

University teaching strategies in the context of the fourth industrial revolution

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Abstract:

Developing new teaching techniques is essential to the current reform of higher education, but it's also a very difficult endeavor. To put the required reforms into practice, teaching methodologies must alter. Additionally, managers in the education sector are forced to actively create visions, innovate strategies, and teach methods in order to train quality human resources to meet the development needs of society in the technology 4.0 era. This is because the education sector bears a heavy responsibility due to the strong development of the 4.0 industrial revolution. This article examines a few widely used university teaching strategies around the globe and offers some innovative ways to improve upon the present paradigm.

Keywords: University, teaching methods, industrial revolution 4.0.

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I. Introduction

In the digital age, lecturers need to innovate teaching methods, flexibly combine traditional teaching methods and active teaching methods, and at the same time apply the achievements of science and technology to innovate teaching methods to improve students' initiative and creativity in learning. In today's higher education institutions, there are six issues related to student learning activities. They are:(1) Many students are dependent on the classroom, leading to a lack of ability for independent learning. (2) Students who read textbooks and understand the lecture are the same, leading to less debate and criticism of thinking. (3) In terms of learning status, students have little learning how to ask questions, study questions and solve problems (4) The curriculum is too much inheritance, too little innovation. (5) Little learning makes it interesting. Learning needs to be interesting to really mobilize students' interest and it is an internal motivation to learn. (6) In academic standards, there is usually too much, too little personality. Students' academic requirements tend to be homogeneous, so students are trained to be the same, but lack personality.

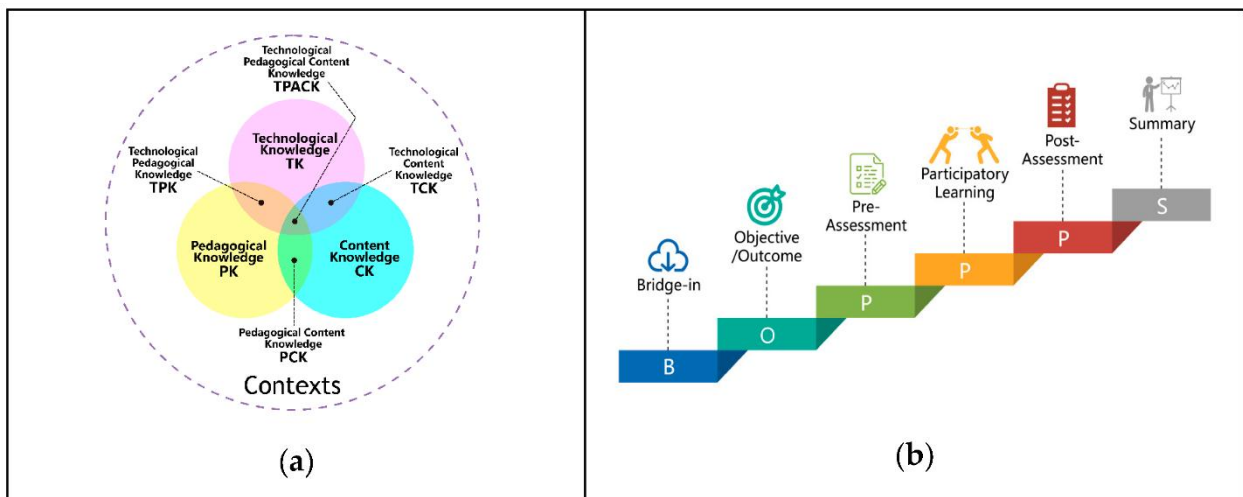
Vietnam is in the transition period to a knowledge economy, and the role of universities contributing to economic growth has become more important than ever. One of the main challenges faced by universities is how to train students to meet the development needs of society. One of the approaches to improve the quality and standardize the training program in engineering and technology is the CDIO program - Conceive – Design – Implement – Operate. As learning outcomes change, teaching and learning activities must also change accordingly. After developing the output standards for the training program as well as for each specific subject, the next question for the lecturer is: "How can we help our students achieve those goals?" This means that we need to pay attention to the methods of organizing teaching and learning for students throughout the training program as well as for each specific subject in a highly effective way to be able to meet the expected output standards.

One of the characteristics of the technical and technological training program according to the CDIO approach is the integrated curriculum (Figure 2). This means that the training program must have specialized knowledge courses that support each other, have a clear plan in integrating personal skills and communication interactions, as well as skills in creating products, processes and systems (Edward et al., 2007). Thus, in order to be able to organize training according to the integrated program, lecturers and students themselves need to be equipped with integrated teaching and learning methods to be able to adapt and achieve the goals of this new program

For skills output standards, lecturers also need to have specific and purposeful teaching plans and methods. For example, asking students to work in a team does not mean that they will learn effective teamwork skills. Issues such as how to form a team, how to plan and divide work within the team, and how to resolve conflicts within the team,... need to be taught clearly. Effective learning only occurs when teaching activities provide specific opportunities for students to practice, reflect their experiences, and they are applied theoretical concepts. This is a huge challenge for the majority of Vietnamese lecturers who have not yet been fully and uniformly trained in new teaching methods.

II. Methodology

The objectives of the lesson include the focus on economics, skills (KN), and practical application. Lesson objectives need to be clear and measurable, emphasizing what to use the lessons for. The general objective of the lesson is not in the style: Students understand, students understand,... but it needs to be clear and specific, such as: students can install circuit diagrams, students can write an advertisement, students can design,... When there are clear goals, the assessment of students' learning results will ensure accuracy, fairness and objectivity. The number of goals in a lesson should not be too large to be satisfactorily solved and it is necessary to emphasize what learners know what to do with the KT that has been occupied. Therefore, the goal first needs to be in line with the curriculum, the ability to apply the curriculum (the requirements to be achieved by the curriculum) and in accordance with the actual conditions (governed by the students, time, facilities, equipment of the school, the capacity of lecturers,...). Too many goals in a lesson will not guarantee feasibility. Teaching activities run according to numbers, making both teachers and students under pressure, not having time to "absorb" the problem, to focus on students' activities, especially practical activities to apply the knowledge they have occupied. Therefore, when developing a lesson plan, teachers need to focus on the big issues that represent the central goal of the lesson. Determining the number of objectives of the lesson plan is very important and necessary because it determines the number of main activities that teachers organize and guide students to perform.



Develop teaching activities for each part of the lesson content corresponding to the objectives - Design activities to guide students to form a key curriculum: The purpose is to help students understand the curriculum, practice new curriculum and integrate them into their existing curriculum system. Teachers guide students to occupy the new curriculum on the basis of comparing the curriculum and experience with new understandings, connecting/arranging the old curriculum and the new curriculum based on speaking, writing new conclusions/concepts. - Design activities to guide students to practice inculcating accounting: The purpose is to help students consolidate and improve the accounting and learning that they have just learned. Teachers will ask students to do specific exercises like the exercises in the process of forming the curriculum to express the curriculum correctly or describe the curriculum in their own way and apply it directly to solving learning situations/problems. Normally, the consolidation and evaluation are carried out at the end of the new technical understanding organization to consider the extent to which the teaching objectives have been achieved. The basic requirement of consolidation and assessment is to rely on the objectives of the lesson, aiming at the core of the lesson. Therefore, the form of reinforcement assessment (by questions, situation exercises, ...) must focus on helping students master and apply economics, and at the same time help teachers know how well students understand and are able to apply economics. - Design activities to guide students to explore and apply technical skills: The purpose of the activity is to help students apply technical and technical skills to solve new situations/problems, which are not the same as those that have been instructed or give reasonable responses to a new situation/problem in learning or in life. Teachers will guide students to connect and rearrange the students they have learned to successfully solve new situations/problems. These can be research and creative activities. Therefore, teachers need to help students take advantage of the guidance of their families and communities when performing learning tasks.

It is expected that some measures to be used to contribute to improving the quality of teaching Teachers need to take into account attracting students' attention: What tactics to use? How to diversify learning activities? What teaching methods and techniques will have advantages over the lesson? Compliance with rules

and codes of conduct in class: Leading and controlling students, caring and cooperating, behaving with positive and negative expressions. Expectations for the subjects: Which students need to be praised, which students need to be paid attention and encouraged to participate in the lesson; What measures are used to create friendliness and interact effectively with students with low expectations? It is expected that how to adjust teaching activities to different groups/subjects of students needs more attention or unexpected situations that occur in the lesson.

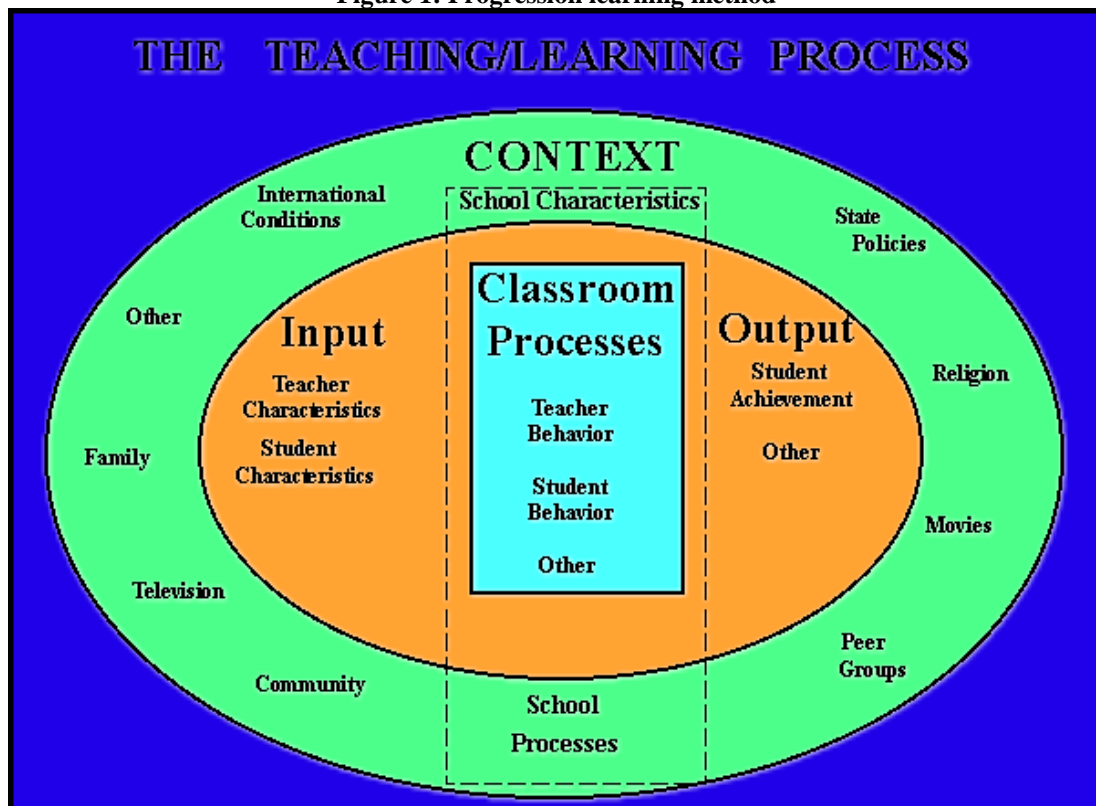
III. Result

Brainstorming method Brainstorming method is defined as a way to apply each person's experience and initiative in the minimum time depending on the problem to get the best information (Osborn, 1963). Brainstorming is a method that helps students in a short time come up with many ideas, many assumptions about a certain problem, including many creative ideas. Implementing this method, the lecturer needs to provide a system of information as a premise for the discussion. This method can meet the output standards according to the CDIO outline such as: Creative Thinking, Solutions and Proposals.

Think-pair-share method:

This method is done by having students read a document or think about a topic, then the students sit next to each other and exchange their opinions and experiences for a certain amount of time (about a few minutes). then share it with the class (Lyman, 1987). This method has the advantage of being very easy to implement all classroom structures, anyone can participate in sharing their opinions, creating confidence for learners to dare to speak their thoughts (this is a weakness for most Vietnamese students). help students focus on the topic they are learning, know what they are learning and how much they understand the problem, and even raise new problems for the lesson. This method can help achieve output standards according to the CDIO outline such as: Communication structure; Critical thinking. (fig 1)

Figure 1: Progression learning method

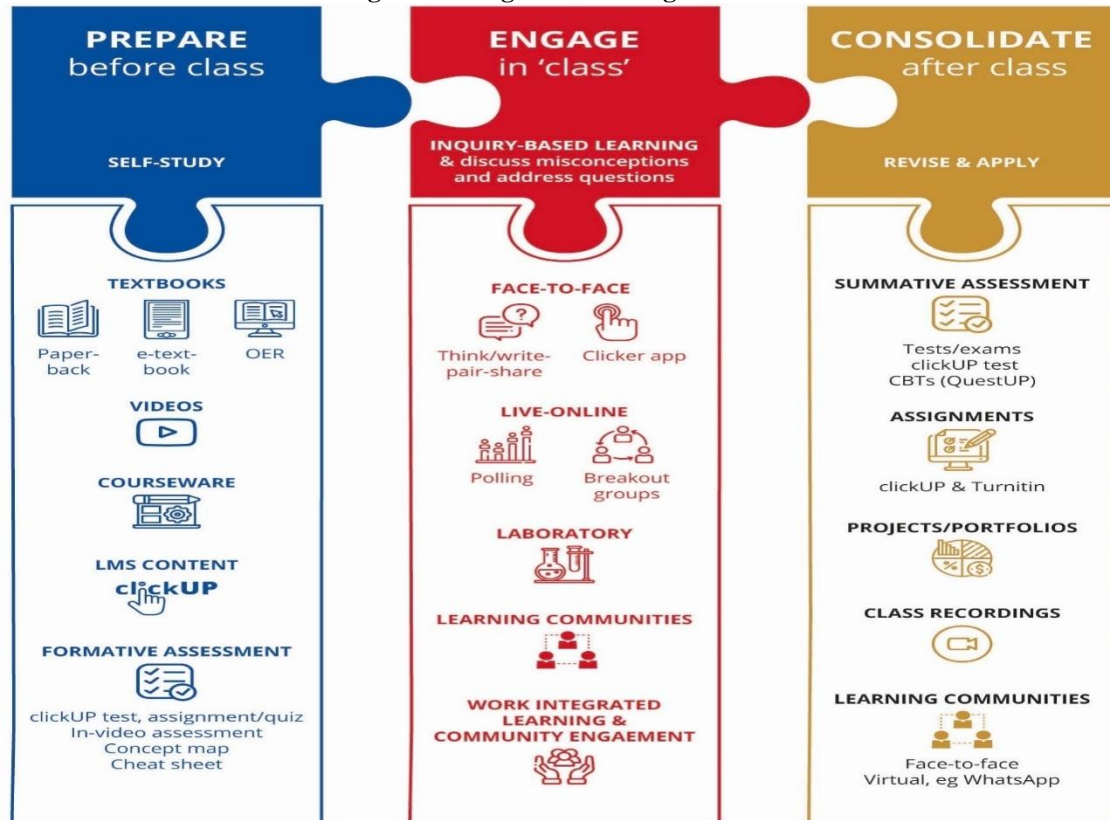


Source: <http://www.mdc.edu/ci/servicelearningoverview.asp>

Group based Learning Classes are divided into small groups of 5 to 7 people. Depending on the purpose and requirements of the learning problem, groups are randomly or intentionally divided, maintained stable or changed in each part of the subject, assigned the same task or different tasks. When working in a group, members must work according to the regulations set by the lecturer or by the group itself. Members must work proactively, they cannot rely on a few more knowledgeable and dynamic people. Team members help each other to learn about the issues raised in the atmosphere of emulation with other groups. When one group gives a

presentation, the rest of the teams have to ask critical questions or suggested questions that clarify the problem. The group activity method helps team members share their concerns and experiences, and build new awareness together. By saying what they are thinking, each person can clearly recognize their level of understanding of the topic and see what they need to learn more. Lessons become a process of mutual learning rather than passive reception from lecturers. This method can help achieve the output standards according to the CDIO outline such as: Teamwork skills, communication skills. (fig 2)

Figure 2: Integrated learning methods



Source: <http://www.mdc.edu/ci/servicelearningoverview.asp>

Role playing is a method of organizing students to practice certain behaviors in a hypothetical situation. The role-playing method has advantages: students are trained to practice behavior skills and express attitudes in a safe environment before practicing in practice; arousing interest and attention for students; creating conditions to give rise to students' creativity, encouraging changes in students' attitudes and behaviors according to ethical and socio-political behavioral standards, it is possible to immediately see the impact and effectiveness of the words or deeds of the roles (Kritzerow, 1990). This method can help achieve output standards according to the CDIO outline such as: Critical thinking; Awareness of one's own personal knowledge, skills and attitudes

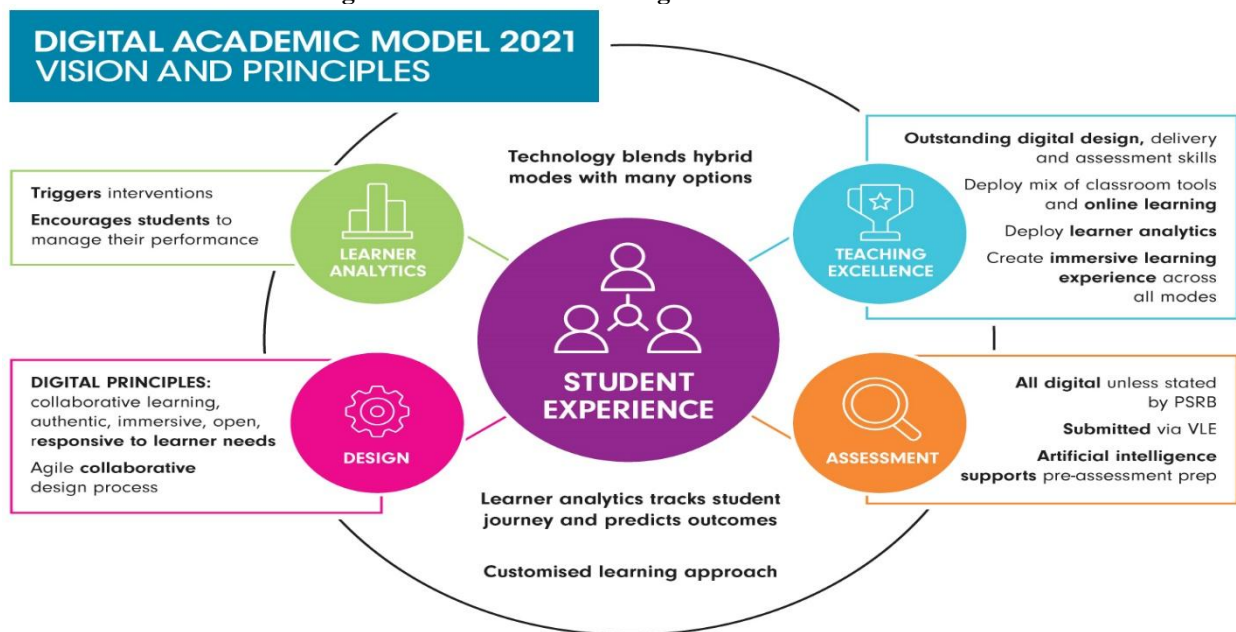
Project-based learning *Project-based* learning is to organize teaching and learning through actual projects or projects. Projects here are understood as complex tasks from questions or problems that stimulate learners to learn and explore (Jones et al., 1996). That solution can include design-implementation experiences. From here, learners will participate in designing, making decisions or surveying activities related to the project. With this learning method, learners will have to work in groups and explore problems related to life, then will give a presentation to the class and share what they have done in their project. During the presentation, audiovisual media, a play, a handwritten report, a website, or a created product can be used. According to Bransford and Stein (1993), project-based learning focuses on long-term and interdisciplinary learning activities and is often associated with problems arising from current life. In addition, the project-based learning method also creates opportunities to help learners pursue their interests, and make their own decisions about answers or find solutions to the problems presented in the project. This method can help achieve output standards according to the CDIO outline such as: Hypothetical; Design - implementation skills; Written communication skills; Presentation skills.

The goal of problem-based learning (defined as the in-depth study of a learning topic) is to learn more about a topic rather than just finding the right answers to the questions posed by the teacher (Hmelo-Silver, 2004). In the problem-based learning method, students both grasp new knowledge and grasp the method of grasping that

knowledge, develop proactive and creative thinking, be prepared with a capacity to adapt to social life, timely detect and rationally solve problems that arise (Hmelo-Silver, 2004). This method can help achieve output standards according to the CDIO outline such as: Identifying and forming problems; Propose solutions; Exchange, judgment, balance in the direction of resolution.

Simulation-based learning Simulations, often used in scientific research, is the process of developing a model and then simulating an object to be studied. Instead of having to study a specific object, which is sometimes impossible or very expensive, we build models of that object in the lab and conduct research on that object based on this modeling. The results obtained must be verified with the actual measurement results. The majority of simulations are based on computer hardware and software. Based on the results obtained after the simulation process, we can draw the next direction for future research and production. Simulation in teaching is a separate case of simulation in scientific research. Therefore, we can define simulation in teaching as also a form of simulation of scientific research, which includes both "pedagogical handling" and "organization of teaching activities" that are alternate. This method can help achieve output standards according to the CDIO outline such as: Modeling skills; Survey testing skills; Graphic communication. (fig 3)

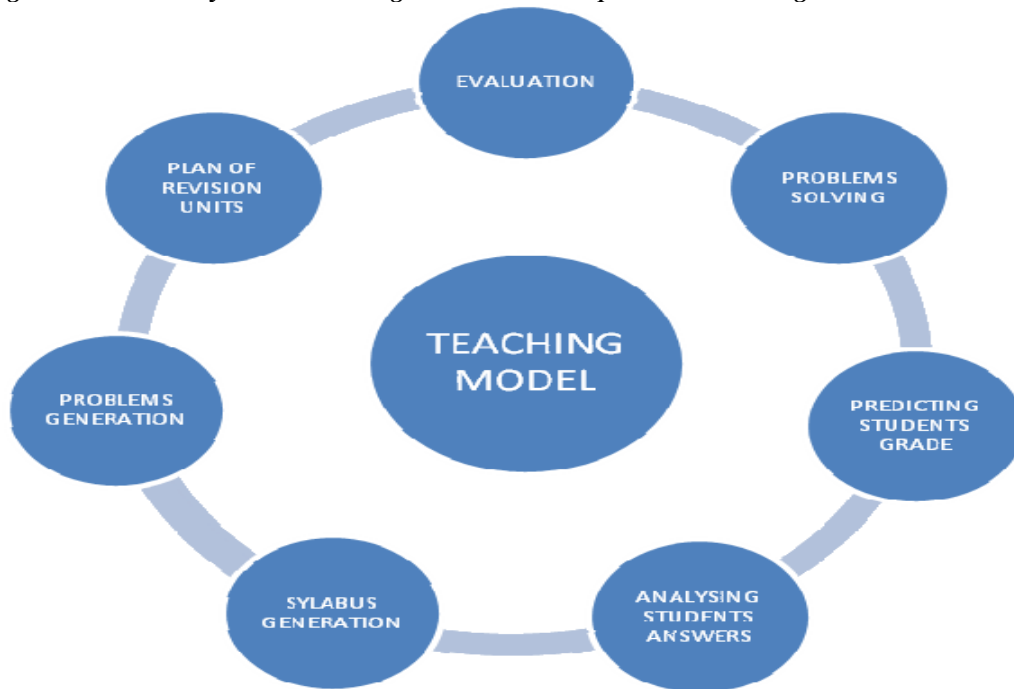
Figure 3: Structure of teaching simulation method



Source: <http://www.mdc.edu/ci/servicelearningoverview.asp>

Case studies Although case studies have been used extensively in law, commerce, and medicine education, they are equally relevant for engineering and technology. The main constituent element of this new training method is based on the actual situations of both students and lecturers. The main purpose of situations is to describe and exchange experiences on how to solve problems and conflicts while performing the assigned work. With different situations that need to be solved within a predetermined period of time and limited resources, learners are put in a position where they need to make decisions or call for the support of their teammates to find a reasonable solution. The variety of situations presented not only encourages learners to promote initiative and creativity but also brings comfort and mental refreshment when attending class. This factor makes learners able to absorb the content of lectures easily, deeply and remember longer than traditional teaching methods (Scholz and Olaf, 2002). This method can help achieve output standards according to the CDIO outline such as: Propose solutions; Qualitative estimation and analysis. (fig4)

Figure 4: Community service learning in the relationship between learning and service activities



Source: <http://www.mdc.edu/ci/servicelearningoverview.asp>

The learning method of serving the community is carried out in the following steps: (1) The community raises the problem to be solved; (2) Teachers integrate community issues that need to be solved into the subject as students' internship topics. It is important to note that these topics must be suitable for the subject content, level and skills of the student; (3) Students are organized into groups to carry out the project under the guidance of teachers. When implementing the project, students must apply the knowledge of the subject to solve problems with the community; (4) The results of the project are used by the community (Phung Thuy Phuong, 2008). This method can help achieve output standards according to the CDIO outline such as: Roles and responsibilities to society; Recognize the context of social organizations; Desire to learn and lifelong learning, Critical thinking; Teamwork; Communication skills in writing and presentations.

IV. Discussion and Conclusion

Studies show that students almost achieve the desired outcomes and they feel satisfied with the education they receive when they are actively engaged in a variety of learning activities. Active learning helps students gain an in-depth approach to the learning process. The in-depth approach means that students are deliberate to learn concepts, rather than merely re-enacting information in exams. To improve student learning outcomes, innovating teaching methods in universities is the key to solving this problem. To implement, some solutions need to be aimed at:

For the new teaching method, the university teaching method must be associated with learners - the object of "teaching" activities, as well as the subject of "learning" activities - who are attracted to the learning activities organized and directed by lecturers, through which they self-discover what they do not know, rather than passively absorbing the knowledge that has been arranged by lecturers. Placed in real-life situations, learners directly observe, discuss, conduct experiments, and solve problems posed in their own way of thinking, thereby grasping new knowledge and skills, as well as grasping the method of "making" that knowledge and skills, not following existing stereotypes. are revealed and promote their creative potential. Teaching in this way, the lecturer not only simply imparts knowledge but also guides action.

The university teaching method considers the training of learning methods for students not only as a measure to improve teaching efficiency but also as a teaching goal. In the rapidly changing modern society - with the explosion of information, science and technology developing like a storm - the teacher himself cannot collect enough information and cannot cram into the minds of students the volume of knowledge is increasing. The role of the teacher is no longer that of a "communicator of information". On the contrary, attention must be paid to teaching students self-study methods from the first subjects of the program. This does not mean that the role of the teacher is no longer important, but now the teacher will be the guide for learners to seek knowledge. In learning methods, the core is the self-learning method. If you train learners to have methods, skills, habits,

and the will to learn on their own, it will create a desire to learn, arouse the internal resources inherent in each person, and the learning results will be multiplied.

In a classroom where the level of knowledge and thinking of students cannot be absolutely uniform, when applying the proactive method, they are forced to accept the differentiation in intensity and progress of completing learning tasks, especially when the lesson is designed into an independent work series. The higher the level of applying the proactive method, the greater this differentiation. However, in learning, not all knowledge, skills, and attitudes are formed by individual independent activities. The classroom is a communication environment between lecturers and students, students and students, creating a cooperative relationship between individuals on the path of occupying knowledge. Through discussion and debate in the collective, each individual's opinion is expressed, affirmed or refuted, thereby raising themselves to a new level. This is in line with the real-world environment later when students have graduated and are working, forcing people to learn for life, coordinating between individual learning and collaborative learning.

Lecturers must be both instructors and organizers at the same time. As mentioned above, in active teaching, lecturers no longer simply play the role of imparters of knowledge but become guides for students on the path to seeking knowledge. More specifically, the teacher also plays the role of designing, organizing, and guiding activities independently or in small groups for students to self-dominate the learning content, proactively achieve the goals of knowledge, skills, and attitudes as required by the program. In class, students are active, lecturers are only instructors. But before going to class, lecturers have to invest a lot of time to design lectures to achieve output standards; select teaching methods and assessment methods in accordance with the objectives and content of the lectures. During the teaching process, in addition to class, teachers must also monitor students' self-learning activities, help when necessary, exchange discussions and give suggestions so that learners are on the right track. Thus, teachers in active teaching and learning need to invest a lot of effort and time compared to passive teaching and learning to be able to perform lessons in class as a person who suggests, catalyzes, encourages, mentors, and referees in exciting exploration activities. lively debate of students. In the past, lecturers held the monopoly on student assessment, but in the proactive method, lecturers must guide students to develop self-assessment skills to adjust their own learning style. In this regard, lecturers need to create favorable conditions for students to participate in mutual evaluation. Proper self-assessment and timely adjustment of activities are very necessary competencies for success in life that the school must equip students. One point to pay attention to in assessment is to have formative assessment, avoid focusing on assessment at the end of the semester and diversify assessment activities so that learners have the opportunity to show their progress in the learning process.

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