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A CASE STUDY ON LEARNING PHYSICS THROUGH PROBLEM BASED LEARNING APPROACH

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A CASE STUDY ON LEARNING PHYSICS THROUGH PROBLEM BASED LEARNING APPROACH

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It is apparent that there should be a right background for the students to learn a subject like physics with full of concepts and that it cannot be learnt in isolation without the right environment. In promoting conceptual understanding of the students, certain areas might be important than the others which might affect in making them aware of their pre-conceptions and also making them believe the newly learnt correct concepts and further in the application of the new concept to everyday situations where they were failed to do so with the earlier concepts.

There were several educational reforms to improve science education in Sri Lanka mainly trying to change the role of teachers as leaders and to change the role of students as passive learners along with the concept of learning to learn. In 1997 educational reforms for junior secondary and senior secondary were introduced to improve the student centered learning, transforming the teacher authoritative classroom into a place where more participation of the students is encouraged. However,still most teachers tend to use teacher centered method to explain concepts in science. If the teachers could guide the students to engage in appropriate learning activities and hands-on experiments it would greatly improve learning.

Hence this investigation was conducted to identify such problematic areas and to design an improved methodology to uplift the degree of understanding the concepts included in the subject physics, considering eight different schools in a non-industrialized city where most of the students are not highly motivated and not readily exposed to the subject matter, as the sources of data for the research.

Advanced Level students who study physics of eight government schools and the teachers, principals of those schools and also some of the directors involve in the subject in this particular area were provided with appropriate questionnaires . Besides, verbal comments of some unstructured interviews with the confronted population were also gathered. The evaluation of the information gained showed disparity of the levels of the exposure to the subject by the students between the schools.

For the second stage, to clarify the above idea and to see the effect of two different teaching methodology on students' performances a detailed study was carried out selecting two schools out of the original lot. To build up two groups of the students and to see the prior knowledge of the students, a pre-test was administered for all the students in four twelfth grade classes of physics in the two selected schools, school A and the school B. Further mean marks for the pre-test showed that the students in both schools were equal level and therefore the school A with two classes was selected for the study. According to the pre-test marks of the individuals, two equal groups were made and they were taught the selected topic, in two different teaching methods, Problem Based Learning (PBL) and the Teacher Centered Learning(TCL). The topic Newton's laws of motion in the section mechanics in the Advanced Level syllabus was chosen because there are new scientific concepts to be understood by the students.

TCL and PBL were practiced by two different teachers. TCL students were taught the concepts in the topic laws of motion in a more conventional way with non-sophisticated and inexpensive teaching aids while the PBL students used an active co-operative learning environment.

Assessments were accomplished during the period of the study both for PBL and TCL groups. The pre-test was repeated at the end of the period of study for the two groups. To obtain a more precise quantitative measurement a post test was also carried out to all the students in both PBL and the TCL groups.

The results revealed that this proposed methodology blended with specific ill-structured problems and with specific activities was more advantageous than the presently practiced conventional methodology because of more opportunities for the students to participate actively in the classroom. Further the proposed new methodology was also successful in uplifting the degree of understanding the scientific concepts than

the other method and this difference was attributed to the emphasis of the items in the two sample t-test (Table No.4.E.1).

This investigation has further shown that the students' performances through better understanding of the concepts can be uplifted by developing new methods attractive to the student. Hence it should be the teachers' responsibility to launch an appropriate methodology for the section to be taught by having a proper understanding of the students' prior knowledge, mental capacity, ability of grasping subject matter etc.

The introduction of PBL into the classroom situation resulted significant changes to the way in which the teaching and learning were viewed before, that the PBL environment promoted deep learning rather than surface learning which is highly seen in the conventional programmes. As students were required to engage in group work enormous time was allocated for them to discuss, clarify and elaborate the concepts they were supposed to learn by producing a group of students really confident in mastering the concepts to any situation at the end. Promoting conceptual understanding of the students especially in an unfavorable background and of a subject like physics is a big challenge! This challenge will enhance the interest in the process of teaching as well.