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REVIEW ARTICLE

## INTEGRATION OF TEAMWORK SKILLS IN TEACHING IN ORDER TO MEET THE LEARNING OUTCOMES IN THE CDIO SYLLABUS: APPLICATION TO TECHNOLOGY AND ENGINEERING

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### ARTICLE DETAILS

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### ABSTRACT

With the goal of fundamental and comprehensive innovation of higher education towards shifting the educational process from mainly equipped with the knowledge to the complete development of learners' competencies and qualities, universities have made many innovation initiatives to meet the increasing demands for higher education. To implement the above objectives, one of the innovations is to apply the CDIO approach as a standard framework for developing training programs, advanced training techniques to meet social needs and response, and international quality standards. Improving teaching capacity for teachers through the selection of teaching methods integrated between teaching professional knowledge with personal skills and interactive skills compatible with output standards and methods evaluate the effectiveness. Teamwork skills are a CDR on skills in CDIO syllabus, so it is necessary to implement teaching, organizing and evaluating group activities. The paper focused on the organization and method of implementing group activities in each class when implementing the training program by the CDIO approach.

### KEYWORDS

CDIO approach, Learning outcomes, CDIO Syllabus, Integrated curriculum, Teamwork skill

### 1. INTRODUCTION

CDIO is a system of methods and forms of accumulating knowledge and skills in training students to meet the requirements of business and society [1]. CDIO provides a very specific and comprehensive guide on how to develop learning outcomes, curriculum frameworks, build learning environments, teaching and learning styles, and how to evaluate teaching and learning [2]. In essence, CDIO is a standard training process, based on the learning outcomes to design and organize training programs (outcome-based) [3]. The core and basic values of CDIO output standard are universal for many training programs built from specific learning results. Therefore, training under the CDIO approach is completely feasible for new construction or "improvement" of existing training programs in universities. One of the effective, already implemented and applied approaches for more than 116 universities in the world is the "CDIO" approach [4]. The "CDIO" approach is a model of educational reforms in technical universities towards meeting the needs of careers in the corporate and social context. It provides a very specific set of tools (including 12 standards) that guide schools to build an integrated training program to develop the learners' essential competencies so that they can fulfill their tasks. In professional activities; directing the effectiveness of the training process to help the school do better informing those capabilities for learners [5]. The "CDIO" approach helps us to more comprehensively look at a modern teaching model (teaching based on output capacity) in university education.

On the path of integration to develop, Vietnam Maritime University is always at the forefront of the renovation of education and training. With the mission of providing high-quality human resources, serving the economic development of the Northern Coastal Region, Vietnam Maritime University has a vision to 2020 in the group of 10 best universities in the country. By 2030 across the region's universities. One of the key tasks to achieve this goal is to build an international standard training program. Specifically, in 2017, CDIO will be implemented and rebuilt the 4-year training program and international integration [6].

One of the highlights of applying CDIO is the integrated curriculum [7]. According to the CDIO official website, CDIO's vision is to: Integrate professional skills such as teamwork and communication; Enhance active learning and experience; Continuous improvement through a high-quality assurance process; Enrich the course with student-designed projects - build and test. Understandably, the CDIO approach aims to train students to develop comprehensively both knowledge, skills, attitudes and practical capacities (called C-D-I-O capacity) and have a sense of responsibility to society [8].

Innovating teaching methods is to improve the quality of education [9]. One of the innovative methods currently evaluated by universities is highly effective is a group discussion method to meet the output standards of the training program by CDIO approach. Currently, group learning is both a requirement in the output standard and a recommended method of





Figure 3: Team development stages [28]

The topic of group discussion may be topics for groups to go home to prepare or may be topics that they discuss on the spot, including:

- Must set specific tasks of each group by the question. The question must be clear, unambiguous, puzzling;
- There must be specific instructions on requirements and orientation of working methods;
- Discussion time must correspond to the required content of the discussion.

#### 2.4 Arranged time

Group activities should take place regularly, and activity is alternating with lectures by teachers (the end of an extensive lecture, after the end of a topic or before moving on to a new topic) [29]. This will help students to be bored and teachers timely grasp the level of learning of students, thereby orienting to adjust and supplement knowledge and reference materials for students.

With the topic of students coming home, they must determine the specific time when they will give presentations, the maximum and minimum time for each topic is so that students can take the initiative.

With topics that require the application of knowledge of the whole subject, the teacher can present the students to the final periods at the end of the course.

#### 2.5 Organizing group discussions

There are usually two options for teachers to present lesson groups: first, randomly call any person in the group to give a presentation; secondly, for students to choose people to give presentations.

To ensure that all members of the group must work, avoid relying on others, right from the first day when assigning the group, we announce before the class that maybe we will choose 1 in 2 options [20].

If we choose the second option, we can randomly call any member of the group to summarize what the group has done. Then give the group a presentation. This work will help to avoid work that is concentrated only in some students and does not promote the effect of group work [30].

If any group has someone who does not prepare a card, the team leader will not report it; the group will be deducted. Create a lively classroom atmosphere by having class members discuss issues that students present. Lecturers only play a role as a bridge for the students to work together.

When a group makes a presentation, the other groups pay close attention and then make comments and ask questions. Groups with good questions and accurate comments will also earn points [31]. But to ensure that all

members of the class are attentive, the instructor can point to any member of the remaining groups who will comment and ask questions.

Often students will ask a lot of questions. Avoid too long a time to answer questions. Teachers can choose right questions for group presentations to answer. Teachers who answer questions are also randomly assigned by teachers. The remaining questions can give students home answers and return them to the class and lecturers.

In addition to the pre-prepared problems, teachers can ask unexpected questions [32]. Innovative questions from students [29]. In the process of discussing, teachers go to each group, listen, open and explore which groups work more effectively so they can invite the group to present in front of the class, and other groups listen and receive review by acquiring both self-study skills and teamwork skills, students will have a habit of proactive and progressive learning [33].

#### 2.6 Evaluate group activities

Summary of evaluation is the final stage of discussion. The assessment and conclusions of lecturers also significantly impact on the quality of teamwork. After the teams work out the products, if the teacher evaluates the good, not good details of the product, compare the outcomes of the groups together so that students can realize their pros and cons. then the lecturer raises the conclusion that the student will understand deeply and master the problem; At the same time, students will be more determined in the next lesson [34]. Conversely, if the teacher does not evaluate the product and the work of the student will cause students to lose interest and motivation to work and so group activities will not be effective.

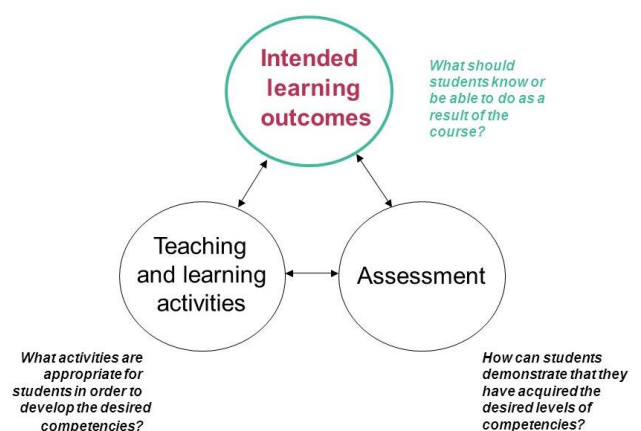


Figure 4: Constructive alignment with teaching and assessment [34]

##### 2.6.1 Students self-assess the group's work results

There is a current fact that even though the lecturer has divided the group, assigning tasks to the group. But many students with a habit of relying on other students did not join the group at home. Just wait for the other



students to do and set to benefit. Especially with the current credit-based training system, the percentage of test scores of accounts for 50% [35]. But teachers can only know the contribution of the students in the class [36]. But discussions at home will not be grasped. So assigning the group's task is to score points for each member of the group about the contributions of each member to complete the homework group. And the contributions of each team member in the class.

### 2.6.2 The group assessed each other's work result

Let the groups give themselves to each other, this is a channel to ensure students promote their ability to review reviews. And also help teachers can provide the most suitable final result [29].

### 2.6.3 Teachers evaluate and comment on the working results of groups

This work can be carried out in parallel or after there is an evaluation among the groups. Teamwork assessment: Whether working groups have science or not. Those who are positive, who are lazy or do their things, need to learn from experiences, ... Teachers should comment specifically and objectively, and it is best to give points to encourage students' learning spirit. To avoid the dependence and laziness of some students in the group, it is necessary to assess the results of the Executive Council based not only on the overall performance of the group but also on the contribution of each group member [23,33]. The average score of the group is based on the quality of group activities (level of understanding of issues, skills of expression/presentation, answering questions, cooperation spirit among group members) [37]. The score of each student is calculated by the average rating of the group taking into account the contribution level of each contributing to group activities.

### 2.6.4 The role of the teacher

Create an exciting and relaxed classroom atmosphere by enhancing the dialogue between faculty and students. In addition to providing knowledge from books, teachers need to provide a lot of practical knowledge [19]. During the school hours, it is necessary to integrate practical knowledge collected from the internet, television, and books for students. Providing such experience will help you feel more excited during class.

In group work of students, lecturers still have an important task to summarize the issues discussed, evaluate the right and wrong ideas and solve students' questions around that issue [38]. This review is very important because it will help students understand the basic knowledge needed. Besides, for students to be able to do their roles well, the lecturers need to provide sufficient reference materials for students, so that they can study and study on their own.

Another requirement is that teachers must deeply understand the content of teaching, master knowledge, know how to process it according to pedagogical intentions and know how to convey it to students [39]. Trainers must have the ability to teach, enthusiasm. Must know constantly update new information and know how to apply it to their teaching work [21]. Thus, new teachers can help students to be active, proactive, promote creative ability in the learning process [40]. Lecturers with a lot of knowledge, many ways to organize and brief and clear presentation with enthusiasm in group discussions will facilitate communication of knowledge to students in an effective and successful way [24].

## 3. CONCLUSION

CDIO training is a model that links training institutions to the requirements of employers, thereby narrowing the gap between the school's training and the needs of human resource users; help learners develop comprehensively with "hard skills" and "soft skills" to quickly adapt to the changing work environment and even take the lead in changing it; help training programs to be built and designed according to a standard process; the training process is interconnected and closely linked with science. Implementing the integration of personal skills and

teamwork skills, communication in teaching to meet the output standards of the training program under the CDIO approach will help students to graduate the requirements of the training objectives are not only about knowledge standards, industry arguments but also students' skills and attitudes.

Group teaching methods have many positive effects in improving the quality of teaching and training at the university level. However, the application of this method in Vietnam Maritime University is still limited. To improve the quality of higher education today, each teacher, Department, Faculty, School, and Ministry of Education and Training should take practical measures to overcome the above limitations, to quickly bring Higher education in Vietnam develops and integrates with countries in the region and the world.

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