FROM PRACTICE TO THEORY: RECONCEPTUALISING CURRICULUM DEVELOPMENT FOR PBL

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Recurring themes in PBL literature are the need for paradigm shifts in teaching and learning. These suggest the teacher becomes a facilitator and students become increasingly self-directed learners. However, there is an associated need for a paradigm shift in curriculum development. The authors argue that failure to achieve this paradigm shift perpetuates dissonance in the implementation of PBL

In PBL, curriculum development needs to occur through a paradigm that articulates and emphasises:

- *Selection of content from practice*
- *Concepts as the organising structure of the curriculum*
- *Process as content*
- *Graduate outcomes, not subject- based outcomes*

Using concrete examples from the development of nursing curricula, the paper will explore why current frameworks of curriculum development are inappropriate for PBL curriculum development and present a discussion of alternative models of PBL curricula. The strengths and limitations of each of the models will be discussed and the process of developing PBL curricula will be explicated.

INTRODUCTION

PBL acknowledges the experience base of the learners as valid (Boud, 1985). In this paper, we draw on our experience as consultants in PBL to identify issues related to curriculum design for PBL approaches.

In a recent study of Australian universities, McInnis (2000) found that 74% of academics claimed to be using PBL in their teaching and that "the bulk of mainstream academics are now seriously engaged in revising their approaches to teaching" (McInnis, 2000, p.150). While PBL is predominantly used in professional education courses, it can also be applied to courses that are perceived not to have such a strong emphasis on the direct application of knowledge, such as Science and the Humanities. In these areas, "real life situations" can be used to explore different worldviews held by the disciplines. Equally PBL in elementary and

secondary education can be used to reflect the knowledge, skills and behaviours of the informed citizen. Given the extent of the transition to PBL in Australia and other countries, it is imperative that there is sound understanding of the implementation of PBL by those who use it.

Problem-based learning has been described as both an instructional strategy and a curriculum design. However, the majority of literature on PBL relates to the use of PBL as an instructional strategy. The authors' experience as consultants in PBL indicates that while those who use PBL are concerned about issues in facilitation, there is limited appreciation of the importance of instructional and curriculum design as the underpinnings of effective facilitation (Ryan, 1997). Typically, staff in PBL programs express concerns about their own facilitation style, management of groups of students and consistency in facilitation approach across PBL facilitators (Creedy, 1993; Wilkie, 2000).

We believe that effective design of learning material is, of itself, the most significant aspect of facilitation of learning. Further, the design of learning material occurs at both micro and macro levels of the curriculum.

SELECTION OF CONTENT FROM PRACTICE: INTERPLAY BETWEEN MICRO AND MACRO LEVEL IMPLEMENTATION OF PBL

At a micro, or instructional level, PBL consists of the PBL package as the central, driving unit for the student's learning. These packages draw on real life situations to generate learning outcomes that are reflective of the professional knowledge, skills and behaviours that demonstrate "thinking and acting like…(a nurse, a doctor, a manager, an historian, a physicist etc)". Well-designed learning packages should provide cues for students to identify learning issues related to both their professional role and lifelong learning, and identify the conceptual understandings required by the practitioner. These understandings are often best represented by concept maps (Bourgeois, 1993; Klausmeier, Ghatala & Frayer, 1974; Stepien, 1994). This mapping and eliciting concepts is a key element in the development of learning packages.

The learning package consists of material for both the students and facilitators. The student material may include a list of concepts for consideration and exploration, learning objectives that indicate application of the concepts, the stimulus material (i.e. scenario and related information), instructions for approaching learning and suggested resources to support learning. The facilitator should be provided with instructions on how to use the package, anticipated responses to student instructions, a list of the main concepts for discussion, suggested responses to the situation, a list of suggested resources (including structured learning events) and the learning outcomes (Little, 1998). The PBL package therefore guides the total, structured learning experience for students.

At a macro, or curriculum level, professional practice situations again drive the development of the curriculum. However, while practice provides numerous examples of situations to drive learning, selection of situations for inclusion in the curriculum is based on predetermined criteria that emerge from the conceptual framework of the discipline and the context in which graduates will practise. For example, in nursing curricula, criteria such as life threatening, typical, preventable and "across-the-age continuum" may drive the selection of situations for inclusion.

The curriculum development process requires an analysis of a range of practice situations in which graduates will be expected to perform. In nursing curricula, this may be in acute care, mental health, community contexts, as well as educational, research and professional development contexts. However, curriculum content should focus on what nurses do rather than where they work. Thus mapping the curriculum involves clustering situations based on relationships identified in concept maps and sequencing learning of concepts that relate to both thinking and action, based on logic consistent with practice. The sequencing that results from this approach is often inconsistent with the sequence of content presented in discipline-specific subjects related to the practice of nursing (e.g. science, law and philosophy). Therefore, those who adopt a PBL approach to curriculum design should be prepared to defend the selection, sequencing and integration of situations in the curriculum. The conceptual framework that emerges from analysis of professional practice provides the mechanism to do this. In nursing, Andersen's (1991) roles and functions model provides a conceptual framework that supports students' learning to think and act like a nurse in a range of professional practice situations.

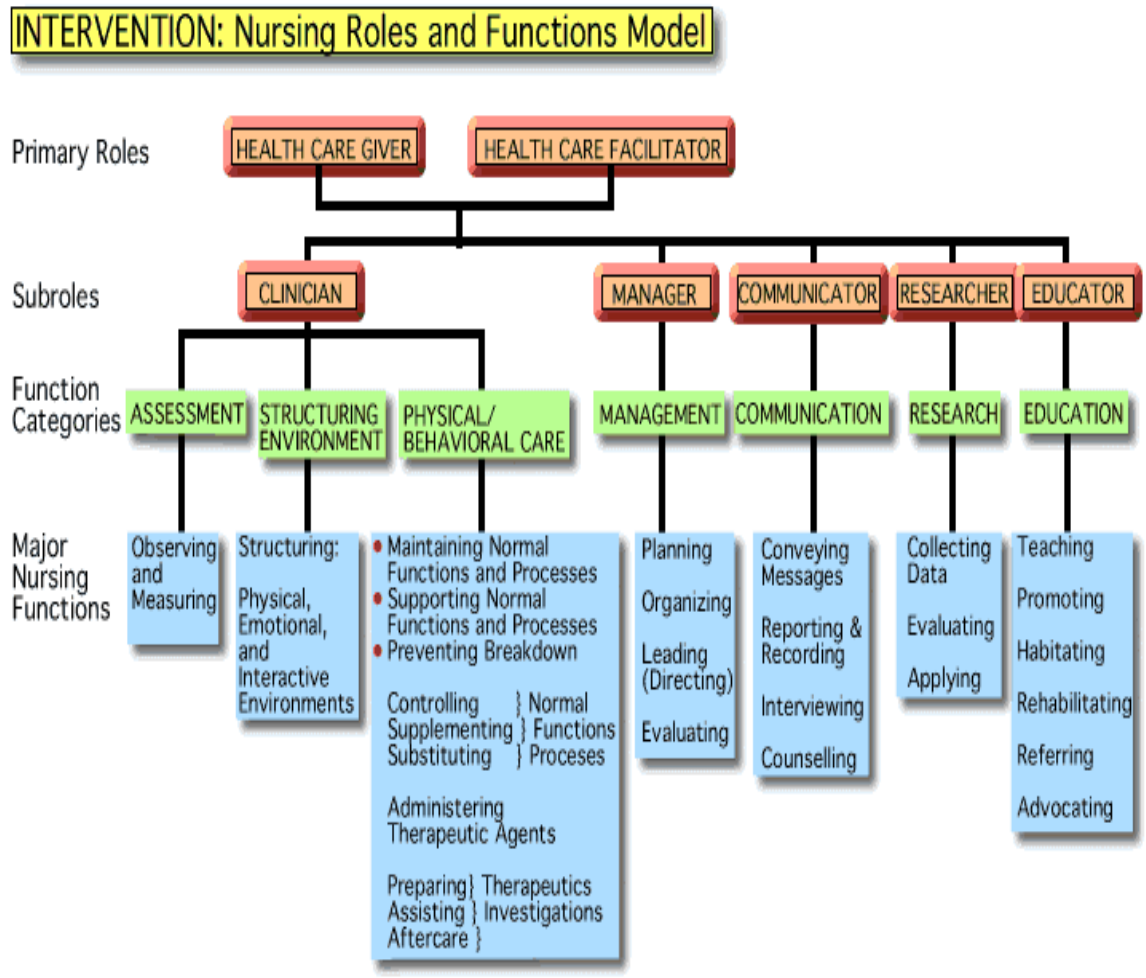
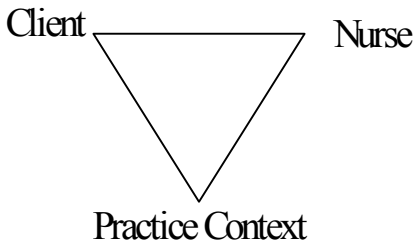


Figure 1. Andersen's nursing roles and functions model

Analysis of practice situations provides the framework for the profile of the graduate and should raise questions about the relevance of espoused theories of professional practice to contemporary and future practice. Thus, examination of practice through curriculum development processes results in testing the congruence of existing conceptual frameworks of any discipline in the reality of contemporary practice. Both micro and macro implementation of PBL requires that practice-based situations drive the student's learning; however, macro level curriculum development should focus on the outcomes of the entire course, not only a specific unit of learning.

Ideally, there is congruence between PBL as the selected educational approach and the conceptual framework of the profession or discipline. Figure 2 provides an example of this, using PBL as the educational approach and a conceptual framework of nursing, that views clients as holistic members of a community who strive for independence and health. The nurses' role is to facilitate optimal health and well being.

A Conceptual framework for Nursing



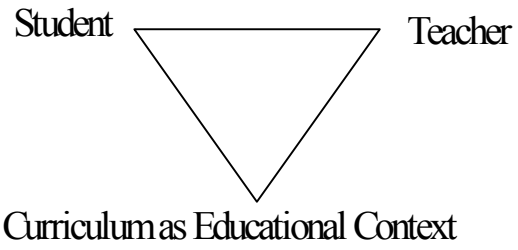
Core Concepts

Client
- Equality
- Community
- Desires self-care
- Multi-dimensional being

Nurse
- Integrates moral - ethical and professional values
- Safe and Effective practice
- Informed through evidence-based practice
- Lifelong learner

Context
- Social change
- Economic
- Environmental

A Conceptual framework for PBL



Core Concepts

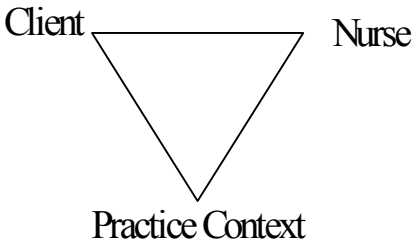
Student
- Equity and access to education
- Community of learners
- Multi-dimensional learner
- Capable of self-directed learning

Teacher
- Integrates moral, ethical and professional values
- Inquiry based learner
- Self-directed learner
- Informed through research
- Lifelong learner

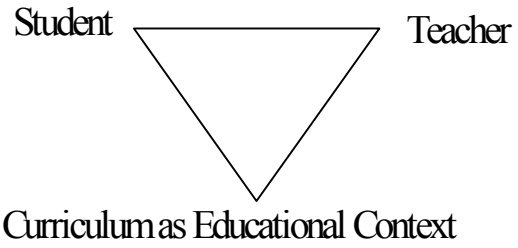
Context of learning
- Integration of broad knowledge domains
- Integration of theory and practice
- Integration of process as content and outcomes

Figure 2: Relationship between practice concepts and educational model: An example (Little & Conway, 2000)

A Conceptual framework for Nursing



A Conceptual framework for PBL



Context
- Cultural
- Health/Illness

Client/Nurse Interaction
- Partnership
- Focus on self-care

Client/Context Interaction
- Client situation as a unique response requiring clinical decision-making

Nurse/Context Interaction
- Inter-disciplinary collaboration
- Change agent

Student/teacher interaction
- Focus on facilitation
- Recognises other learners as facilitators of learning
- Focus on self-direction

Student/curriculum interaction
- Situation-context based learning
- Focus on decision-making

Teacher/curriculum interaction
- Team work/inter-disciplinary collaboration
- Critical thinking

Figure 2: Relationship between practice concepts and educational model: An example (Little & Conway, 2000)

Where there is dissonance between the model of education and the belief systems inherent in the discipline, we believe a PBL approach generates conflict for staff and students. For example, if there are fixed discipline beliefs about the nature and purpose of knowledge in a discipline, then an instructional approach that values the learner's experiences and reflective practice may be at odds with the nature of the discipline. Further, we suggest that unless the congruence between the educational model and the professional practice model is made explicit, staff and students are not able to test the assumptions that underpin the models.

ISSUES IN USING CONCEPTS AS THE ORGANISING STRUCTURE OF THE CURRICULUM

Based on our preliminary research, it appears that staff who use PBL often have difficulty in conceptualising their own practice area and are challenged by curriculum development strategies that cause them to articulate and then operationalise concepts within a practice-based framework.

In an exploratory study of five clinical nurse educators' role in the clinical setting, Conway (1997) identified that nurse educators appear to teach, and assess students' learning, on the

basis of modified medical rather than nursing knowledge. This was predominantly about recall of content rather than conceptual understandings and application of principles. It seems that this difficulty in identifying concepts that underpin content is not unique to clinical nurse educators.

In 1999, the authors conducted interviews with 11 staff members in a range of disciplines (nursing, business, pharmacy, computing science and medicine) about their experiences in developing PBL learning packages.

All those interviewed reported that the most difficult aspect of developing the package was writing learning objectives that identified concepts to be applied throughout the package, rather than a list of content for students to learn. One participant suggested this was "because everything is about the content. Even though we say we are preparing lifelong learners, we seem to want to keep packing more and more into the teaching. As more information keeps coming in, we keep wanting to be the experts but I think we are experts in telling them what to know, not how to think. There is a big difference you know... We encourage surface learning. If I think we know that, but we do not seem to stop and draw the links for ourselves. I do not know the latest bit of information in my subject, then I still feel as if I am not a good teacher, even though I teach in PBL". Perhaps the apparent difficulty staff have in identifying concepts contributes to Ostwald and Chen's (1994) observation that PBL has the potential to marginalize theoretical issues in students' learning, as concepts are not extrapolated from content.

For example, if one of the major concepts in a curriculum that focuses on pathophysiology is obstruction, then students could learn about airway obstruction and be assessed on their management of gastro-intestinal obstruction. In this case, the learning objective should be related to their ability to transfer concepts and apply principles in unfamiliar situations, rather than how much they "know about" management of gastro-intestinal obstruction. The concept of obstruction can be extrapolated from a package about management of airway disease, and assessed through re-application of the concept to another situation.

For staff who are "content" specialists, this can be particularly challenging (Cowdroy, 1993). The development of a PBL curriculum inevitably raises questions such as: "How much content do students need to know?" "Which content should be selected for inclusion in the curriculum?" and "What happens to the staff who are content experts and whose content expertise is no longer required in as much detail?"

The analysis of practice that occurs in PBL curriculum development encourages professions to define the scope of their practice area. Therefore, it raises challenges for staff from other disciplines who fulfil a service-teaching role (e.g. biochemists who teach nursing programs, lawyers who teach business programs). Thus, curriculum design in PBL requires staff to demonstrate a capacity to work towards desired goals in a way that is sensitive to the political and interpersonal context of their own workplace.

Once the concepts of the discipline are articulated, the PBL curriculum should provide an opportunity for students to revisit and develop their understanding of core concepts throughout the curriculum. Figure 3 highlights the differences in designing curricula around discrete, content-based subjects and using problems to drive the development of conceptual understanding and application.

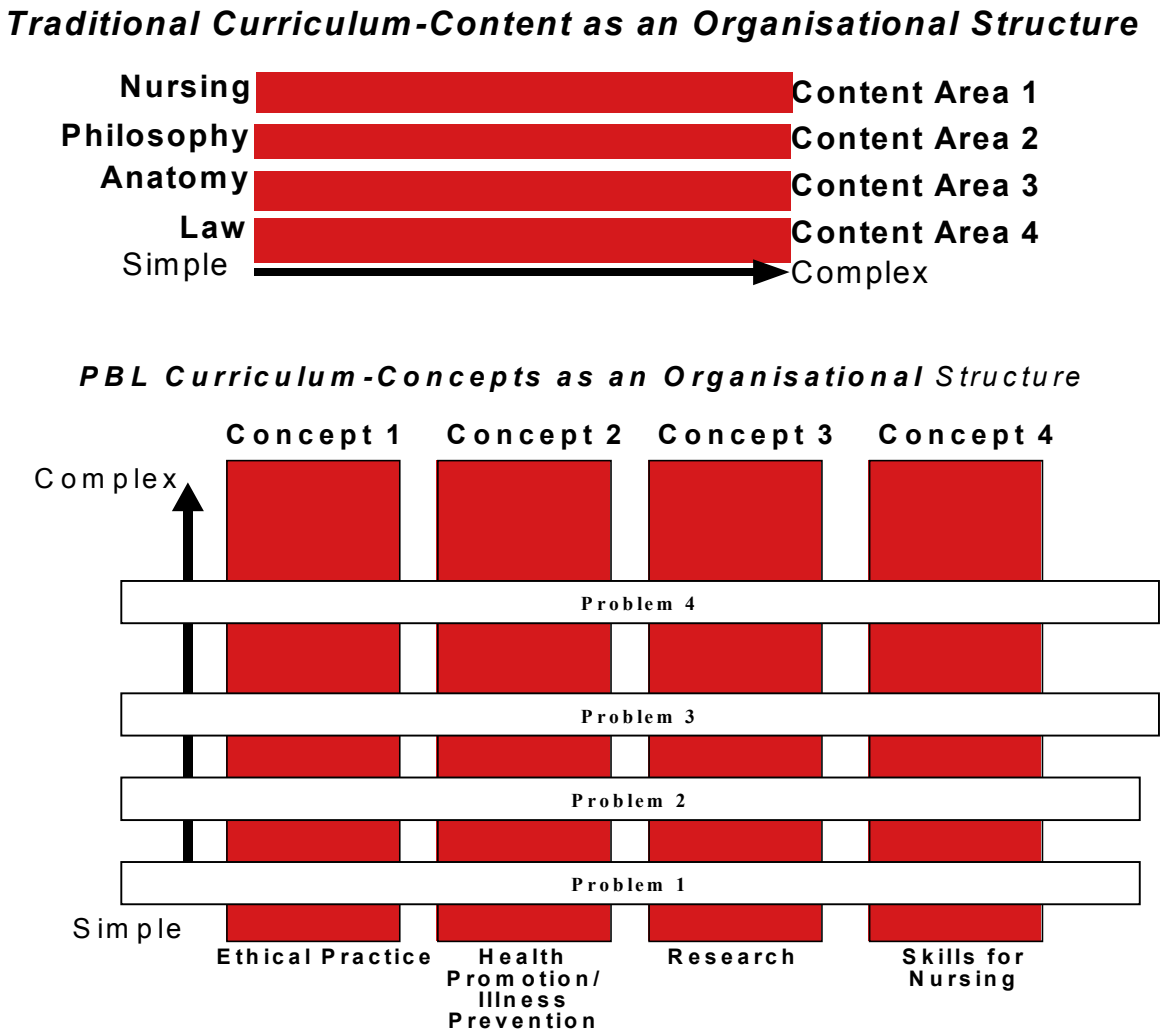


Figure3. Model of different organisational structures of traditional and PBL curricula (Conway & Little, 1999)

More traditional curricula may identify the concepts of practice but usually segregate these into specific subjects rather than revisiting the concepts throughout the entire curricula. This separation of concepts into discrete subjects results in compartmentalising of the concept and reduced ability of the student to apply the concept to real life problems (Barrows, 1985). Furthermore, it often results in the student not developing their understanding and application of the concept to the depth that is required for sound professional practice (Barrows & Tamblyn, 1980; Biggs, 1999).

PROCESS AS CONTENT

One of the central tenets of PBL as an educational approach is that it should assess the processes as well as the products of learning. In PBL curricula, " 'knowing how' and 'knowing that' forms of knowledge are equally emphasised" (Glen, 1995, p.90). Thus the process skills, such as critical thinking, situation analysis, enquiry skills, problem solving skills, teamwork skills, participation skills and reflective practice skills, add an additional dimension to the development of PBL curricula (Little, 1996).

According to Norris (1990, p.103) "an educational project or programme is defined as a statement of intended outcomes together with the methods and techniques for their achievement, and judgements about worth are based on measures of goal attainment." Thus the PBL curriculum needs to identify outcomes of learning (through the profile of the graduate that reflects the objectives of PBL), select appropriate methods and techniques to attain these (through PBL as an instructional method) and devise assessment that is both reliable and valid for the processes and content that is articulated in the objectives. For many staff, the challenge is in identifying the teaching techniques that promote process skills; designing assessment that measures these skills; and, providing evidence of valuing these in the curriculum by conducting assessment of process skills and weighting these to reflect valuing of process. If teachers continue to claim that process skills are of value and then design assessment that represents at best a tokenistic inclusion of process assessment, they are indicating to students that their espoused theory of learning and the reality of their teaching practice do not match. Students very quickly become aware of the game and prioritise their learning activity to match the assessment tasks (Biggs, 1999).

GRADUATE OUTCOMES, NOT SUBJECT-BASED OUTCOMES

Any statement about the profile of the graduate from a PBL program should clearly identify the relationship between the profile of the graduate and the objectives of a PBL course. According to Engel (1991) these are that students should be able to:

- Develop high professional competency
- Deal with problems; reason critically and creatively
- Make reasoned decisions in unfamiliar situations
- Adapt to and participate in change
- Appreciate another person's point of view
- Make self-evaluations
- Identify own strengths and weaknesses and undertake appropriate remediation, and
- Work productively as a team member

Clearly, if these are the objectives of a PBL course, implementation of PBL must promote the acquisition of these through ensuring that the teaching /learning process focuses on the characteristics of PBL which are:

- Draws from practice context and uses "real life" situations
- Focus is on thinking skills (such as problem solving, critical thinking, decision making)
- Requires an integration of knowledge, skills, attitudes and behaviours

- Promotes self-direction and lifelong learning
- Learning is shared in small groups (Little, 1996)

STRENGTHS AND LIMITATIONS OF VARIOUS MODELS OF PBL CURRICULA

There are numerous possibilities in the models selected to implement PBL curricula. Choices about these must be made on the basis of the context in which the PBL approach is to be implemented. The implementation of PBL should be made with the reality of the current context in mind. From our consultancy activity with client groups nationally and internationally in a range of disciplines, it appears that fewer professional practice courses have small numbers of students in groups, are well resourced or pre-select their students for PBL. Therefore, models of PBL have to fit existing contexts as the context cannot readily be changed to meet a preferred educational approach. Regardless of the context in which PBL is to be implemented, staff face the choice of a fully integrated or non-integrated, hybrid model of PBL.

In an integrated model of PBL, students experience one problem at a time and this problem drives all learning. Advantages of this are:

- It provides a focus for learning
- It limits the number of problems students have to encounter in a limited time frame
- It provides clear integration of concepts within the conceptual framework of the profession and therefore seems to enhance students' awareness of the interrelationships within their profession

(Conway, Jefferies & Chen, 2000)

Limitations of the fully integrated approach identified by Barrows and Tamblyn (1980) are:

- It can place increased demands on resources related to the problem being examined if there are large numbers of students
- Staff are often concerned about their personal knowledge base in exploration of an integrated problem

Additionally, staff with whom we have worked have identified that;

- The sequencing of integrated problems impacts significantly on faculties which provide service teaching into professions
- Administrative issues such as providing transcripts and managing systems that require differentiation of subjects are difficult
- Allowing flexibility in student enrolment and progression is challenging.

Development of integrated curricula in universities provides the greatest challenge in the implementation of PBL because it challenges the organisational and political structures of those institutions.

Hybrid models of PBL, where there is partial integration of some subjects and a traditional subject structure, appeal to those who seek to overcome the limitations of a fully integrated PBL curriculum. However, there is potential that these hybrid models result in problematising of the existing subject content, rather than requiring the student to integrate concepts from

many subjects to respond to a problem. Thus, this is not PBL. Rather, it is the application of subject content to a specific problem and the desired outcome is demonstration of application of subject knowledge to a given problem. When this occurs, students compartmentalise and disintegrate their professional practice knowledge (Conway, Jefferies & Chen, 2000). Clearly, this is not consistent with the characteristics of PBL and staff who design PBL curricula should guard against this occurring.

CONCLUSION

Although authors such as Ryan (1997), Creedy (1993) and Wilkie (2000) identify that staff of PBL programs are frequently concerned about their facilitation skills, we believe that facilitation skills are a pre-requisite of effective teaching irrespective of the educational approach. For many staff, the transition to a PBL curriculum provides a stimulus to reflect on how well they have facilitated learning in previous curriculum models. What is unique in a PBL approach to teaching and learning is the way in which the student's experiences are structured through the design of instructional packages to elicit process outcomes as explicit curriculum content. Well-designed instructional material facilitates facilitation of learning and produces an emancipated learner who can test the assumptions underpinning the learning experience.

The decision to implement a PBL curriculum raises many challenges for staff beyond facilitation skills. As the PBL curriculum is derived from practice, it causes staff to articulate their professional /discipline values and their educational practice values. Through the application of these to the "real life" situations captured in learning packages, staff themselves are caused to repeatedly test their espoused theories of education and their profession/discipline. They are in fact required to demonstrate the process skills that underpin the PBL curriculum. This testing of assumptions, defining concepts of the profession/discipline and education and applying them in the context of their own "real life" teaching situations are the ongoing challenges in implementing PBL.

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