based on a thorough examination of the socio-economic requirements that employers demand. This helps to reduce costs and resources related to training. On the SV side, they will be well trained, developed in knowledge, skills and attitudes; Instructors must follow advanced teaching methods that meet the standards of scientific research, thus contributing to the creation of a high quality, internationally qualified faculty.

In addition, the CDIO model gives a more comprehensive view of the teaching and learning methods as well as the student's assessment or faculty capabilities. In addition to providing a template of output standards, CDIO promoters also provide very specific guidelines on training and management methods such as entrepreneurial spirit, leadership in higher education, professional development of trainers Associating business with HE, internationalizing HE, project-based learning, framing program improvement, informal communication skills, learning experience and learning initiative, learning environment, testing , Evaluation ... so it is very useful in the application and deployment.

In the CDIO curriculum, each subject, at different angles, contributes to the achievement of the standardized output of the entire curriculum. As a result, each faculty member must adhere to the program standards and commit to passing on the course content delivered by the instructor.

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3. Conclusion

CDIO not only provides an output standard but also a clear guideline for training and management such as leadership, management of higher education, development of professors with deep expertise, With higher education institutions, project-based learning methods, teamwork, frameworks reform, informal communication skills delivery, experiential and proactive learning, training program design, Schools, examinations,

assessments, internationalization of HE ... Therefore, it can be said that CDIO is very useful in deploying effective training programs as one of solutions to improve the quality of HE. Today, universities around the world are adopting more and more widely the CDIO model and its strengths and validity have been confirmed, tested over time, practiced in many different schools.

However, the concept, procedure and application of CDIO is a new problem for universities and colleges in Vietnam. Obviously, access to CDIO requires basic conditions: facilities, faculty, staff, training programs, students, ... meet basic standards of CDIO, copper The time must have a consistent and standardized process system to ensure the success of the program. CDIO requires following a rigorous process from the field survey and survey to determine the requirements of the social sciences for training products to the design, organization, and evaluation of the program. These are great challenges for Vietnamese universities. But that does not mean we cannot do it. Changing awareness to take proper action in applying CDIO will certainly bring about a practical effect for improving the quality of higher education in Vietnam in the present and in the future.

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