

PROBLEM-BASED LEARNING INTO THE FUTURE E-LEARNING

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ABSTRACT

In applied medical sciences related multi disciplines the theoretical and mathematical knowledge is first taught to the students. The main drawbacks of this approach are lack of motivation and high drop-out and failure rates. This case study uses the Problem Based Learning (PBL) approach in introductory courses of medical biophysics, and microbiology to overcome the main drawbacks of more traditional teaching schemes. A learning method based on the principle medical sciences of using problems as a starting point for the acquisition and integration of new knowledge intellectual and professional skills. The students and the teachers have assessed the experience and the results are very satisfactory in both cases.

KEYWORDS: Problem based learning- Medical sciences- Student Assessments- Teacher assessment.

INTRODUCTION

Problem-based learning (PBL) is an educational instruction method that fosters learning and the development of 21st century competencies and skills (Bell, 2010) through problem solving and the integration and application of knowledge in real-world settings (Capraro & Slough, 2013). The problem-based learning of medical biophysics was successfully implemented to the students (Hala Moustafa *et al* 2012). From the facilitator observation generally the students were starting to understand the concept of PBL. They are also trained to be punctual, actively generating ideas in group and to be good motivator to the friends. Finkle and Torp (1995) describe problem-based learning as "a curriculum development and instructional system that simultaneously develops both problem solving strategies and multi-disciplinary knowledge bases and intellectual and professional skills by placing students in the active role of problem solvers confronted with an ill-structured problem that mirrors real-world problems".

PBL as an instructional methodology

PBL was first applied in in the Faculty of Applied Medical Sciences of October 6 University Egypt (Hala Moustafa *et al* 2012).The main objectives during each small group session, the student group will identify and prioritize a number of learning issues. Student independently study outside the small group to research new information and concepts. As part, lecturer acts as a facilitator for reference or discussing problem that arise during the PBL session .They have to build and organize

their own knowledge, and develop critical thinking. They work in groups through discussion, questioning and group presentations. The case must be written to enable students to come with learning issues that demonstrate their learning moves from the lowest level to the highest level in the hierarchy of learning. One of the main purposes of PBL programs is the practical understanding of the relationship between classroom lectures on traditional theories, e.g., material mechanics, fluid dynamics, dynamics of machinery, and control engineering, and real phenomena of mechanical systems. (Susumu Hara *et al* 2020).

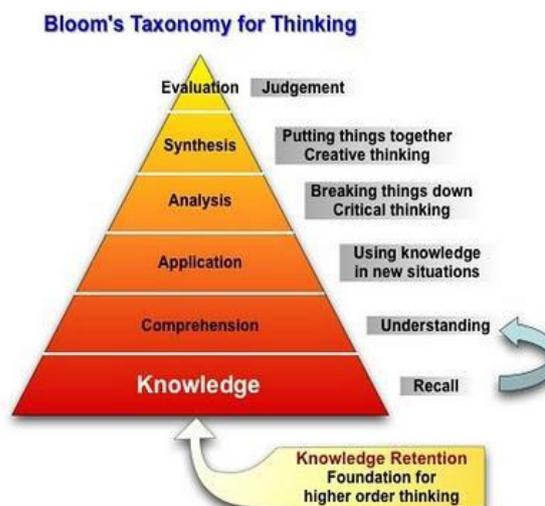


Fig. (1): Bloom's Taxonomy for Thinking.

Planning of a PBL case in applied medical sciences

The current level of knowledge, other parallel learning activities and specific learning outcomes **Iramaneerat (2009)**. Knowledge basic and clinical content in context Skills scientific reasoning, critical appraisal, information

literacy, the skills of self-directed, life-long learning Attitudes value of teamwork, interpersonal skills, the importance of psychosocial issues **Capraro, R (2013)**. These topics are part of the whole curriculum which has been agreed to be for that year.

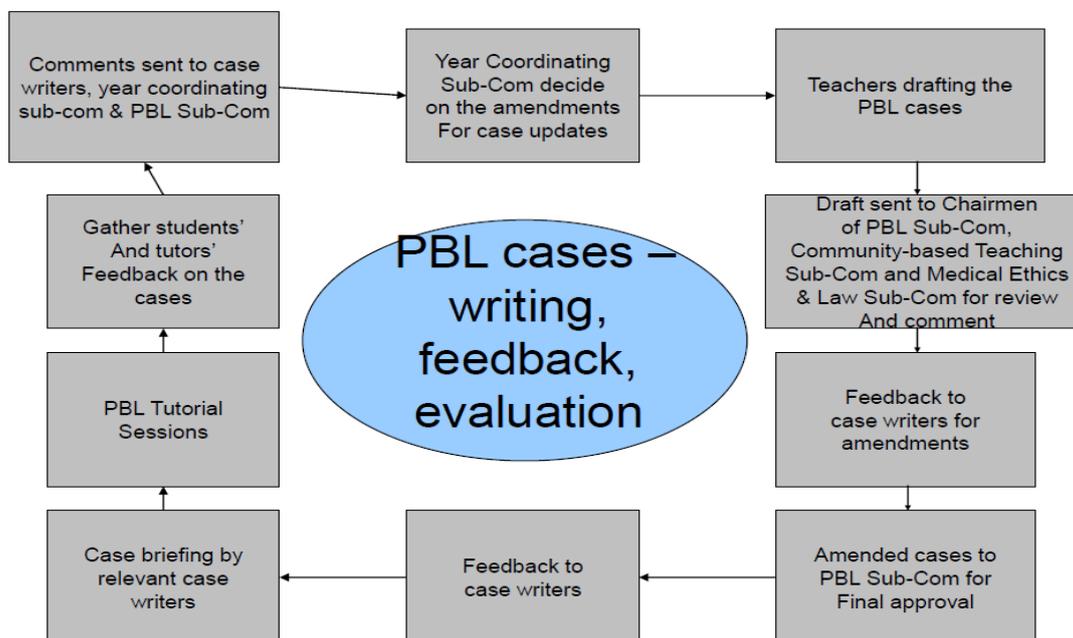


Fig (2): The design of a case In Applied Medical Sciences, each case is made up of certain topics.

The design of a case In Applied Medical Sciences

A PBL-student group can have ideally about 10 students and consists of a chairman, a presenter and a scribe, besides regular members of the group. The group is formed by the faculty, NOT by the students themselves. Reason for that is that we do not want that students only learn to work in a team with their friends, but also with others, even with people they do not like (so much). Just like in a team that they will work in when they have finished their studies. During a group meeting, the chair has the task of maintaining the agenda and steering the conversation. In order to have information available to the entire group, it is useful to keep a record as part of the work on a case study. The scribe does so by taking down important matters on a white board, flip chart or large sheet of paper. PBL is a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem, or challenge” **Buck Institute of Education. (2018)**.

The information addressed in a student group must be incorporated in minutes of the group meeting. This facilitates the recording of a case study, and is part of the process of ensuring that the case study functions well. During each group meeting, one of the students therefore acts as presenter. By rotation at each meeting, students play four specific roles within the group. These are chair, minutes-secretary, scribe and general group members. Rotation ensures that students are exposed to all of these roles. That means that – ideally – every student performs

in all the four roles that are given. A way to control this is to ask the student to take care of these themselves. Each role would have to be evaluated by the group and the tutor. The student gathers information about this evaluation of each of the roles in a portfolio and presents the portfolio to the tutor, when it is filled with evaluations of all four roles and a list of learning points the students derives from the evaluations. Reason for this is, that we want to give every student the opportunity to learn all of the four roles in a PBL-group. **Ismail Hegaze et al (2014)**

Findings

Assessment and Evaluation results

The course has approximately 60 students divided into six groups of ten students. One important issue in PBL is access to information and appropriate modern technology: web, simulation tools, projectors, lab, and library etc. Student assessment can be defined as the bridge between teaching and learning. It is the process of gathering and evaluating the gaps between knowledge rendered and knowledge retained. It may sound fairly straightforward, but in reality, student assessment is a complex issue that has many facets. These days, schools, colleges, and other education bodies are making use of assessment tools to meet the requirements of student assessment tools. Considering that most of Cuban vehicle and transport infrastructures are underdeveloped and have been used for more than 20 years this has had a significant impact on the environment (**Cuesta Santos, et al., 2019**). Vehicle

Service Technicians were therefore taken as a priority to develop environmentally sound education projects.

Student Assessments

Formative assessment is used in the first attempt of developing instruction. This assessment is carried out before the learning is provided to assess the level of existing knowledge based on which the learning to be provided takes shape. The goal is to monitor student performance to provide feedback. This study was to examine the effect of subject matter experience on student motivation in PBL. These results are in agreement with previous studies and in line with the findings derived from problem based learning studies **Ahmed Yaqinuddin. (2013)**. Summative assessment is

aimed at assessing the extent to which the most important outcomes at the end of the learning have been reached. It is carried out after the learning has been provided. It measures the effectiveness of learning, reactions to the learning provided and the benefits on long-term learning. Problem based learning is that students are deliberately faced with the problem at the start of the learning process. This is like getting this is like getting the challenge of preparing a celebratory meal for a special occasion where no recipes or ingredients are given. We also found that the students responded positively to their participation in the creation of criterion based assessments that clearly involved learning outcomes related to PBL.

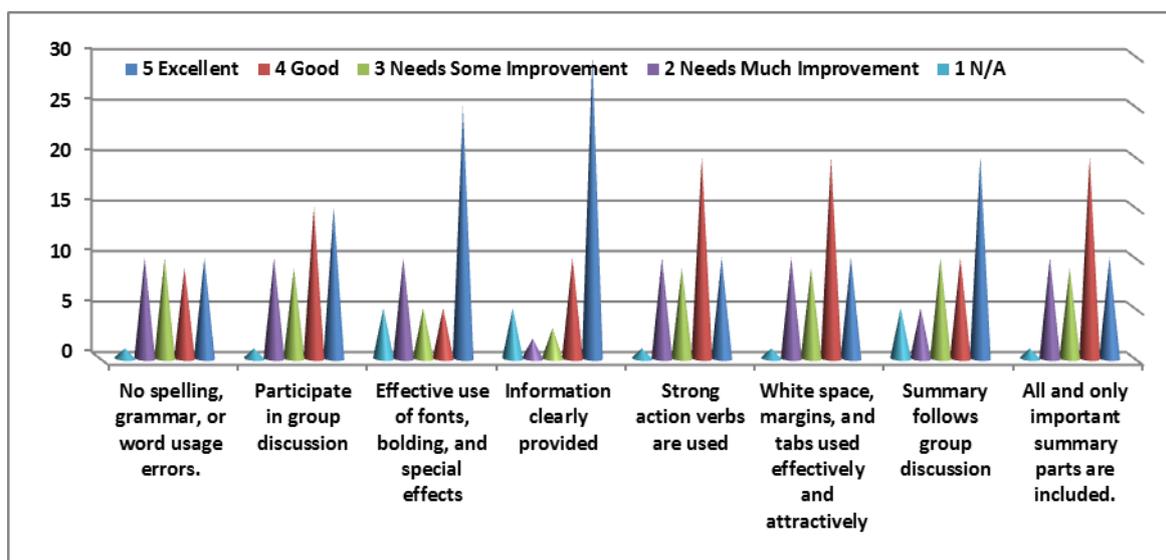


Fig. (3): Scribe Rubric of student's assesment.

Teacher assessment

From the teachers' point of view, PBL requires teachers to change role: from transmitter to mentor. This involves some difficulties: they have to develop coaching skills. There is also a change in the structure of class time, and the teachers have to redesign the course before it starts. In general, the teachers spend most of their time on planning the PBL content and sequence of assignments, providing immediate feedback on students' work, and discussing and evaluating students **Rodrigo Polanco (2004)**. It would be difficult to do all the work if there were more than four or five in each group. However, the experience is very satisfying because teachers can see the evolutions of students day by day, and the relationships are closer. **Moustafa, H, et al., (2012)**. All of this can help teachers to avoid conflict and reduce failures before the final evaluation. 70% of students agree the relevancy of teaching and learning (T & L) method using PBL in medical biophysics syllabus and even 90% of the students agree they get useful benefits from the PBL methods. **Ismail Hegaze et al (2014)**. These results are in agreement with previous studies and in line with the findings derived from problem based learning studies, **L.P. Samaranayake. (2013)**. A profession may be

defined as any group sharing a special body of knowledge, standards of education and practice, and an ethical framework practice, and an ethical frame work based on a social contract that permits self-regulation. Professionalism is the medical profession's contract with society and an altruistic manner of medical care delivery which means placing the interests of patients above those of physicians'. Interests of patients above those of physicians' **Yeo M (2009)**. This professional ideal is essentially bound to moral norms expressed in terms of values, virtues, or principles **Pellegrino ED (2004)**. Despite extensive research on problem based learning a thorough examination of student engagement in relation to PBL is lacking (**Savin-Baden, 2014; 2016**).

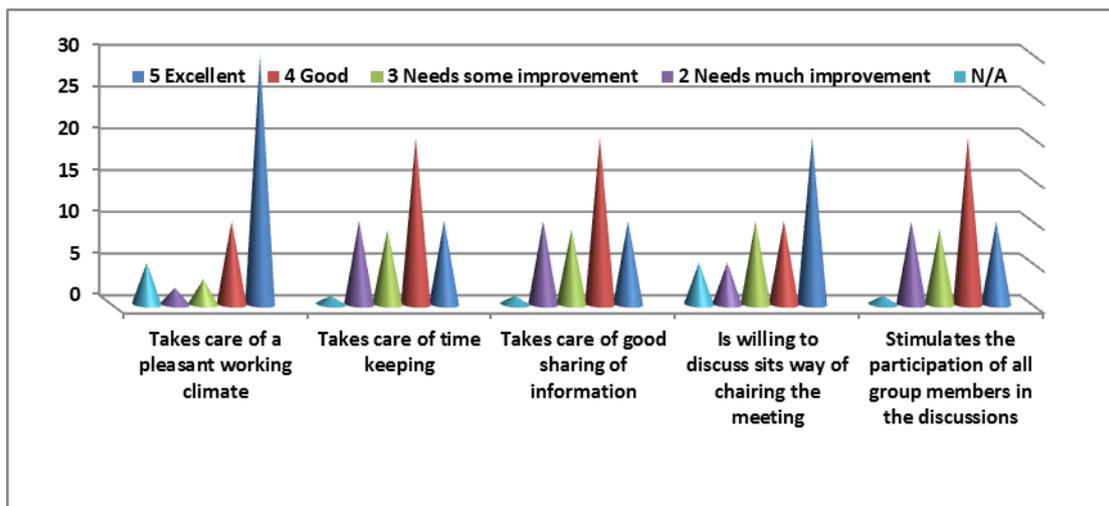


Fig. (4-A): Scribe Rubric of chairman assesment.

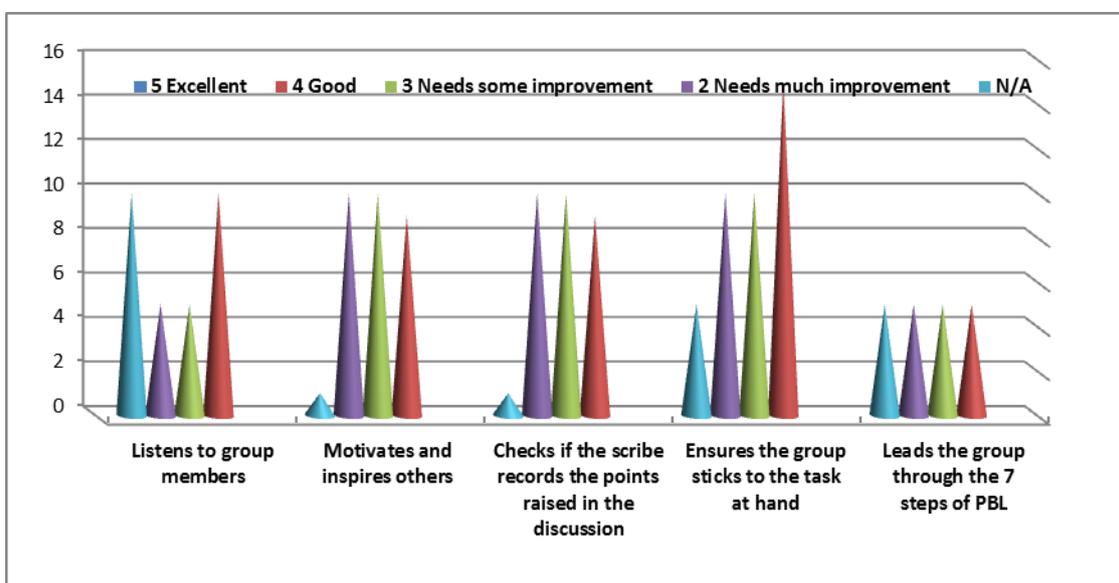


Fig. (4-B): Scribe Rubric of chairman assesment.

CONCLUSIONS

The PBL methodology is regarded as being appropriate to achieve these objectives. Moreover, PBL encourages group work and some additional skills such as problem-solving and self-directed leaning skills. The course has been structured around several assignments that students must resolve in groups. The teacher acts as an assessor instead of a transmitter, which makes the student-teacher relationship more fluid. The final assessment was more positive, both from the students’ and the teachers’ point of view. More than 90% of students not only would do it again, but will recommend it to other students. Finally, via PBL scenarios the enhancement of the learners’ interest to the subject is possible, learning issues about professionalism and patient safety can be preset, learning issues about professionalism and patient safety can be preset, Teaching and learning can be very funny and interesting.

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