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Comparative study of Problem Based Learning and Traditional Lecture Delivery- A case study

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Abstract: In order to contrast the pedagogies and results, the class of final year, divided into two strings—The PBL string and the Traditional string. PBL class could not support a large size; the number was limited to 25. Traditional String was quite traditional with the students sitting in the classroom in rows, facing the teacher. The demarcation of Lecture, Tutorial and Practical classes was quite clear. The teacher gave lecture in lecture classes, made the students practice closed ended problems in tutorial classes and made the students do experiments in the practical classes, in a typical laboratory set up. For the PBL string, there was no structured plan in terms of delivery of content. However the teacher termed Facilitator - prepared a complete set of Technical Nodes and Learning Objectives. The role of the teacher was changed from the "content-delivery-man" to a facilitator

Keywords: PBL- Problem based learning, Traditional String, Knowledge and Skill Scores, Table Descriptive, ANOVA (Analysis of variance), Standard deviation

I. Introduction: Problem-based learning (**PBL**) is a student-centered pedagogy in which students learn about a subject through the experience of solving an open-ended problem. It is a learning method based on the principle of using problems as a starting point for the acquisition and integration of new knowledge. Students learn both thinking strategies and domain knowledge. PBL is characterized by a student-centered approach, teachers as "facilitators rather than disseminators," and open-ended problems (in PBL, these are called "ill-structured") serve as the initial stimulus and framework for learning. While working in groups, students identify what they already know, what they need to know, and how and where to access new information that may lead to the resolution of the problem. The role of the instructor (known as the tutor in PBL) is to facilitate learning by supporting, guiding, and monitoring the learning process. PBL represents a paradigm shift from traditional teaching and learning philosophy, which is more often lecture-based.

Steps involved in a PBL process:

1. Clarify terms and concepts not readily comprehensible.
2. Define the problem.
3. Analyze the problem (brainstorming).
4. Resolve issues based on prior knowledge.
5. Formulate learning objectives
6. Information gathering, (self-study)
7. Synthesize and test the newly acquired information

The methodology adopted for implementing PBL technique will be as given below

1. The course coordinator (tutor) will have to give an open ended (ill-structured) problem to students and not the lectures or assignments or exercises.
2. The role of course coordinator will be only to facilitate learning by supporting, guiding and monitoring the learning process.
3. Small groups of 2-4 students will be working on the problem given or presented by course coordinator.
4. These groups will usually meet twice a week for around 1-2 hours.
5. At the first meeting, the groups of students will be given a new situation or problem (trigger).
6. The students will have to identify the main issues and raise questions in order to find out the solution to the problem.
7. Period of 2-3 days is given for individual study. The group reconvenes again.
8. A group discussion and sharing of knowledge will be done.
9. At the end of the course, assessment of individual student will be carried out jointly by course coordinator based on the work done by students.

Illustrative Example

PBL is implemented at RIT for the course Embedded System Design Using MSP430 (PE-II) (EC408) with its evaluation scheme. The methodology adopted for implementing PBL technique & Evaluation Scheme adopted is as given below:

ISE: Evaluated for 20 marks based on different evaluation parameters.

MSE: Written exam is conducted and evaluated for 30 marks

ESE: Regular written exam. is conducted. After completing the module, the students are expected to meet the following learning outcomes:

1. Understand the design methodologies, techniques and test strategies used in the embedded system design.
2. Develop transferable skills in the use of computer tools to capture, simulate, verify and implement (on MSP430 launch pad) digital circuits/systems of different levels of complexity.
3. Demonstrate skills in teamwork, time management, collection and presentation of information, decision