Professional Development for Technical Support Staff in PBL

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Abstract

The hypothesis of problem-based learning is that learning begins by dealing with problems which occur from professional training. Traditionally, education at Victoria University Engineering (VUE) has been structured according to the logic of separate courses. However, because professional training and individual learning practices do not pursue such dissection, this has led to an amplified gap between professional engineering training and education.

The conversion of the Engineering programs to the Problem-Based Learning (PBL) paradigm fundamentally enhances the relationship between the program and current University practices, by incorporating cross-departmental and cross-faculty co-operation within the fabric of the program design, as well as the program delivery which is heavily based on the assistance of technology. This technology is integrated into the PBL curriculum with the assistance of technical support staff. Their role and support is vital in achieving constructive alignment in problem based learning.

One of the questions which may arise from the above descriptions is: How can we involve and train technical support staff to assist in a problem-based curriculum to promote success?

This paper will focus on the above questioned issue. The paper will describe activities which focus on professional development which is aimed at training technical support staff to understand the problem based methodology and in addition prepare them for problem based learning integration. Some of the topics considered are: Occupational Health and Safety, students contact, problem design.

1.0 Introduction

Problem-based learning (PBL) is generally regarded as an innovative method for engineering education [1]. The success of this method is very much dependant on the learning principles which the method possesses. When compared to traditional lecture-based engineering curriculum, the PBL models appear to inspire a higher degree of involvement in study activity. This could be due to the fact that the project work is the initialisation of the learning process. Fig 1 illustrates how the PBL problem/projects exercises are the core of the program surrounded by resources for students to tap into [2].

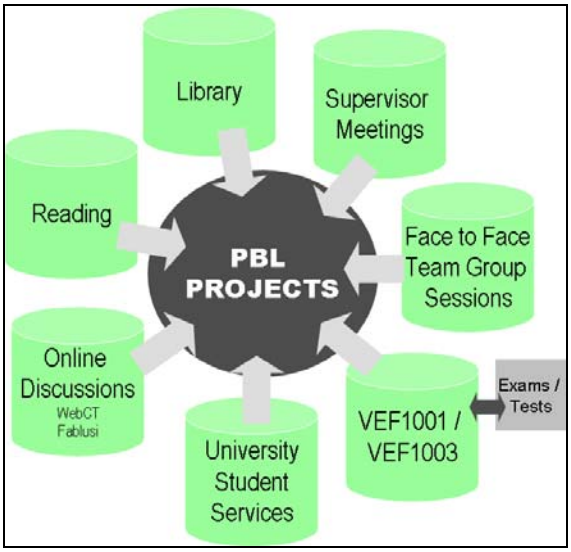

Fig 1. PBL Exercises Signifying the Core of the Curriculum

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One of the main reasons for the change to delivering engineering courses through PBL was due to the wide range of competencies gained by students, competencies specifically requested by Victoria University's industry partners. These competencies are:

- Technical knowledge
- Strong communication skills
- Project management skills
- Written skills
- Ability to work in teams

A successful curriculum in Problem Based Learning requires academic staff trained to move away from a teacher-centred to a student-centred learning methodology. In line with this, the technical support staff needed to distinguish themselves from being an end user resource to the students to be able to direct students to the appropriate sources of information to enable them to find information for themselves.

Further to this, the technical support staff need to be able to have input in the process of problem/project development as well as locate and obtain hardware/software and equipment for the projects selected to be used for each semester.

2.0 Learning Principles in PBL

2.1 PBL Learning Principles

Gijselaers 1996 [3], and also used by Graaff and Kolmos [1], define PBL in relation to theoretical learning principles, such as learning as a construction of knowledge, meta-learning and contextual learning. In recent years, researchers relate PBL models to an array of learning principles. Fig 2 illustrates the main learning principles in three categories: cognitive learning, collaborative learning, and contents.

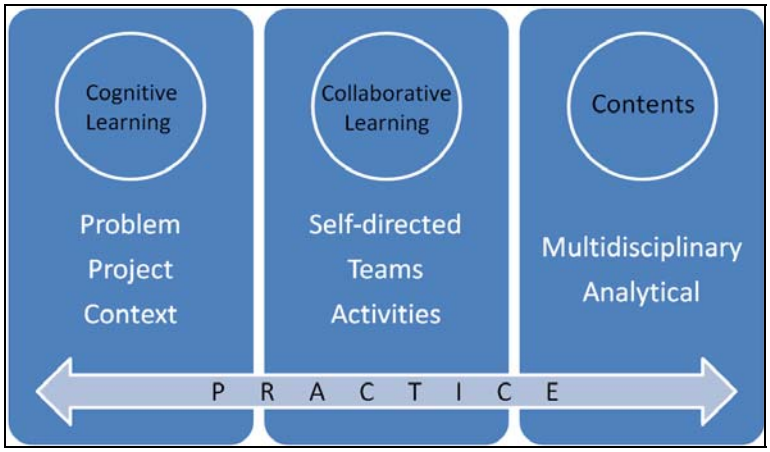

Fig 2. PBL Learning Principles

The cognitive learning category indicates that learning is scheduled around some types of problems however the learning is achieved through project work. This indicates that the problem is the initialisation of students' learning. This way, learning is placed in context. The idea with the learning being obtained through project work means that a unique task which involves complex problem analysis is required.

The collaborative learning category is all about learning taking place in teams and being self-directed. The idea here is that learning takes place through communication which will usually involve a team of students with similar objectives. An integral part of this process is that students learn from each other, and take ownership in what they do, especially in the formulation of the teams.

The contents category is about multidisciplinary learning and analytical thinking. This indicates that the work which students perform could be spread across traditional field related boundaries, as well as outside these boundaries. Analytical thinking is another critical learning principle in the fact that theory and practice come together. By observing Fig 2, it can be noticed that practice is across all of the learning principles of the Victoria University Engineering PBL Model. This is very important for VUE, as it not only indicates that practice is the integral part of the model, but is performed while achieving all of the above mentioned learning principles.

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3.0 Technical Involvement in PBL

Traditionally the technical support staff were laboratory based and there was no formal contact between students and the technical support staff. The defined role of the technical support staff was maintenance based role in which the technical staff maintained the laboratories and constructed equipment for laboratory experiments to ensure that all laboratory sessions ran smoothly and without incident. The involvement in student projects was never formalised and any involvement was ad-hoc either to supply students with components and equipment or as a point of call to fix problems. Since the introduction of the problem based learning mode of delivery of the engineering programs the technical support staff had a much more active role in the development, design and the delivery of projects to students.

As illustrated in Fig 3, technical support staff are called upon by both academic staff and students in multiple stages of the PBL project process [4].

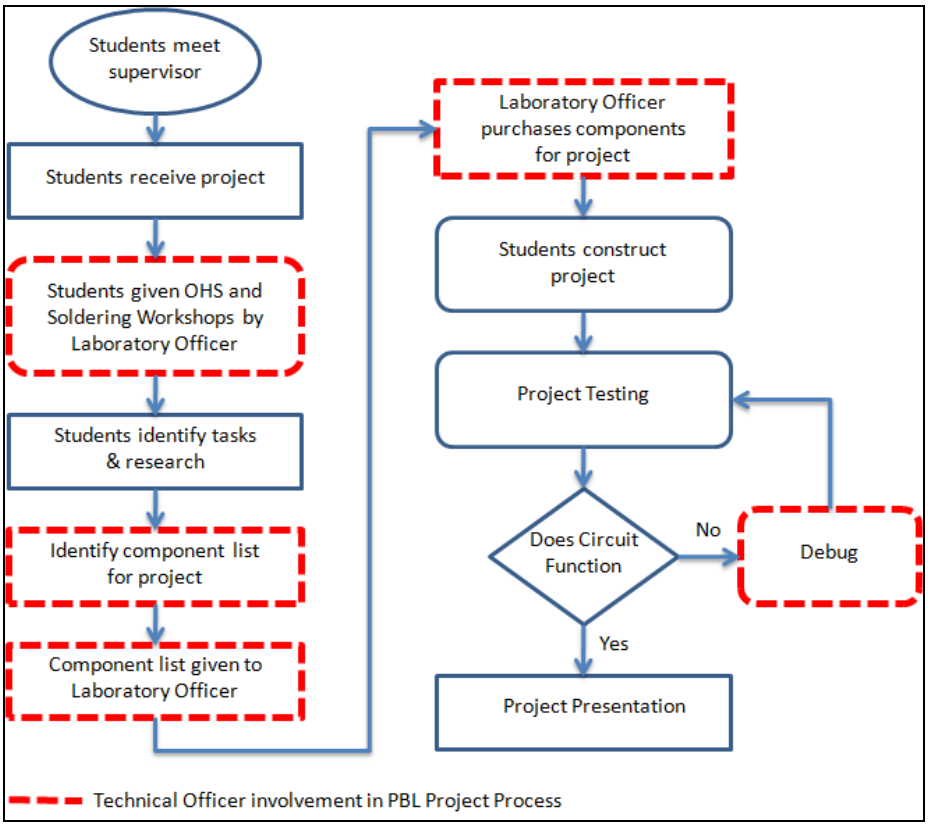

Fig 3. PBL Project Process

Once the students meet with their supervisors and receive their projects, Technical support staff run OHS and soldering workshops to ensure the students work safely and receive some basic technical training in soldering techniques. The students with their supervisor then identify the tasks needed to complete the project and produce a list of items/components they require. This list is then given to a technical officer to purchase. Once the students have their components and have built the circuits for the projects, they may then call upon the technical support staff for help with debugging problems with their circuits to ensure that the project functions to specification.

3.1 Project Development

The project development process is carried in almost the same format as the students projects themselves, as illustrated in Fig 4. A team of staff come together in a brainstorming sessions to come up with ideas for possible projects that meet the criteria's listed in the student learning outcomes for the unit of study. Each member of the development team then produces a project from those selected at the brainstorming session. The group then selects the best out of these projects to include in the semesters teaching.

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Technical involvement in this process is vital to producing successful projects as the technical know-how and the technical staff knowledge in key areas of the school and the universities operation as well as availability of suppliers and resources enable the project development team to come up with projects that integrate seamlessly into the schools support structure.

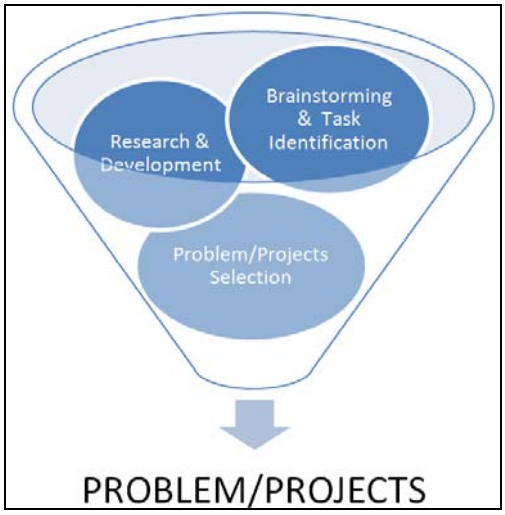

Fig 4. Problem/Projects Development Process

This involvement of technical support staff also allows the school to be prepared for equipment and component requests by students and enables the technical support staff to give clear direction to students in relation to their projects.

3.2 Occupational Health and Safety

As we head further into the 21st Century the integration of Occupational Health & Safety (OHS) into the Teaching and Learning framework has become a necessity. By having OHS permanently included into the curriculum, we as a Tertiary institute are recognizing the importance of a safe and healthy workplace for teacher and student alike. It is no longer acceptable to acknowledge that certain occupations involve risks. All forms of work involve risks of a certain degree and through increased knowledge we have the ability to not only identify the risks but to try and avoid the risks through OHS management and implementation.

OHS is one of the first issues presented to new students in Engineering with strong emphasis on safe laboratory practice. By providing the students with OHS, we are in affect giving them the opportunity to identify and where possible, avoid risk and injury. With the recent outcomes of some of the highest penalty rates ever seen for OHS infringements, we as a Tertiary Institute have a great opportunity to create Graduate's with the highest level of OHS awareness.

For the OHS system to be successful it is critical for the staff to be involved. Through Staff College and with the support of management, all Technical and Academic staff is given the opportunity to attend an accredited 5 day course, after which the staff member is awarded with a Certificate in Occupational Health & Safety. During this course the many aspects of OHS are covered, from Risk assessment and Incident Reporting to detailed analysis of the OHS Act and OHS Regulations, both revised and re-published in 2004 and 2007 [5].

During the 5 day course staff are expected to work through the OHS Act of 2004 [5]. This is achieved in a number of ways. By working alone and in groups the reasons to why some of these acts came in to effect in the first place are discussed, dating back to the 1880's and the rise of industry, and how many of these Acts have evolved over the years to apply to modern workplaces. This gives one the opportunity to see how OHS can be applied to every workplace, from manual handling to office ergonomics and beyond. On day 3 a mock inspection of a typical workplace is organised for a hand on approach to the application of the OHS Act and Regulations.

For a detailed breakdown of what to expect during the 5 day OHS training course see Table 1.

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As awareness of the importance of OHS in the workplace increases, we can expect the introduction of more relevant projects and assessments at Victoria University in the area of Problem Based Learning. Not only can we reduce the risk of accident and injury in the workplace but through innovative thinking can change workplace attitudes resulting in a smarter, healthier and safer workplace for all.

Table 1. OHS Training course breakdown

DAY	ACTIVITTIES
1	- Introduction to course - Background of OHS Act & Regulations - Other material - Group activity
2	- Specific Sections of OHS Act. - Group activity - Video of scenario - Analysis of actual cases
3	- Specific Sections of OHS Act cont. - Risk Assessments and Incident Reporting - Mock Inspection of workplace
4	- What OHS systems are at your workplace? - What possible improvements are required? - Other WorkSafe publications - Group activity
5	- Any remainder Sections - Specific question and answer session - Mock Committee Meeting - Certificate Presentation

4.0 Professional Development

Staff development continues to be a critical factor in all pedagogical developments. Although this is critical in today's institutional agenda, research has shown that it is a very difficult task to achieve, in the sense that it is very difficult to motivate and get senior staff to participate [6, 7]. The reason for this is because senior staff are rather more involved with their research activities which brings in funding opportunities. Research indicates that staff development is easier integrated into newly employed staff as the professional development training could be integrated into their formal requirements. The task becomes even more challenging when a curriculum change at an institution takes place, such as the change at Victoria University Engineering, where the method of teaching changed to PBL. This requires regular short term and long term staff development, not only for the academic staff members, but also for all those involved in the process, which includes technical support staff.

Technical staff development for PBL has been and to some extend still is a grey area. Some literature discusses academic staff development, however due to the nature of the PBL teaching and learning methodology, technical staff development is on equal par in terms of its importance in this process. This matter is taken very seriously at Victoria University Engineering. As part of the development in order to get staff in line and ready for PBL delivery, a period of staff development sessions take place to enable staff unfamiliar with PBL to not only have an understanding of the PBL principles but also to be able to produce PBL problem/projects to match the learning principles as well as being able to supervise teams of students in group discussions. Technical staff members are encouraged to participate in these workshops. As the initial introduction of the PBL mode of delivery was going to be rolled out one year at a time, only the technical staff directly involved with the first year teaching took advantage of these workshops.

As progressive years were rolled out more technical involvement was required, unfortunately without the benefit of the initial training. In order to address this situation the Technical Support Manager of The School of Electrical Engineering and the Director of the Office for Problem Based Learning started running PBL workshops specifically designed for the technical support staff.

The workshops included activities to introduce the technical support staff to:

- The learning principles of the PBL Model at VU Engineering
- Technical involvement with students

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- Project development
- Occupational Health and Safety

Along with a new initiative for the “Technical Support Hub”, to assist students with their PBL projects, the technical support staff will be able to interact with student and staff at a level that is not only beneficial to the students but a vital part of their learning process. The Technical Support Hub is described in section 4.1 of this paper.

4.1 Technical Support Hub

The Technical Support Hub was an initiative driven by the specific requirements of Problem-based learning as well as the rising demand from students to have more access to the technical support staff as well as being able to collect equipment and components for their projects. Initially the old school store was converted into the Technical Support Hub with a single technical officer in attendance to supply students with equipment as well as being available for student consultation. The limitations in this system have been identified and a proposed new Technical support hub has been designed to accommodate the deficiencies in the converted school store come Technical Support Hub.

Fig 5 shows the proposed Technical Support Hub layout with appropriate technology integrated into the Hub [8]. This new Hub will mean that all the technical support staff are located in one place and students visiting the Hub will have access not only to the equipment they require for their projects but also to all the Support staff with their individual areas of expertise.

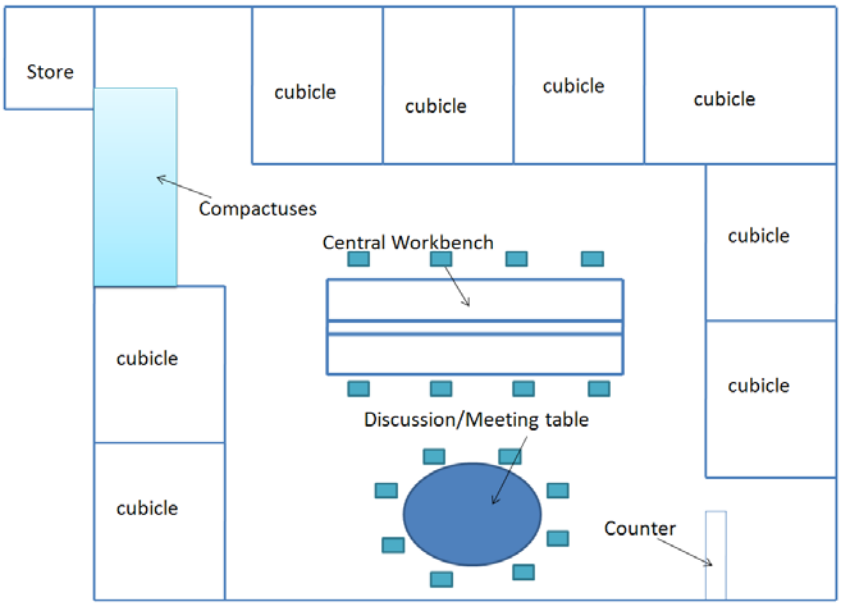

Fig 5. Proposed Technical Support Hub layout

5.0 Conclusion

Technical support requirements in Problem Based Learning are significantly different to technical support requirements in traditional lecture-based teaching and learning. The success of Problem Based Learning at Victoria University Engineering is very much dependent not only on the curriculum structure, but also the technical activities undertaken within. The technical support to problem-based learning requires an active approach as well as a more flexible timetable for laboratories. For this reason, professional staff development, for both academic and technical support staff is a necessity.

This paper described the laboratory involvement and requirements which have taken place at Victoria University Engineering, to support the Problem Based teaching and learning curriculum. Therefore, the paper described the activities undertaken by technical support staff in terms of professional development, which includes an understanding of the Victoria University Engineering PBL model and its learning principles, technical involvement with student, introduction to the problem/projects development process, and Occupational Health and Safety training.

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