APPLYING PROJECT-BASED LEARNING FOR A FLIPPED CLASSROOM MODEL IN TEACHING THE GENERAL INFORMATICS COURSE AT THAI NGUYEN UNIVERSITY OF AGRICULTURE AND FORESTRY

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ABSTRACT

Nowadays, Information Technology (IT) plays a more and more important role and becomes one of the effective tools for teachers and students in the current digital transformation era. For students, in addition to training basic knowledge and skills, they need to be able to update themselves with the cutting-edge technologies in their professional fields to meet the requirements of their future careers. Therefore, the selection of appropriate teaching methods to improve the students' professional capacity is one of the core issues in every training program today.

Project-based learning and the flipped classroom model have been implemented in many educational institutions and brought about many positive effects in teaching such as: Through the implementation of learning projects, students have chance to solve a case study associated with practice and can create practical products with high applicability. The flipped classroom model helps students promote their ability of self-study. In addition, students can actively arrange the time, the place as well as the duration for their study to suit themselves.

General Informatics is one of the compulsory subjects in many training program at the undergraduate level in general and at Thai Nguyen University of Agriculture and Forestry in particular (TUAF). The course provides students with basic knowledge and skills about computers, computer networks, internet and Microsoft Office in order to serve their learning process and achieve the learning outcome of the training program as well as use them in their future professional career. The feature of the course is the high applicability and reality. Therefore, in order to improve the teaching and learning quality of this module, we propose a teaching method that combines the project-based learning and the flipped classroom model. By exploiting the advantages of IT in active teaching methods, this strategy will help students promote their self-study ability, problem-solving ability, as well as train and develop themselves new skills, necessary soft skills.

Keyword: - *General Informatics, project-based learning, flipped classroom model, active teaching methods*

1. PROJECT-BASED LEARING AND FLIPPED CLASSROOM MODEL

1.1 Project-based learning (PBL)

There are many definitions for the concept of PBL. W.H. Kilpatrick defines this as "an intentional activity, with full enthusiasm, that takes place in a social environment, or in short, a deliberate and passionate activity" [1].

According to the author N. V. Cuong, "Project-based instruction or project-based learning is a form of teaching in which students have to solve by themselves a learning task combining not only the theoretical issues but especially the practical features under their teacher's supervision and support in order to create the practical products which may be introduced, exhibit to the public" [2].

According to Microsoft's PIL program, PBL is also considered as a teaching model: "These are carefully designed, lifelong learning activities involving many academic disciplines, taking student-centered learning and combining with the problems and realities of the real world" [3] .

According to the author L. Khoa, in his doctoral dissertation of Education science in 2015, it is stated that: "Project-based learning is a teaching method in which students working mainly in groups, under the instruction of teachers, independently solve a complex learning task combining theory and practice. Teams define their own goals, plan and execute projects, participate in monitoring progress, and evaluate results. The results are products which are able to be exhibited" [4].

The abovementioned definitions are stated differently, according to each author, in which PBL can be defined as a teaching method, a teaching model, or a form of teaching, etc. In this paper, we approach the concept of PBL as a form of teaching.

1.2 Flipped classroom model
Flipped classroom model is an instruction strategy which was first invented in USA in 1990s, then it was deployed all around the country and in many countries in the world. According to Lage et al.: "Flipped classroom means that the events used to traditionally take place inside classroom now turn to be taken place outside classroom and vice versa" [5]. In [6], basing on Bloom's Taxonomy of Cognitive Levels, deploying the flipped classroom model will contribute to practice and develop the cognition for students as shown in the Fig -1.
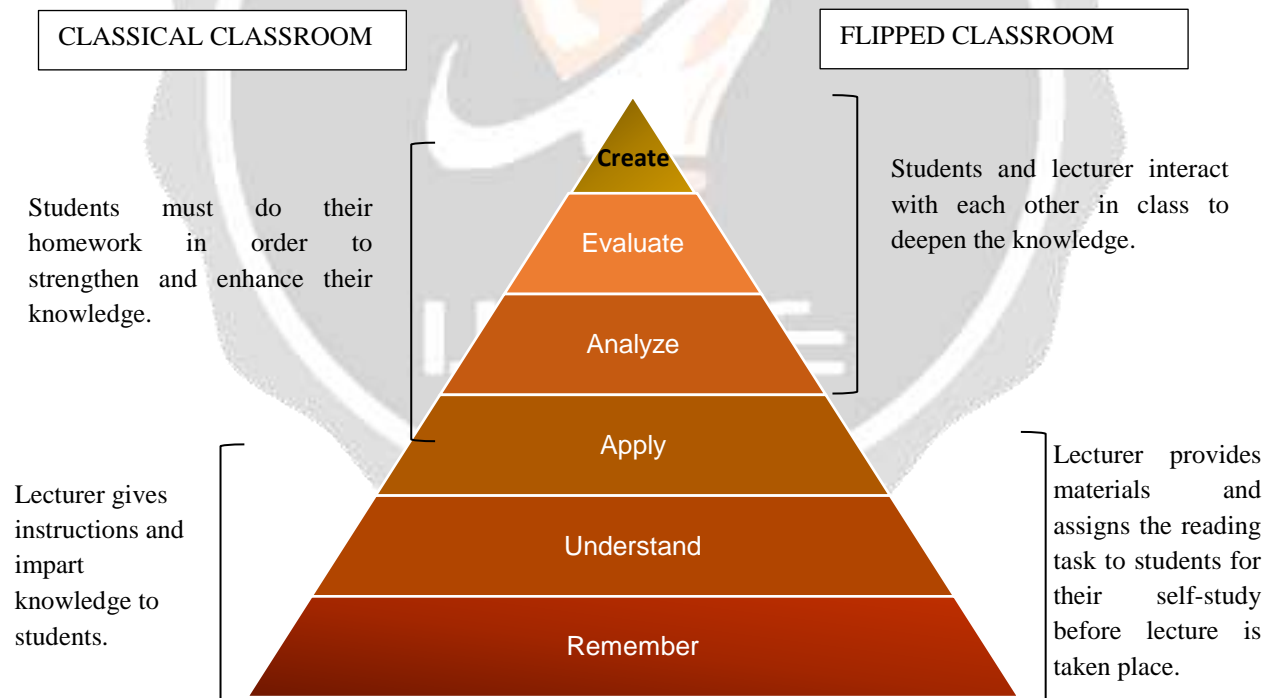
Fig -1. Comparison between the Classical classroom model and the Flipped classroom model basing on Bloom's Taxonomy of Cognitive Levels.

According to this comparison, we observe that in the Classical classroom model, the lecturer play the central role in imparting knowledge to students, the improvement of students' knowledge is due to the process of doing their homework, while in the Flipped classroom model, the students can learn new knowledge by themselves at home through lectures and materials the lecturer has provided, and they can spend the lecture time on discussing, answering the questions bought by together, as well as discovering and broadening the knowledge to a deeper level,

etc. In this model, the lecturer is only a director who give the instruction and students are the right center of the learning process. They actively explore, create and acquire new knowledge.

Thus, teaching in the Flipped classroom model will create a flexible, positive environment of study maximizing the student participation. This process will contribute to the formation and the promotion of necessary competencies for students.

There are various Flipped classroom models proposed for different subjects. Based on the features of the General Informatics course, the author propose the three-step teaching strategy of the Flipped classroom model as follows:

Table -1: Three-step teaching strategy of the Flipped classroom model

Step	Lecturer's activities	Students' activities
Step 1: Before lecture time	Analyzing the program, determining the objectives of the new lecture, selecting the teaching topics for the Flipped classroom model. Providing the lecture notes and materials to students via a Learning Management System (LMS) or other means. Assigning the students to do self-study on the provided materials.	Xem bài giảng và nghiên cứu các học liệu. Tự học kiến thức mới, ghi lại câu hỏi thắc mắc và nội dung cần trao đổi. Doing self-study on provided materials and assigned tasks. Learning new knowledge and noting questions of the new lecture.
Step 2: During lecture time	Organizing the discussion and exchange of opinions within class on the contents of the new lecture. Commenting, assessing, and answering students' questions; Summarizing the focus of lecture. Organizing games or assigning tasks to students to enhance their knowledge. Introducing and broadening the knowledge at deeper levels.	Working in groups, discussing on case study, practicing skills, doing individual or group presentations. Exchanging opinions and counter-arguing to clarify lecture issues. Discussing lecturer's comments, instruction and answers on lecture issues.
Step 3: After lecture time	Assigning supplementary tasks to students (if any) Continuing instruct and support students with the incomplete lecture contents	Practicing, examining the knowledge which has learnt. Self-evaluating the personal study activity. Keeping the exchange of lecture issue with lecturer as well as other students (if any).

1.3 Combination of Project-based learning in the Flipped classroom model
In recent years, the trend of capacity development in teaching has been paid a lot attention and implemented in any level of education. In order to develop the competence of students at the undergraduate level, many researchers have used the Flipped classroom model [7] as well as the active teaching methods [8] and the combined teaching models [9]. In Vietnam, V.T.T. Nga [10], N.T. Thanh & N.T. Dung [11] have also successfully applied this combined model in teaching the subjects of Informatics for Pedagogical major students. In order to further develop this model and improve the quality of teaching the subjects of Informatics, we have conducted a study on the combination of Project-based learning in the flipped classroom model in teaching the subject to students in the agriculture and forestry majors. From the analysis of characteristics for the curriculum in these majors and of the General Informatics subjects, we propose the integration of Project-based learning through adding the before-lecture-time activities (Step 1) the task of implementing the project of learning and adding to the during-lecture-time activities (Step 2) the task of presenting the results of the implemented project and introducing the products as shown in Table 1. Details are as follows:

- Step 1:
Lecturer: Determines the learning projects, assigns the tasks to individuals (or groups). Give general directions about contents, time, products, and the form of report, etc.
Students: Make plan, organize the implementation of the learning project.

- Step 2:
Lecturer: Arrange the presentation for students to present the results of the implemented project.

Students: Present the implemented project and the products obtained.

By this association, besides of developing the students' self-study capacity, the ability of using Informatics applications in learning will be much helpful for students to access huge digital resources which are useful in learning, as well as in reality. Thus, this enable students to practice and improve their competence in Information Technology.

2. EXAMPLE OF APPLYING THE PROPOSED MODEL IN TEACHING THE GENERAL INFORMATICS COURSE FOR UNDERGRADUATE STUDENTS AT THAI NGUYEN UNIVERSITY OF AGRICULTURE AND FORESTRY

In this research, we deploy the Project-based learning strategy in a Flipped classroom model in teaching the content: "Use of Micrsoft Powerpoint 2010" as follows:

2.1 Step 1: Before lecture time
- Lecturer's Activities:

Providing the lecture notes and course materials, the learning projects to students via Learning Management System or other technical means.

Identifying the lecture objectives: Students is required to practice basic operations on Powerpoint; design a particular presentation on Powerpoint and well present it in class; apply what they have learnt in reality.

Determining the learning project: "Make a presentation on Powerpoint about the plan of participating the clean agricultre fair orgnized by Phu Binh district's Agriculture Extension Center".

Description: You are supposed to be a civil servant of a district's Agricultural Extension Center. In November, the Provincial Agricultural Extension Center held a fair to introduce and promote typical clean agricultural products of all districts in your province. The task assigned to your team in this activity is to select products, develop a plan and present it in the monthly conversation in order to obtained comments and readily implement it in the next month.

Assigning a team to carry out the project, determining the common requirements: one week preparation time; the required products includes: assignment table of each team member, the detail table of tasks and steps which will be performed, a video summarizing the implementation of the learning project and a presentation on Powerpoint.

Planning the learning project evaluation; Organizing the discussion and the exchange of opinions in class, the interacting with students about their project; Providing the set of orienting questions to students: What are the selected products to present in the fair? Where can the information of these products be found? What are the criteria of the fair? From which family in the district the products meeting the criteria in the fair are selected? What do we need to prepare for participating the fair? Which department is assign to support this participation? What are the steps and their detail to deploy the plan? How to describe the plan in Microsoft Word? How to transfer the available table of contents in Word to presentation in Powerpoint? What are the concrete operations to do it? How to design the contents of presentation in Powerpoint? How to present the slides in Powerpoint?

- Students' Activities:

Grouping and assigning tasks to each group member. Studying the lecture notes, materials. Doing self-study on the basic operations and functions of Powerpoint.

Exploring and selecting the products which will be presented in the fair. Making a detail plan which is implemented: Selecting the family whose products meet all criteria of the fair, submitting the inscription, informing to the family the preparation as well as the decoration and the arrangement of furniture in the display frame, etc. Discussing and deciding the appropriate option.

Completing the specific contents in Word. Designing the slides of the presentation in Powerpoint in an understandable, relevant and attractive manner. Slicing and organizing the presentation contents. Practicing the presented contents. Noting questions and problems which need to be discussed more.

2.2 Step 2: During lecture time

Lecturer controls the students' presentation, discussion, introduction to products of the learning project implemented. Lecturer comments, evaluates, suggests the orientation and extension of lecture to students as follows: The presentation needs to include the following slides: title, the problem statement, the main content, the specific contents, the conclusion. Are the presentation format and layout appropriate? Does slides include suitable illustrations such as images, figures, tables, diagrams, hyperlink, and videos? Are there any background and effects? Are contents in slides adequate of information and relevant to the subject? Are slides understandable, interesting, and attractive to audience? (Evaluation of this section is based on the students' self-assessment form)

Besides, assessment is also based on the summary video of the group activities during the deployment of the project and the opinions of other group members (collected individual opinions on a survey), the way of expression and presenting the subject, the evaluation of other groups and the ability of answering correctly questions of the student or the group.

2.3 Step 3: After lecture time

Exchanging opinions, discussing problems, or answering questions about the learning project to students (if any).

3. SOME ACHIEVED RESULTS

By the experiment and testing process, we deduce the following observations:

Attitude, motivation and self-discipline greatly impact to learning outcomes. Students with serious attitude in learning, clear learning motivation and high self-discipline in learning showed their great interest toward this learning model. These students actively approach new knowledge, study unclear or ambiguous problems in learning materials. However, the other whose the learning motivation is unclear or the self-study method has not been suitable and effective show off a great confusion and anxiety when discussing and exchanging during the lecture time and the review section preparing for examinations. This is proved by the bar chart in Figure 2 below which shows the comparison of the overall grade course between the experimental group and the control one:
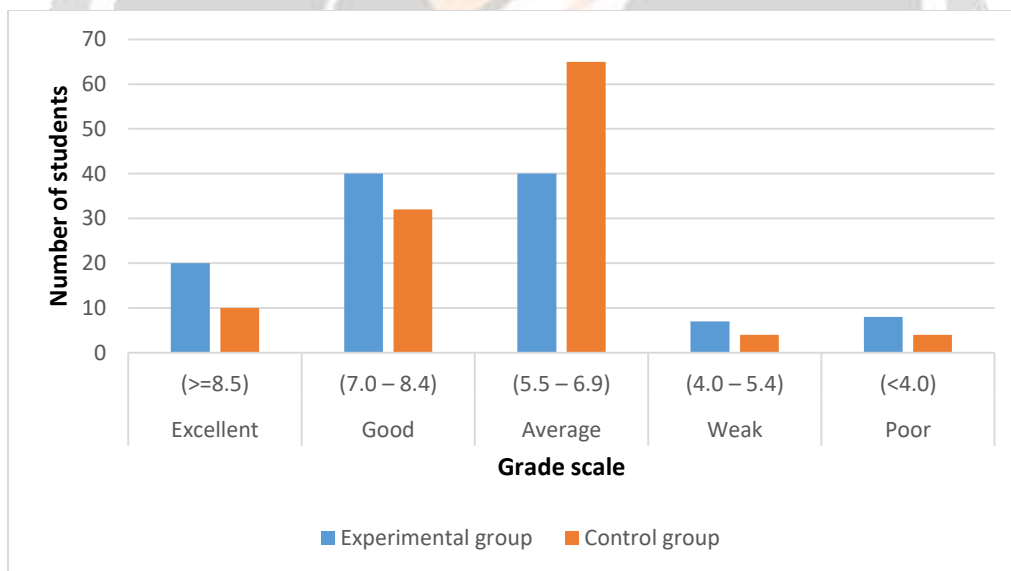
Chart -1: The bar chart compares the overall grade course between the experimental group and the control group.

In the bar chart, the overall grade course of the experimental group is significantly improved. However, the proportion of the students with weak and poor grades is higher. This indicates that the effectiveness of this model is so much dependent of the students' attitude, motivation, and self-study method. The model shows a high suitable strategy to students with high self-discipline in learning and effective self-study skill, but in contrast, it seems unsuitable to one who are passive or have poor self-discipline in learning.

In summary, by the pedagogical experimental results obtained and the evaluation process of the students' improvement participating the learning project, we can draw the following conclusions of the teaching method in the

proposed model: Students become more active and positive in their study. They actively plan and deploy the individual learning plan in a appropriate and flexible way. They are able to manage effectively the time of self-study and in class. Student has gained experience in self-study and in teamwork process such as the method of determining the objectives, dividing appropriately tasks, study materials, actively expressing personal opinions, critiquing, etc. Their presentation skills, teamwork skills are improved, especially the overall grade course are significantly better.

4. CONCLUSIONS

In this article, the authors have proposed an integrating teaching strategy embedding the Project-based learning in Flipped classroom model and applied it in teaching the General Informatics course. The authors has concluded that this combination enables students to practice and develop their capacity of self-study in accessing new knowledge. This is impressively suitable to the training objectives of an undergraduate program in the era of digital technology nowadays.

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