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CURRENT STATE OF TEACHING AND LEARNING FOR ELECTRONIC PRACTICE COURSE IN HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY AND EDUCATION PROPOSING OF PROJECT – BASED TEACHING METHOD

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ABSTRACT

This paper aims to survey the teaching and learning for Electronic Practice Course. Then, making suggestions for applying the Project – Based Teaching method to this course to achieve effectiveness (knowledge, skills, atitudes). The article uses theorical research methods (to build the basic of application suggestion) and reality research methods (to implement the surveys with google form, scientific observation method, experiential teaching). The survey results say that the Project – Based Teaching method creates an active, positive, and inspiring attitude for learning of students that is better than when compared to the Problem – Based Teaching method, the presentation method, v.v. Besides, the Project – Based Teaching method has specific result product. This teaching method is suitable for Electronic Practice Course because the resulting product is of course an applied electronic circuit.

Keywords: *active, inspiration, Project – Based Teaching, skill, teaching effectivement*

1. Introduction

Toward the model of current and future image of 21st century education, modern / active teaching methods are mentioned such as: problem solving & conduct teaching, case teaching, mind map teaching only, seminars teaching... [1]. Particularly in Vietnam, in the "Plan to implement suitains development goals in the field of education and training to 2025 and orientation to 2030" [2], stated:

"Increasing practical educational contents, using active teaching methods, experiential learning/research, project/case learning, and holistic school approaches".

This orientation finds that Project – Based Teaching is the effective, positive teaching method of technology and technique education. In the fact, learning that is attached to importance to theory is not suitable yet. Because companies underappreciate of students' social skills (soft skills) when students apply for the jobs [3]. The lecturers immediately stopped providing information to students in a computerized way. The lucturer's task is to share with students "how to collect, process, and deal with that information" [4] so that they can comprehend, apply and create useful purposes for students and society. With the Project – Based Teaching method, the lecturers organize and

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motivate learners to be inspired to find the initiative [5] to have the knowledge as mentioned above, "while also bring into play the self – assessment, responsibility, community skills" [5], which is called essential soft skills.

Experiential teaching of one lesson of Electronic Practice Course with Project – Based Teaching, conduct tests and evaluations according to 3 points: the lecturer scores for groups, each student scores by themselves, and the groups score the ones. Such Project – Based Teaching method has new changes and strong improvements in testing and assessment "in the direction of developing creative features, self – learning spirit", encouraging flexible application of knowledge and skills in practical society [6].

For the Electronic Practice Course (EPC) at the University of Technology and Education of Ho Chi Minh City, the applying the Project – Based Teaching method is encouraged to implement and expand investment. From the status of implementation, and the results achieved with the current teaching method, the researcher proposes solutions to help the Project – Based Teaching method expand according to improve the quality of teaching.

2. Research Methods

a. Theoretical research methods: refer to documents (synthesize, analyze to develop the basis of the proposed survey)

- Scientific basis for conducting a survey on the teaching activities of the lecturers in Electronic Practice Course.

According to the authors Robinson, K. & Aronica, L., Nguyen Chi Hieu and Nguyen Thanh Tung translate [7], formal education has 3 main components: curriculum content, teaching, testing and evaluation.

Therefore, to consider the current status of teaching activities of the lecturers, the survey asks about the initial preparation and implementation of learning time, as follows:

- Initial preparation: the content of the course program with the existing curriculum, course outline; Teaching means are measuring devices, electronic components, whiteboards and markers,v.v.
- Implementation in the lesson: the results after learning are the students' knowledge, skills, attitudes / soft skills; the form of class organization is how to divide the class to teach; teaching methods are used such as demonstration, presentation, explanation...; testing and assessment activities to score on knowledge, skills, attitudes/soft skills.

- Scientific basis for conducting a survey of students' learning activities in Electronic Practice Course.

The applying of Project – Based Teaching methods especially creates a positive and creative learning atmosphere for students. In addition, according to the authors Robinson, K. & Aronica, L., Nguyen Chi Hieu and Nguyen Thanh Tung translate [7], in general the standardization movement focused on the content of the course curriculum contents and on testing and assessment. However, teaching methods are seen as a way to help students achieve standards. Above all, the core of educational innovation is to inspire for learning's students.

Student learning activities were surveyed in two parts as follows:

- Initial goal: to understand the

content of the course curriculum contents, which is the weekly lessons prepared and taught by the lecturers for the class.

▪ The end result is achieved: the result after the learning process is the student's knowledge, skills, attitudes/soft skills; students' interest in learning for the course; the level of interest of students when learning the course with different teaching methods.

b. Practical research methods include:

- Survey method (the teaching method of lecturers and the learning of students).

Goals of the survey on teaching EPC of lecturers, including: contents, methods, means, learning outcomes of students (knowledge, skills, attitude), testing and evaluation.

Goals of the survey on learning EPC of students, including: contents, the level of interest, results after the course (knowlegde, vocational skills, soft skills of studens).

The survey method: using Google Form, Excel soft-ware; January - February; 10 lecturers and 33 students participated in the survey; the questionares of survey form use the qualitative scale (type of ordinal scale) with 3 or 4 levels to choose.

- The scientific experiential method (experiential teaching through 1 lesson).

3. Results and Discussion

3.1. Results of the survey on teaching and learning Electronic Practice Course at Ho Chi Minh City University of Technology and Education

3.1.1. Applying Project – Based Teaching method to EPC

a. Project – Based Teaching method

When applying Project – Based Teaching method, there are 5 steps:

- Step 1: Discussion to name for the project.

- Step 2: Builing the schedule of project.

Forming groups, choosing the header of group, assigning member's task of group, time to imlpement, what are mini tasks of main task, who will do mini tasks.

- Step 3: Implement of project.

All groups carry out the project implement according to discussed plan.

- Step 4: Asessment and evalution for each group.

The marks of each group, each student are decided by both the lecturer and the class. The result after the lesson is the application electronic circuit.

- Step 5: Conclusion and review.

The lecturer says the conclusion of the lesson and reviews for groups, students.

b. There are 3 projects in EPC

EPC has 10 lessons (applying traditional teaching method) and 3 projects (applying Project – Based Teaching method).

Those project are: Design and asembly the 5Vdc Power Circuit, Design and asembly the amplifier with BJT, Design and asembly the amplifier with JFET.

The researcher has just taught experiential lesson "Design and asembly the 5 Vdc Power Circuit" from school year 2020-2021 to now. After course with Project – Based Teaching method, the result of this lesson/ this project is a specific electronic circuit "The 5 Vdc Power Circuit".

c. Implement of Lesson – Project "Design and asembly the 5Vdc Power Circuit"

- Step 1:

The lecturer with class set name of lesson – project: "Design and asembly the 5Vdc Power Circuit". The situation of our

project is: the lecture don't bring a charger of his smart phone. So, he request the class make 1 charger for him (This means: "Design and asembly the 5Vdc Power Circuit").

- Step 2:

The schedule of project is about: who is the header of group, what are mini circuits of main circuit, who will do that mini circuits, v.v.

- Step 3:

Implement of the project: the lecture will ask to help groups find the knowlegde, skills, v.v.

- Step 4:

The lecturer with the class asess and evalute each group through each group's presentation and result paper.

- Step 5:

The lecturer conclude the lesson through results of all groups.

3.1.2. The survey on teaching of lecturer

Results and evaluations of the survey

- Survey on course curriculum contents:

Table 1: Results of the survey on course curriculum contents

Contents of the survey	**Ideas of the lecturers**			
Course curriculum contents	Very suitable	Suitable	So so	No suitable
	40%	50%	10%	0%

Discussion of results: Almost lecturers feel satisfied with contents of the course curriculum. This content is compiled according to CDIO orientation, so lectures can flexibly choose interesting content to teach while teaching. The course includes the basic, important, popular electronic circuits. Lessons are arranged from the simplest structure to the more complex structured electronic circuits. These contents are presentated first will be the basis for the subsequent contents in an orderly, uncluttered, non-random manner.

- Survey on teaching methods:

Table 2: Results of the survey on teaching methods

Teaching methods	**Ideas of the lecturers**		
	Often	Rarely	Never
Sample demonstration method	80%	20%	0%
Presentation method	70%	30%	0%
Explanation method	60%	40%	0%
Teaching method of rising and solving problems	30%	70%	0%
The other methods (please enumerate your new teaching methods)	Project – Based Teaching (10%)		

Discussion of results: From the survey, the lecturers are familiar with using traditional methods such as the sample demonstration method (80% "often"). Next, the presentation method has 70% "often", the explanation method has 60% "often", the teaching method of raising and solving problems has 30% "often". Only 10% of lecturers choose PBT method (Project – Based Teaching). However, when the researcher interviewed in depth, this lecturer admitted that he only teach almost like Project – Based Teaching method, but have not yet ensured the implementation steps of Project – Based Teaching method. (after the results of this survey, one lecturer implemented Project – Based Teaching method with 2 semesters, and proposed to ask for funding to support students to implement the project).

In the Electronic Practice Course, the lecturer will choose the sample demonstration method for students so that they observe and follow. This method helps the students understand well, but it does not promote their activeness, initiative and creativity.

- Survey on the levels of knowledge of students after the course:

Table 3: Results of the survey on the level of knowledge of students after the course

Contents of the survey	**Ideas of the lecturers**			
The level of knowledge of students after the course	Good (8–10)	Pretty Good (7–7,9)	Medium (5–6,9)	Under Medium (<5)
	10%	80%	10%	0%

Discussion of results: When the lecturer uses traditional teaching methods, almost all students achieve in knowledge at pretty good. It just is 10% at good. Innovation of the teaching method is one of the applying to increase the percentage at good.

- Survey on the level of applying vocational skills of students:

Table 4: Results of survey on applying vocational skills of students

Contents of the survey	**Ideas of the lecturers**			
The level of applying vocational skills of students	Good (8–10)	Pretty Good (7–7,9)	Medium (5–6,9)	Under medium (<5)
	10%	80%	10%	0%

Discussion of results: Students' level of applying vocational skills is similar to the one of students' knowledge after the course. So, students have the same between theory and practice. That is the idea development.

Survey on practicing the soft skills:

Table 5: Results of survey on practicing the soft skills of students

Soft skills	Ideas of the lecturers			
	Good (8–10)	Pretty Good (7–7,9)	Medium (5–6,9)	Under medium (<5)
- Presentation skill	0%	37,5%	50%	12,5%
- Group working skill	25%	75%	0%	0%
- Cooperation communication skill	12,5%	75%	12,5%	0%
- Skill of planning and solving problems	0%	87,5%	12,5%	0%

Discussion of results: Group working skill, cooperation communication skill, skill of planning and solving problems is pretty good. Particularly, presentation skill is lower percentage. This is important skill to express the idea in words.

- Survey on the model of evaluating for students:

Table 6: Results of survey on the model of evaluating for students

The model of evaluating for students	Ideas of the lecturers		
	Often	Rarely	Never
- Evaluation with model of groups	77,8%	22,2%	0%
- Evaluation with model of each student	66,7%	33%	0%
- Evaluation with model of students' self-evaluation	22,2%	22,2%	55,6%
- Evaluation with model of groups of students by different ones.	22,2%	22,2%	55,6%

Discussion of results: Evaluating with model of groups or model of each student is used popularly by the lecturers. That in the pressure for students. They will depend on only evaluating of the lecturers.

3.1.3. The survey on learning of students

Results and evaluations of the survey

Survey on course curriculum contents:

Table 7: Results of survey on student' ideas for course curriculum contents

Contents of the survey	Ideas of the lecturers			
Course curriculum contents	Very suitable	Suitable	So so	No suitable
	18,8%	75%	6,2%	0%

Discussion of results: Almost students are satisfied at course curriculum contents. This is an advantage for participating the course.

- Survey on students' interest for the course:

Table 8: Results of survey on student' interest for course

Contents of the survey	**Ideas of the lecturers**			
Student' interest for course	Very interested	Interested	No discussion	Boring
	21,9%	37,5%	40,6%	0%

Discussion of results: The student's interest is approximately 50% for "very interested" and "interested" when the lectuers use traditional teaching methods. That percentage isn't high. So, we need a solution to increase that percentage.

- Survey on students' interest for the course with different teaching methods:

Table 9: Results of survey on student' interest for course with different teaching methods

The level of interest	**Ideas of the students**			
	Very interested	Interested	No discussion	Boring
- Sample demonstration method	29,4%	52,9%	17,6%	0%
- Presentation method	12,5%	37,5%	43,8%	6,2%
- Explanation method	25%	43,8%	25%	6,2%
- Teaching method of rising and solving problems	18,7%	62,6%	18,7%	0%
- Project – Based Teaching	43,8%	43,8%	12,5%	0%

Discussion of results: The interest of students is highest percentage when using Project – Based Teaching. With the other teaching methods, the percentage is lower 5,1 – 12,5%.

- Survey on the levels of knowledge of students.

Table 10: Results of survey on the levels of knowledge of students after the course

Contents of the survey	**Ideas of the students**			
The level of knowledge of students after the course	Good (8–10)	Pretty Good (7–7,9)	Medium (5–6,9)	Under medium (<5)
	18,2%	63,6%	18,2%	0%

Discussion of results: The level of knowledge is self – evaluated is high percentage at "pretty good".

- Survey on applying vocational skills:

Table 11: Results of survey on the levels of apply vocational skills of students after the course

Contents of the survey	**Ideas of the students**			
The level of applying vocational skills of students	Good (8–10)	Pretty Good (7–7,9)	Medium (5–6,9)	Under medium (<5)
	15,2%	63,6%	21,2%	0%

Discussion of results: The level of vocational skills is self – evaluated is high percentage at "pretty good".

- Survey on practicing soft skills:

Table 12: Results of survey on the level of soft skills of students after the course

Soft skills	Ideas of the students			
	Good (8–10)	Pretty Good (7–7,9)	Medium (5–6,9)	Under medium (<5)
- Presentation skill	11,8%	29,4%	58,8%	0%
- Group working skill	41,2%	52,9%	5,9%	0%
- Cooperation communication skill	35,3%	58,8%	5,9%	0%
- Skill of planning and solving problems	35,3%	58,8%	5,9%	0%

Discussion of results: Group working skill, cooperation communication skill, skill of planning and solving problems is self – evaluated by almost students: "pretty good" and "good".

Acording [8], Project – Based Teaching method is applied for Digital Electronics in India. After that course, the servey on learning of student has results:

- The students are more confident after their course with Project – Based Teaching.
- The students evalute that their performance skills and their knowlegde are better.
- The student use their learning time with high effectiveness.
- The student love Project – Based Teaching method much than traditional teaching method.

Both this paper and that paper [8], have a high assigment for applying Project – Based Learning. That method is a excellent teaching one. It can improve student's knowledge, skills and attitudes.

3.2. Proposing Project - Based Teaching for Electronic Practice Course

3.2.1. Advantages of apply Project - Based Teaching for Electronic Practice Course

With 15 year – teaching of Electronic Practice Course, the researcher have the following evaluations about current teaching methods.

* Advantages (from table 1, 7, 8):

- Knowledge and skills are transmitted with the model of accuracy standard.
- Knowledge is transmitted in a systematic and high-mass way.

* Disadvantages:

- Students are not interested in learning much, so their learning results are just medium or pretty good (from table 8 above).
- Students don't not encouraged to seek, be active, be creative, or to apply the internet to study/research (from table 2 above).
- Soft skills such as presentation skill, skills of planning and sloving problem...

aren't practiced (from table 5 above).

- The industrial revolution 4.0 is taking place all over the world, and Vietnam is no exception.

Teaching in the old style of approaching content is no longer relevant. Education is innovating towards capacity development. Old learning is illustrated by pouring water into a brain. If knowledge is poured into a student's brain, students will receive it yet. But students do not know how to find knowledge by themself. And if pouring too much knowledge into the brain, it will overflow, be saturated, not absorb, causing waste. The illustration for innovative learning is that the students, with the support of the lecturers, will know how to light up the light source by himself.

- Training is step by step change to self – training in the world. The students get used to self – study, self – research toward the learning citizen model.

3.2.2. Proposing solutions for applying the Project – Based Teaching to Electronic Practice Course

In order to successfully apply the Project – Based Teaching to the course so that to improve teaching effectiveness, the researcher would like to have recommendations as follows:

a. On the side of management of universities, faculties and departments

- Our school had implemented Project – Based Teaching in the 2020 − 2021 school year with a support policy of 20 million VND / the project of the course. However, the number of lecturers participating is not much. The faculty and department sides have not clearly any support policy to the lecturers. They should have a team to support all problems for lecturers when implementing Project – Based Teaching. This support will be closer and more effective due to the same specializes.

- Should follow up and help the teachers improve both awareness and knowledge for Project – Based Teaching through training sessions (from table 2 above).

- The internet should be well equipped for the teaching room.

b. On the side of lecturers (from table 2, 9 above)

- Lecturers must comply with regulations and contribute ideas to universities, fulculties, and departments in innovation with Project – Based Teaching to improve teaching effectiveness.

- Lecturers need to be awared of the advantages of Project – Based Teaching, voluntarily improve their pedagogical skills and professional knowledge to be able to well implement Project – Based Teaching.

- Lecturers need to actively exchange and learn Project – Based Teaching experiences from experts and lecturers through seminars, professional activities, etc.

- Teaching with Project – Based Teaching many times to have more experiences for self-researchers and other lecturers.

c. On the side of students (from table 6, 9, 10, 11, 12 above)

- Students should voluntarily participate in learning through project with the teacher's organization. Students learn actively and positively so that they can find new knowledge by themselves.

- Students should openly discuss and give suggestions to the lecturer so that the lecturer can adjust their teaching to be

more and more appropriate and effective.

- Students should participate in study groups, and should pratice in communication with other students in the class.

4. Conclusion

The article concludes the comments both lecturers and students about the current state of teaching and learning of Electronic Practice Course. In this course, the lecturers uesd to teach mainly with the methods of presentation, sample demonstration, but not effective to achieve knowledge, skills and attitudes. The Project – Based Teaching method is taught in 1 practice session. Lecturers and students both appreciate the high quality of the lesson if teaching according to the project. This artice will be an important reference of Project – Based Teaching in the Electronic Practice Course. This paper can be extended if grading each section on knowledge, vocational skills, attitudes/soft skills.

The researcher would like to thank to the lecturers, classes participating in the subject.

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