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Applying Project-based Learning Method to Teaching Subway Project Management Course

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Abstract: **The purpose of this paper is to study how to apply project-based learning method to teaching project management course. First, we introduce the course contents and give the check list for setting the course frame. Then, we report the procedures of applying project-based learning method and summarize the tools for teaching the course. In contrast with the traditional way of teaching, project-based learning method can promote student-centered and experiential approaches to education through the interactive, collaborative exploration of real-word challenges.**

Keywords: **Project-based learning; Project management; Teaching, Student-cantered.**

I. INTRODUCTION

Project-based learning (PBL) is the method that relies on the open-ended questions to develop students' competences. It usually starts with a question or scenario that requires students to explore a topic or concentration of the curriculum. It ends with finding a solution, drawing a reasonable conclusion, making substantive decision, or applying new knowledge or skills. The whole purpose of PBL is to encourage students to research and to find answers and solutions help them to develop higher-order thinking skills, analyze the information they find, interpret and compare their findings. The process of PBL can lead both teacher and student to new knowledge. Then, the key question for most teachers is: how to apply PBL to the teaching practice. This question will need teachers to have well understanding of both course contents and PBL method. And this paper will report how we use PBL to teach project management course.

II. COURSE FRAME SETTING

The project management has long been the style of doing business in many industries. It provides people with a powerful set of tools that improves their ability to plan, implement, and manage activities to accomplish specific organizational objectives. The subway project management course focuses on a project of upgrading ventilation system in a subway station. This project aims to speed up fresh air circulation in order to mitigate the potential risk of the airborne disease, such as SARS, Covid-19, etc.

The teacher will give students the practice manual, which includes the project background, procedures, working hours for each step, human resource requirement, budget, salary, time constraints, equipment availability, etc. And then, the teacher will play videos about how workers upgrade the subway station ventilation system, the possible contingencies the project may encounter, and the related laws and regulations. The task for students is to act as a project manager and coordinate the project. The ultimate question for students is how to design a project plan with certain flexibility and minimum time and budget. In order to make the students' work easy to conduct peer comparison, they will be required to organize this project on the same software platform, such as Microsoft Project. Trello, Wrike or etc.

Before students conduct project planning, they also need to have knowledge preparation about project management, which refers to defining the project, estimating project times and costs, project network, managing risk, scheduling resources and costs, project duration, project leadership, managing project teams, project performance evaluation, project audit and etc. The above course setting can be concluded into following checklist, which can help teacher implement the PBL method.

TABLE I: Checklist for course frame setting

Checklist	Course setting
1) The project idea	Upgrading subway station ventilation system project
2) The time frame proposed	2 weeks
3) Is it manageable	Same targets and software platform, not overly ambitious
4) Is it a project just between you and your class?	Yes
5) Working language of the project	English
6) What subjects could be integrated into the project?	Social science about efficiency and fairness
7) What technical tools, if any, will you use?	Operation research algorithm and project management software
8) How does PBL fit with the academic calendar?	The practice session of the project management course

III. COURSE PRACTICE

Project-based learning method can be practiced in two ways. Either you work in your own classroom with your class, or you decide to collaboratively work with other teachers. Obviously, the rewards of collaboration can be enormous benefit both to you and your students. Teachers, who want to practice PBL, are no longer alone. There are many professional communities that can advise you to organize the PBL course. In general, you can refer to the following six steps.

step 1 is to involve your students from the very beginning. Start with a guided exploration of some topics you have in mind, but be prepared change if better ideas are emerging from the class. It is also important to establish certain ground rules with your students regarding behaviour with them in advance.

Step 2 is to define the topic in the class and break it down into different tasks. Discuss which technologies can be used and how they will be integrated.

Step 3 to plan well, set goals, define outcomes. Above all, students need concrete goals to work upon and achieve.

Step 4 is to proceed to break the students into small groups and encourage them to ask relevant and significant questions regarding the topics chosen, and try to work to the strengths of each student.

Step 5 is to create a tangible artifact that address the issue or answer question. The core is to drive students learning and being accountable. Then, students can arrive at a meaningful conclusions.

Step 6 is to hold a presentation session with a wider audience. Letting students present their outcome is an effective way to engage students in their learning activities. Their attitude to learning will undoubtedly change for the better.

In addition, one of the most important issues in PBL is about setting key question. In the course of project management, our key question in PBL is: how to design the most effective and efficient project in upgrading the subway station ventilation system. On the one hand, this question cannot easily be answered by just looking up Google or Bing or Wikipedia or any of those online encyclopaedias. On the other hand, this question can lead students to engage in a form of the meaningful research. It is much more than just a memorizing the Pythagorean theorem and having to prove it or knowing in physics newton's three laws of motion.

Therefore, we summarize the tools of applying PBL method in the figure.

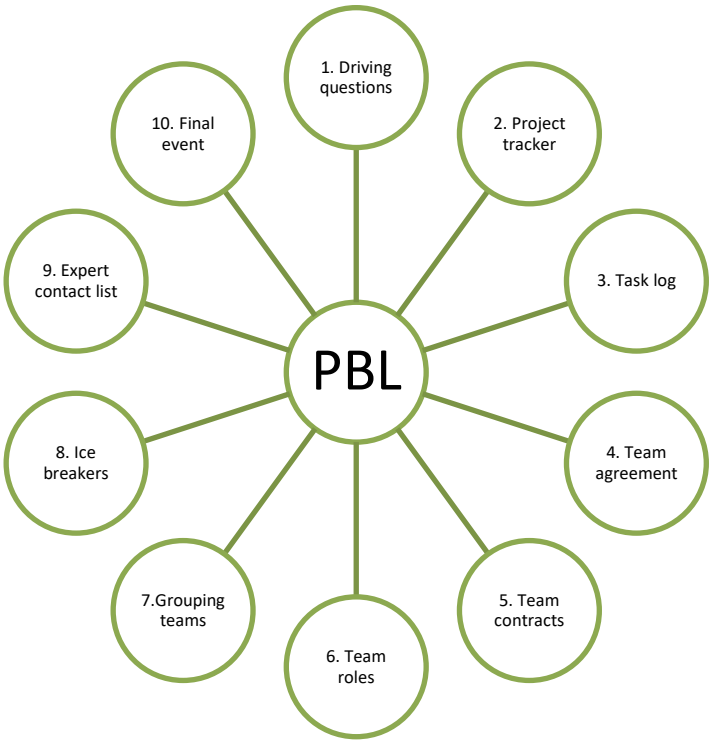

Fig. 1 Tools of applying PBL method

IV. CONCLUSION

In contrast with the traditional way of teaching, in which students dutifully record what teacher speak in front of the green board loaded with lots of equations, applying PBL to the course aims to promote student-centered and experiential approaches to education through the interactive, collaborative exploration of real-word challenges. It's going to be open-ended. So a lot of students maybe feel a little uncomfortable with that. PBL involves students designing a project plan and completing complex tasks resulting in a product, even presentation to an audience. The product will be a combination of a written report, concrete recommendations, and oral report.

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