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Utilizing Cooperative Learning for It Graduate Studies

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Abstract. The continuous call on the increase of the quality of teaching put more pressure on academics to draw on students experiences and propose new approaches for delivering information and increasing the standards of teaching excellence. There are several generalized approaches to the scholarship of teaching and learning such as continuous professional development and learning by developing, however cooperative learning combined with project-based learning can be used in a range of disciplines in graduate studies such as Information Technology. From our experience in teaching: e-commerce subject and web application security course we found that such a strategy encourages lecturer to continue improve the curriculum and delivery process leading to better learning experience for the students. This paper reports on the practical nature of cooperative learning and how to use it to bridge Teaching and Learning as well as Theory and Application. Our purpose is to report on cooperative learning in graduate studies using Project-based learning strategy. It demonstrates the value of student empowerment and leadership in autonomous project groups. The strategy is designed primarily to increase student engagement and improve the learning process. We evaluate the success of the strategy by evaluating student attendance and active participation in classroom discussions, learning outcomes, and student results. The success of the strategy encourages us to incorporate the project-based approach on more than one course.

Keywords: Cooperative Learning, Project-Based Learning, Knowledge, Technology.

1. Introduction

Worldwide Growing pressure to restructure and reform education is encouraging university academics to use innovative practices that assist students to develop new skills that can be deployed in real life. Project-based learning has been suggested [3], [6] as an appropriate and effective mechanism to integrate teaching and learning practice by positively contributing relevant information from different sources for constructing knowledge. Cooperative learning is a specific kind of learning where students work together in small groups on a structured activity/project, they are individually accountable for their tasks, and the work of the group as a whole (project) is also assessed. In this strategy the students can share their strengths, develop their week skills and improve their understanding of subjects explored. For this strategy to be effective the following is necessary:

- Students should be motivated and challenged by giving them specific tasks such as selecting a published paper and analyse it then prepare a critic and present it, and investigating security issues for 10 national websites available for users,
- Small groups are created (less than 5 students), and projects are assigned to each group, so that all members can participate,
- The projects should be clearly defined (ex. E-yellow pages, Stylish women).
- Each student should select two recently published papers for discussion in the class
- Each group has to evaluate and report on other groups' projects

In this paper we report on the use of cooperative learning strategy by employing project-based learning approach and other activities in graduate classes as it was unique in the study program at the Libyan Academy of Graduate Studies.

2. Background

Graduate students at the Libyan academy of graduate studies take optional courses in Information technology Department. Students' interest in some courses such as e-commerce and web application security

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is fuelled by the practical nature and its importance nowadays. The student cohort involved is comprised of two classes of 24 graduate students who were involved in the courses of:

- E-Commerce, and
- Web-application security

In each course the students were given the opportunity to form groups of 3 or 4 students each, and select a project of their own interest such as developing a commercial website for electronic equipments, with an expectation that the students would devote more time to their study of the subject through an additional two recently published scientific papers in the subject that have to be presented and criticized during the class. A project-based learning approach enabled students to identify learning needs aligned to their interests and abilities.

Because of the complexity of the subjects (e-commerce and web application security) and the lack of background on the student part, the lecturer discusses the initial parts of the material topics identifying the important knowledge with an intention of stimulating students to become reflective practitioners while undertaking their projects.

3. Project-Based Learning

Project based learning is a learning methodology that facilitate developing skills and knowledge through cooperative investigation and analysis, it depends on well defined project then using teamwork, goal setting, planning, data collection and decision making. The learning in this approach is a reconstruction of knowledge rather than a mere transmission of knowledge, and learner experiences constructing a meaningful product, and that is why project-based learning is characterised as: active, self-directed and student-centred approach.

Research conducted on project-based learning [2], [3], [6] found that students gain several benefits for example they:

- Can positively share relevant knowledge with their peers
- Are able to Interpret and evaluate obtained information from different sources
- Will demonstrate effective research abilities
- Gain effective communication while working in groups
- Are encouraged to give oral presentation of scientific research work
- Will be able to report on research work

4. Cooperative Learning

It is well recognised that society as a whole could not survive with achievement without the cooperation of its members, and on a personal level individuals who are best enabled to cooperate are most likely to survive and become successful. However less attention is paid on how students perceive each other and interact with one another, and with their academic environment such as instructors, Books, Internet, and curriculum programs.

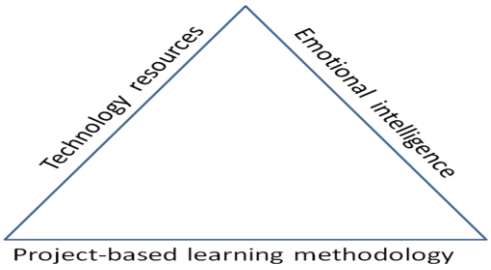

Fig.1. Cooperative learning strategy framework.

In cooperative learning student interaction is characterised by positive goal interdependence with individual accountability, therefore cooperative learning can be defined as a collection of concepts and techniques used to help students learn together. This strategy has been successful in several fields such as language learning [3]. Many people like the idea of partnership and group work because of many advantages

to group work activities, but teaching students how to be involved in it is a daunting task. The components of this strategy are summarized in Fig. 1.

From our experience in teaching graduate students, several observations can be collected with respect to cooperative learning strategy:

1) Reaching the class early

It has been observed by several authors [1] that it is important to plan going to the class early and spend few minutes talking to the students informally about different topics such as current events in the field of study/subject's field, or asking students about their progress and difficulties facing them in the course. We observed that this behaviour allowed the students to see their professor as a friendly person and feel easy to talk informally.

2) Leadership behaviour

Students learn more by exploring the problem solution in a group. Throughout the semester the instructor emphasize to the students that taking the project as an engineering management task where cooperation is very vital was always beneficial and important. The group leader (a student) is requested to submit a progress report of the project every two weeks.

3) Teaching technique

While there are several styles of teaching, it is always good idea to share with the students your style of instruction method, tell them what material you are going to discuss and tell them the goals that are going to achieve, so they can reason what they are learning and why. This could help students to come to the class prepared and may be equipped with some questions related to his/her term project.

It is our opinion that periodic review sessions could work really well. During these review sessions give your students the opportunity to share some ideas with their colleagues and get motivated.

4) E-mail correspondence

We feel that it is nice to facilitate communication between students and instructors using electronic media such as e-mail facility. If some one is facing a problem either related to the term project or even some topic of the course material then he/she can send e-mail messages soliciting help. The e-mail worked well in such cases.

5. Elements of Cooperative Learning

Arranging students in groups does not necessarily describe cooperative learning; it is only if the following elements take part in achieving a common goal as shown in Fig. 2.

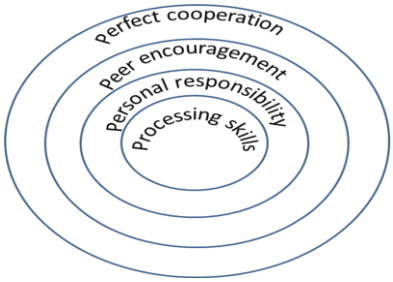

Fig. 2: Elements of cooperative learning.

- Perfect cooperation: The first requirement for an effective cooperation is that the students are united around a common goal, and each student works toward: mastering the subject material, and helping his group members learn the same subject material. The perfect coordination would establish the belief that the group they form will either succeed or fail depending on the joint effort (dual responsibility).
- Peer encouragement: Perfect coordination results in encouraging each other's efforts and improves his/her performance to complete partial tasks for achieving the desired group's goal. Another sort of

effective help that arises is exchanging needed information and reached conclusions by individuals to improve group's performance.

- Personal responsibility: the third element of cooperative learning is personal (individual) responsibility. Each individual student gives back the results of his share to the group and be assessed by his group mates for including this contribution in the final project. Cooperative learning strengthens the confidence in each individual student and be prepared to be accountable for completing his task.
- Processing skills: the fourth element of cooperative learning is the processing skills, appropriate utilization of group skills such as accepting and supporting each other and communicating friendly and constructively are expected skills within cooperative learning. Effective group work is normally influenced by member actions and decisions about what actions to continue or change to achieve the project's aim.

6. Benefits of Cooperative Learning

In cooperative learning setting, students learn to work with different types of students, there are many benefits the students can gain such as:

- Interpersonal development, students learn to relate to their peers as they work together, this can be very helpful for students experiencing difficulty with social skills
- Each student has the opportunity to contribute in small groups
- Acknowledgement of individual differences, when papers are selected and presented in the class, students will have a variety of responses. Positive and negative perspectives are reflected on the paper methodology or its application for example.
- Opportunities for personal feedback, the students have great chances to exchange information with their group members as well as with their professor.

7. Processing Structure

Structure is employed to help learners interact more actively with each other as well as with project activities. The structure selected for our study is Jigsaw as it fits well with project-based learning. Teams of four (4) were ideal, they are small enough for good cooperation between the participants and split easy during pair work when required. Each student must contribute to part of the project and must put his knowledge together with his team to complete the project, team members decide who does what and must be able to explain his knowledge to his colleagues.

8. Process of Assessing Students and Project Evaluation

Projects are complex tasks that involve students in all stages of the project such as design, problem-solving, decision making, investigation, evaluation, and system documentation. The experiential nature of projects creates new knowledge and increase self-confidence of participants as they meet new challenges. Creativity is also channelled towards renewal and reform which finally realised in a complete real working software product.

The starting point for evaluating projects and assessing students is related to an oral presentation of the completed project by the students involved, where each student takes part of the presentation in relation to his/her effort by identifying and explaining tasks carried out by him/her within the project's group. The objective of the individual presentation is to reflect the individual participation/experience and reveal what new conceptual knowledge gained by the student.

The project' evaluation (completed software project) depends on several criteria such as: Ease of use, richness of knowledge, users support, level of security (such as secure authentication, authorisation), shopping cart facilities, and documentation. The following procedure from [3] is followed for students grading:

- Use of a variety of assessment methods
- Including both individual and group grades

- Emphasizing individual performance over group performance

9. Conclusion

From the previous discussion we might infer that cooperative learning is efficient in constructing novel knowledge for students engaged in this study, while this is true we feel that more effort has to be spent on integrating cooperative learning within learning management systems such as moodle [5].

One evolving aspect of cooperative learning involves how to compose small groups, there is no agreement about whether to group students according to their abilities or to mix them. We took a different approach by letting the students form their own groups based on their objectives.

In some situations particularly those in which conflict arise within a group, there should be some technique for conflict resolution.

From the general definition of learning as a transmission of knowledge we conclude that if all the students in a group ignored some piece of knowledge then there is no way to acquire that knowledge by simply cooperating. The straight mechanism for overcoming this is the existence of teacher as a guide or moderator who can introduce that knowledge in certain depth.

In one situation where a small group (two students) the project was not completed possibly because of underestimation of the task, therefore the students were given (Incomplete) extra time to finish their project. This could be seen as flexibility in the strategy for student evaluation.

No one learning method has been proven more effective than another, but we are confident that knowledge constructed through constructive/cooperative learning when applied successfully, will be beneficial for the individual's retention of knowledge and replicable skills.

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